

**SUPPLEMENTAL ENVIRONMENTAL ASSESSMENT  
FOR AMENDMENT OF HYDROPOWER LICENSE**

Gross Reservoir Hydroelectric Project—FERC Project No. 2035-099

Colorado

Federal Energy Regulatory Commission  
Office of Energy Projects  
Division of Hydropower Administration and Compliance  
888 First Street, NE  
Washington, D.C. 20426

**February 2018**

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## ACRONYMS AND ABBREVIATIONS

APE	area of potential effects
BA	Biological Assessment
BLM	U.S. Bureau of Land Management
BMPs	best management practices
BO	Biological Opinion
C	Celsius
CFR	Code of Federal Regulations
cfs	cubic feet per second
Colorado DPHE	Colorado Department of Public Health and Environment
Colorado DOT	Colorado Department of Transportation
Colorado NHP	Colorado National Heritage Program
Commission	Federal Energy Regulatory Commission
Corps	U.S. Army Corps of Engineers
CR	County Road
CWA	Clean Water Act
Denver Water	City and County of Denver, Colorado
DO	dissolved oxygen
EIS	environmental impact statement
ESA	Endangered Species Act
FERC	Federal Energy Regulatory Commission
Forest Service	U.S. Department of Agriculture, Forest Service
FPA	Federal Power Act
FWS	U.S. Department of the Interior, Fish and Wildlife Service
GWh	gigawatt-hour
HAER	Historic American Engineering Record
HPMP	Historic Properties Management Plan
Interior	U.S. Department of the Interior
kW	kilowatt
MMI	multimetric index
msl	above mean sea level
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act of 1966
PA	Programmatic Agreement
RMP	Recreation Management Plan
SH	State Highway
Supplemental EA	Supplemental Environmental Assessment
SHPO	State Historic Preservation Officer
WQC	water quality certification

## EXECUTIVE SUMMARY

In this supplemental environmental assessment (Supplemental EA), Federal Energy Regulatory Commission (Commission or FERC) staff reviews the environmental effects of the City and County of Denver, Colorado's (Denver Water) November 25, 2016 application to amend the license for its Gross Reservoir Hydroelectric Project No. 2035 to raise the elevation of the project's Gross Dam and increase storage in the project's Gross Reservoir.

Gross Reservoir is a component of Denver Water's Moffat Collection System, which is a large, complex water collection and storage system which moves water from the west side of the Continental Divide to the east side, providing municipal water supply for Denver and the surrounding area. Denver Water proposes enlarging Gross Reservoir and amending the project license because the enlargement would be necessary in order to store the water in the enlarged system.

On April 25, 2014, the U.S. Army Corps of Engineers (Corps) completed a final environmental impact statement (Final EIS) on all aspects of the proposed expansion of the Moffat Collection System. The Commission acted as a cooperating agency in preparation of the Final EIS. The Corps issued its Record of Decision on July 6, 2017. The Final EIS includes analysis of some of the effects to the Gross Reservoir Project. However, at the time the Final EIS was produced, not all aspects of the plans for enlarging Gross Reservoir had been completed, and not all aspects of the proposed license amendment had been finalized. This Supplemental EA examines the effects of the proposed action before the Commission not addressed in the Final EIS.

Specifically, this Supplemental EA analyzes the effects of: (1) revisions in certain details of dam raise construction activities, such as relocation of the on-site quarry; (2) potential replacement of the proposed auxiliary spillway with a saddle dam; (3) certain aspects of tree clearing and inundation to a new maximum reservoir elevation of 7,406 feet mean sea level not addressed in the Final EIS; (4) effects of changes in project operation such as revisions to the ramping rates required under the license; (5) modifications to project recreation facilities required under the license; (6) modification to the project boundary; (7) effects of environmental mitigation plans and other mitigation measures Denver Water proposes; and (8) effects of Denver Water's compliance with statutory requirements.

The U.S. Department of Agriculture-Forest Service (Forest Service) provided a total of 30 preliminary 4(e) conditions that Denver Water would need to comply with to help mitigate and protect resources on National Forest System lands that would be affected by an amendment of license, and by continuing operation of the Gross Reservoir Project. The Colorado Department of Public Health and Environment (Colorado DPHE) issued a water quality certification for the proposed expansion of the Moffat Collection

System, several conditions would apply to Denver Water's proposed amendment of the Gross Reservoir Project license. In performing our analysis, we include the benefits of the environmental mitigation plans Denver Water identifies, and its compliance with the Forest Service conditions and the applicable conditions of the water quality certificate.

The Commission issued a public notice of Denver Water's amendment application on February 1, 2017. Many of the comments filed in response to the notice focused on aspects of the overall expansion of the Moffat Collection System, which was covered in the Final EIS and are outside the scope of this Supplemental EA. Comments expressing concerns within the scope focused on tree cutting and wildlife habitat loss associated with expansion of Gross Reservoir, and traffic, public safety, and noise associated with construction. We summarize and address within-scope comments as part of this Supplemental EA.

Approval of Denver Water's amendment application would result in no more than minor negative effects to environmental resources in the Gross Reservoir Project area. An approval would not likely affect any federally-listed threatened or endangered species that may be present in the Gross Reservoir Project area. Compliance with measures described in this Supplemental EA would help ensure that any effects to cultural and historic resources in the project would be minimized.

Staff recommends approving Denver Water's amendment application. Staff recommends requiring, as part of any approval, that Denver Water finalize, in consultation with applicable resource agencies, many of the mitigation plans identified in the application, and that the plans then be filed for Commission approval prior to any ground-disturbing or construction work. Denver Water's compliance with the approved plans, and its compliance with the conditions provided by the Forest Service and Colorado DPHE, would help to reduce any environmental effects specific to a Commission approval, and would help to reduce the effects identified in the Final EIS.

Based on staff's independent analysis in this Supplemental EA, a Commission approval of Denver Water's proposal, as mitigated by the environmental measures discussed in this Supplemental EA, would not constitute a major federal action significantly affecting the quality of the human environment.

# **SUPPLEMENTAL ENVIRONMENTAL ASSESSMENT**

Federal Energy Regulatory Commission  
Office of Energy Projects  
Division of Hydropower Administration and Compliance  
Washington, D.C.

Project Name: Gross Reservoir Hydroelectric Project

FERC No: 2035

## **1.0 INTRODUCTION**

1. Application type: Amendment Application to Raise Gross Dam and Enlarge Gross Reservoir
2. Date Filed: November 25, 2016, as supplemented March 24, 2017
3. Applicant: City and County of Denver, Colorado (Denver Water)
4. Water body: South Boulder Creek
5. County and State: Boulder County, Colorado
6. Federal Lands: The Gross Reservoir Hydroelectric Project occupies federal lands within Roosevelt National Forest, administered by the U.S. Department of Agriculture, Forest Service (Forest Service), and lands administered by the U.S. Bureau of Land Management (BLM)

## **1.1 BACKGROUND**

The existing Gross Reservoir Hydroelectric Project (project) is located on South Boulder Creek in Boulder County, Colorado. It occupies federal lands within Roosevelt National Forest, administered by the Forest Service, and lands administered by BLM (Figure 1). South Boulder Creek is a tributary of Boulder Creek, within the St. Vrain River Basin; the St. Vrain then flows into the South Platte River.

Denver Water supplies water to the City of Denver and nearby areas on the Front Range (eastern slope) of the Rocky Mountains through operation of two water collection systems: the South System, located to the west and southwest of Denver; and the North System, also known as the Moffat Collection System, located north and west of Denver. The Gross Reservoir Project's Gross Reservoir is a component of the Moffat Collection System, and is used to store water from South Boulder Creek and from diversions on tributaries of the Upper Colorado River on the west slope of the Rockies. Water from the

west slope diversions is conveyed through Moffat Tunnel to South Boulder Creek above Gross Reservoir. Gross Reservoir then stores water from those diversions, native flows entering South Boulder Creek, and flows from the reservoir's smaller tributaries, Winiger Gulch and Forsythe Canyon. Water is released from Gross Reservoir into South Boulder Creek below the dam, and water supply flows are then diverted to the South Boulder Diversion Canal for delivery to Ralston Reservoir, raw water customers, and the Moffat Water Treatment Plant. The Gross Reservoir Project generates electricity only when water is released from Gross Reservoir for the purpose of meeting municipal water supply needs.

As licensed by the Commission,<sup>1</sup> the Gross Reservoir Project consists of: (1) a 340-foot-high, concrete gravity arch dam with a crest length of 1,050 feet, including a 160-foot-long ogee-crested spillway section at elevation of 7,280 feet mean sea level (msl), without the 2-foot-high flashboards; (2) a 418-acre reservoir with a storage capacity of 41,811 acre-feet at full pool and with flashboards in place; (3) low-level outlet works consisting of a 25-foot by 25-foot concrete box intake structure with trash rack, an 8-foot-diameter concrete-lined tunnel transitioning in a valve vault to a 6-foot-diameter steel pipe conduit that branches into five smaller pipes before entering an existing 56-foot by 37-foot concrete outlet works and valve house; (4) a powerhouse located 440 feet downstream of the valve house containing two 3,799-kilowatt (kW) horizontal Francis turbines connected to two 4,050-kW synchronous generators for a total installed capacity of 7,598 kW; (5) a 580-foot-long, 60-inch-diameter buried penstock; (6) a concrete tailrace structure, integral with the powerhouse outlet works building; (7) a switchyard containing project transformers; (8) a 1-mile-long, 25-kilovolt project transmission line; and (9) appurtenant facilities.<sup>2</sup>

As part of a planned expansion of its Moffat Collection System, Denver Water plans to increase diversion flows through Moffat Tunnel into South Boulder Creek, which would then be stored in Gross Reservoir. Gross Reservoir would need to be enlarged to store the additional water. This would require an amendment of the Gross Reservoir Project license by the Commission, approving an increase in the height of Gross Dam, enlargement of Gross Reservoir, changes to the licensed project boundary, and amendment of a number of the existing license conditions.

Specifically, Denver Water proposes to increase the height of Gross Dam by 131 feet, from 340 to 471 feet high. The normal maximum elevation of Gross Reservoir would be raised by 124 feet, from 7,282 to 7,406 feet msl. This would increase the

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<sup>1</sup> The project description is from the license issued on March 16, 2001 (94 FERC ¶ 61,313) as amended on October 1, 2004 (109 FERC ¶ 62,002).

<sup>2</sup> Each turbine has a maximum hydraulic capacity of 157.5 cubic feet per second (cfs), for a total project hydraulic capacity of 315 cfs.



normal maximum surface area of the reservoir from 418 to 842 acres, and increase its maximum storage volume from 41,811 to 118,811 acre-feet. Denver Water would install a pressure reduction valve to maintain the project's existing authorized installed capacity, but the proposal would increase the project's annual generation by approximately 4.4 gigawatt-hours (GWh). Under its proposal, Denver Water would add 12 acres of privately owned land, 3 acres of Forest Service land, and 40 acres of its own land to the project boundary, and remove 321 acres of Forest Service land and 68 acres of its own land. Denver Water also proposes changes to certain license articles. In addition, Denver Water seeks a 10-year extension to the 40-year term of the project license.

On April 25, 2014, the U.S. Army Corps of Engineers (Corps) completed, pursuant to the National Environmental Policy Act (NEPA), a Final Environmental Impact Statement (Final EIS) on Denver Water's proposed expansion of the Moffat Collection System. The Corps prepared the Final EIS to support its review of authorizations needed by Denver Water for the proposed enlargement of the Moffat Collection System. The Corps issued its Record of Decision on July 6, 2017. Because enlargement of Gross Reservoir was an element in the series of alternatives considered in the Final EIS, and the reservoir is a component of the Commission-licensed Gross Reservoir Project, the Commission acted as a cooperating agency in the Corps' NEPA process. The NEPA process evaluated many aspects of the proposed Gross Reservoir enlargement, including the effects of raising the maximum water level. However, at the time the Final EIS was produced, not all aspects of the plans for enlarging Gross Reservoir had been completed, and not all aspects of the proposed license amendment had been determined. Therefore, the Final EIS was unable to review the environmental effects of Denver Water's proposed amendment of license.

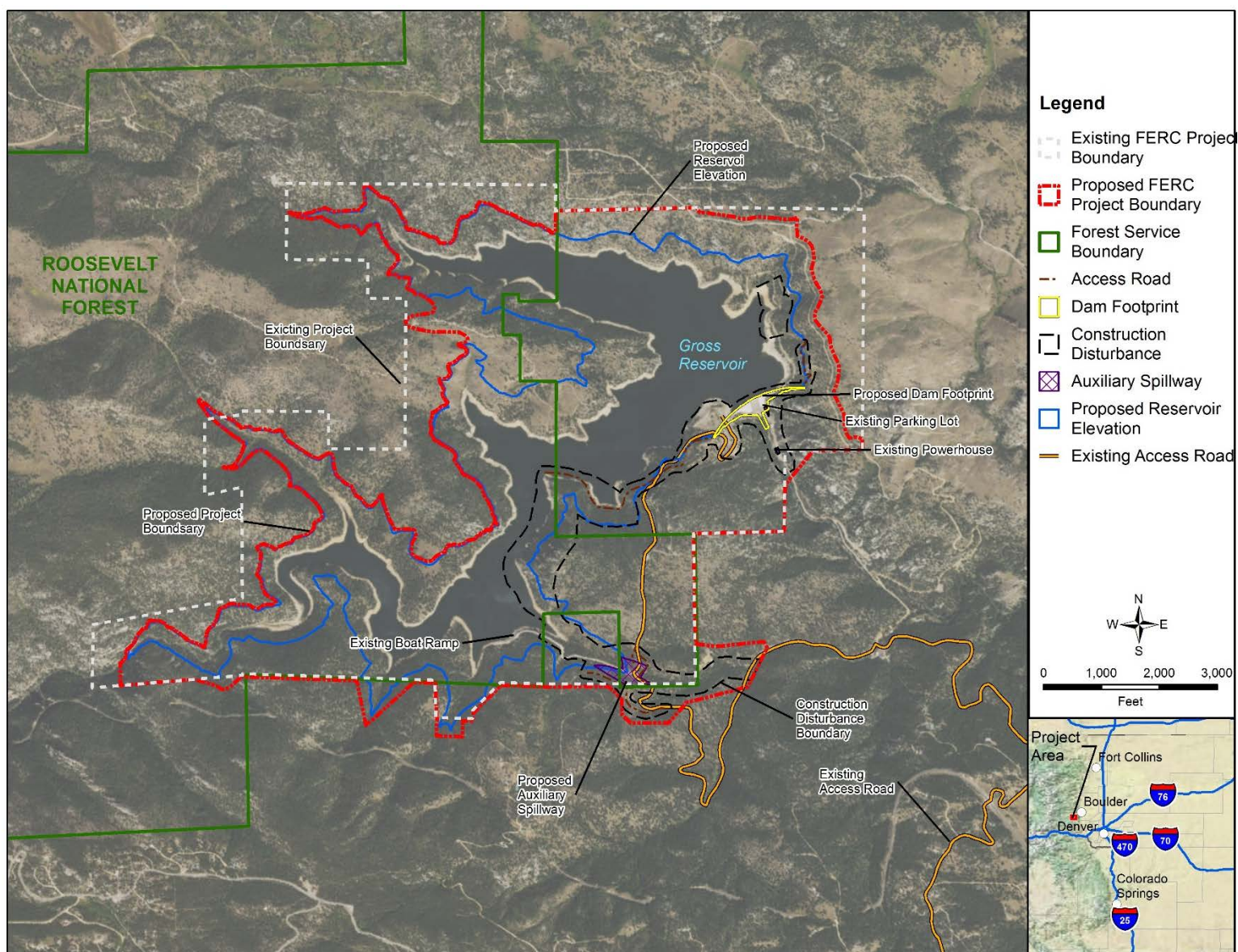


Figure 1. Location of Gross Reservoir Hydroelectric Project (Source: Denver Water, 2016 as modified by staff).

## **2.0 PURPOSE AND NEED FOR ACTION**

### **2.1 PURPOSE OF ACTION**

Denver Water (licensee) owns and operates the Gross Reservoir Hydroelectric Project (FERC No. 2035). The project's Gross Reservoir serves as a component of Denver Water's Moffat Collection System. The reservoir is used to store water before it is released into the municipal water system as needed. Section 1.1, *Background*, provides a more detailed description of the Moffat Collection System, the Gross Reservoir Project and the Commission's jurisdiction.

Denver Water plans to enlarge the Moffat Collection System to increase collection and storage of raw water. As part of the planned enlargement, Denver Water would need to increase the storage capacity of Gross Reservoir by raising Gross Dam 131 feet, to allow the storage of up to an additional 77,000 acre-feet of water. Therefore, Denver Water proposes to amend its license for the Gross Reservoir Project to reflect the proposed changes to the dam, reservoir, and related project facilities. Denver Water also proposes to amend certain requirements of its license related to the changes, and add a series of environmental protection, mitigation, and enhancement measures, which reflect modified or new mandatory conditions based on agreements it has reached with federal, state, and local resource agencies and other entities. The elements of Denver Water's license amendment proposal are fully described in section 3.0, *Proposed Action and Alternatives*.

### **2.2 NEED FOR POWER**

The need for power is not a determining factor for the proposed project. Power production at the Gross Reservoir hydroelectric facility is incidental to the operation of the project for its primary purpose of water supply. Hydroelectric energy is only generated at the project when flows are released from Gross Reservoir downstream into South Boulder Creek. These releases are based on water supply needs, maintenance of water elevation limits in response to inflows, and other operational variables. Moffat System Water supply operations are not within the Commission's jurisdiction. The operation of the expanded Moffat Collection System would cause the Gross reservoir Project to produce an estimated additional 4.4 GWh of energy per year, an increase of 16.5 percent over the existing facility. Denver Water currently uses the power generated at the project to supply the project powerhouse, the project valve house, and the caretakers' residences and facilities. The remaining power generated is sold to Xcel Energy.

By producing hydroelectricity, the project displaces the need for other power sources such as fossil-fueled facilities, thereby avoiding some power plant emissions and creating an environmental benefit.

## **2.3 SCOPE OF THIS SUPPLEMENTAL ENVIRONMENTAL ASSESSMENT**

The Commission prepared this Supplemental Environmental Assessment (Supplemental EA) specifically to review environmental effects that would be related to a Commission approval of Denver Water's proposal to enlarge Gross Reservoir and amend the license for the Gross Reservoir Hydroelectric Project that were not addressed in the Corps' 2014 Final EIS. The 2014 Final EIS covered expansion of the entire Moffat Collection System, of which Gross Reservoir is a component.

While many of the environmental effects of enlarging Gross Reservoir, such as inundation to new maximum water levels, were addressed in the 2014 Final EIS, the Final EIS did not consider all of the effects the Commission must consider under NEPA. This was partly because some information, such as decisions on quarry sites and other construction elements, and proposals to modify license-required recreation facilities, were not yet available. The Corps' Final EIS was also not able to address effects of the Commission's incorporation into the project license of conditions stipulated by the Forest Service pursuant to section 4(e) of the Federal Power Act (FPA), or other conditions that may be required through the Commission's statutory responsibilities under, for example, the Clean Water Act (CWA), the National Historic Preservation Act (NHPA), and the Endangered Species Act (ESA).

The scope of our analysis in this Supplemental EA is generally limited to the following: (1) revisions in certain details of dam raise construction activities, including relocation of the on-site quarry; (2) potential elimination of the previously-proposed auxiliary spillway and replacement with a saddle dam; (3) certain aspects of tree clearing and inundation to a new maximum reservoir elevation of 7,406 feet msl not addressed in the Final EIS; (4) effects of changes in project operation, including revisions to the ramping rates required under the license; (5) modifications to project recreation facilities required under the license; (6) modification to the project boundary; (7) effects of Denver Water's proposed environmental mitigation measures; and (8) effects of Denver Water's compliance with statutory requirements.

## **3.0 PROPOSED ACTION AND ALTERNATIVES**

### **3.1 APPLICANT'S PROPOSED ACTION**

The proposed action addressed in this Supplemental EA is Denver Water's proposal to raise Gross Dam by 131 feet to increase the maximum storage capacity of Gross Reservoir. The enlargement would allow Denver Water to store an additional

77,000 acre-feet of water in the reservoir. The new maximum capacity would include an additional 72,000 acre-feet of water for which Denver Water has existing water rights, and a 5,000 acre-foot Environmental Pool that Denver Water would store for the Cities of Boulder and Lafayette. The expansion would require the FERC-licensed project boundary to be adjusted to add Forest Service land and private property acquired by Denver Water. Denver Water also proposes to remove lands owned by Denver Water and the Forest Service that are not needed for project purposes from the FERC project boundary.

### **3.1.1 Proposed Construction Activities and Changes to Project Facilities**

#### **Dam**

Denver Water would raise the dam crest by 131 feet to a final height of approximately 471 feet. Based on preliminary design, the length of the dam crest would increase by about 790 feet to 1,940 feet. The actual dam crest length would be determined during final design. Denver Water would construct the raised dam with roller compacted concrete, and the modified dam would have approximately the same dam axis, arch radius, crest width, and downstream slope as the existing dam, subject to evaluations during final design.

#### **Primary Spillway**

Denver Water would raise the primary spillway crest, which would be located near the center of the dam, about 124 feet to elevation 7,406 feet msl. Denver Water would determine the size and location of the primary spillway during final design.

#### **Auxiliary Spillway**

The auxiliary spillway included in the Final EIS for the Moffat Collection System Project may be unnecessary. In the Final EIS, the auxiliary spillway is located within a topographic saddle about 1 mile south of Gross Dam and is described as a concrete weir structure. Denver Water would determine the need for an auxiliary spillway during final design and in coordination with the FERC Division of Dam Safety and Inspections and the Independent Board of Consultants. Regardless, there is a topographic saddle along the reservoir rim that requires a small water impounding structure (either the auxiliary spillway or a saddle dam). If the inflow design flood can be accommodated within the primary spillway at the dam and an auxiliary spillway is not required, then Denver Water would construct a small saddle dam in the topographic saddle in lieu of the spillway. The footprints of the auxiliary spillway and the saddle dam are similar in scope, size, and site disturbance limits.

### Inlet and Outlet Works

There would be no major change to the existing outlet works. Preliminary analyses show that the system is capable of withstanding the increased reservoir head. As part of the final design, Denver Water would evaluate the existing piping and discharge valves for the new hydrostatic conditions.

### Penstock and Turbine Equipment

The proposed dam raise would require modifications to the existing 66-inch-diameter penstock valve on the penstock upstream of the two turbines. Modifications would include replacing the 66-inch butterfly valve with a pressure reducing valve. While the existing 66-inch-diameter penstock is suitable for the higher pressure conditions that would exist after the dam is raised, the turbine equipment was not originally designed for an increase in dam height greater than 60 feet. During final design, Denver Water would evaluate modifications that could extend the operating range of the turbine equipment.

### On-site Quarry for Borrow/Aggregate Materials, Temporary Stockpile Areas, Concrete Batch Plant, and Temporary Spoil Areas

Denver Water intends to obtain all of the aggregate required to construct the dam from an on-site quarry, and it has identified and evaluated both a primary and an alternative (backup) quarry site. Both the primary and alternative quarries are sized to produce at least twice the volume of aggregate required for construction. Denver Water intends to quarry exclusively from the primary quarry and would only develop the alternative quarry if the primary quarry does not produce the required quality or quantity of aggregate for the project.<sup>3</sup>

The primary quarry site, Osprey Point quarry, is different from the quarry site analyzed in the Final EIS. It is located entirely on Denver Water property, within an area normally inundated by the reservoir, and would be accessible during the construction period when the reservoir level is reduced. The quarry would be in the area of the Osprey

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<sup>3</sup> For the Final EIS, based on preliminary site investigations, Denver Water estimated that 426,000 cubic yards of aggregate material could be obtained from the original quarry site to be located on Forest Service lands, with the remaining 370,000 cubic yards of aggregate to be trucked in from off-site locations. Subsequent site investigations have shown that all 796,000 cubic yards of aggregate material needed can be obtained on-site from either the original quarry site (Final EIS quarry site) or a quarry location entirely on Denver Water lands at Osprey Point.

Point boat launch draw, west of the proposed auxiliary spillway/saddle dam (Figure 2).<sup>4</sup> Denver Water identified the Osprey Point quarry site and planned its possible layout to minimize or avoid quarry-related impacts identified in the Final EIS. Specifically, Denver Water has developed two possible layouts for the site. The most optimistic quarry layout would result in the quarry site being completely submerged when the reservoir is refilled to its new normal elevation of 7,406 feet msl. The more conservative design would result in up to 55 vertical feet of quarried high wall remaining above the new water level. Access to the Osprey Point quarry would be from the existing Gross Reservoir access road leading to the existing boat ramp. The existing access road would also serve as the main haul route for transporting finished aggregate material to the concrete batch plant at the dam site (Figure 2).

If the Osprey Point quarry is not able to produce the required quality or quantity of material, an alternative quarry (the Final EIS quarry) would be developed to complete the dam (Figure 2). The Final EIS quarry site is located on approximately five acres of Denver Water land and 24 acres of National Forest System lands. The Final EIS quarry site was evaluated in the Final EIS. About 125 vertical feet of the Final EIS quarry would be situated below the new normal water line of the expanded reservoir, and 250 vertical feet would be an exposed high wall rock face above the normal water line. Access to the Final EIS quarry would be provided by a new temporary haul road from the Final EIS quarry stockpile to the other proposed stockpile area just west of the dam. Regardless of the quarry location, Denver Water would develop the final quarry configuration during final design and in coordination with the FERC Division of Dam Safety and Inspections and the Independent Board of Consultants. Post-construction, any exposed quarry would be reclaimed to minimize its effects. Because a portion of the Final EIS quarry occurs on Forest Service lands, Denver Water would address reclamation and rehabilitation of the Final EIS quarry in an updated Erosion Control and Rehabilitation and Restoration Plan, which would describe the location, activity, amount of surface activity, reclamation measures, safety measures, and measures to protect and minimize impacts on natural resources on Forest Service lands.

Denver Water would locate stockpile areas for the Osprey Point quarry at the quarry, the dam, or along the existing project access road connecting the Osprey Point quarry to the dam site (Figure 2). Denver Water's preliminary evaluations show that there is sufficient stockpile area within or adjacent to the Osprey Point quarry and/or west of the dam site. Tentative stockpile areas for the Final EIS quarry have been identified and are shown on Figure 2, one adjacent to the Final EIS quarry and one located west of the dam. The exact size and location of the stockpile areas would be identified during final design.

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<sup>4</sup> Final Quarry Location Report (Denver Water 2016a).



Denver Water would construct a temporary concrete batch/production plant at Gross Dam and include equipment to handle, store, and mix aggregate, cement, water, and fly ash to produce concrete. The plant would include up to four standard 12-cubic-yard concrete mixers and approximately six 100-horsepower diesel engines and engine-generator sets to power the equipment.

Denver Water has identified two potential spoil areas, located due north and south of the dam site (Figure 2); exact size and location of the spoil areas would be determined during final design. Spoil areas may contain excavated materials and other materials not used for dam construction. Post-construction, spoil areas would be situated entirely below the proposed high water line. Some spoils would be used to re-contour and reclaim the portion of the quarry above the new high water line.

#### Temporary Support Facilities/Staging Areas

Denver Water has identified several temporary staging areas at the reservoir site, including two areas near the hydroelectric plant along South Boulder Creek downstream from the dam and one area at the southwestern end of the dam (Figure 2). These staging areas are associated with the proposed dam construction footprint. Denver Water would locate the concrete plant, job trailers, and equipment yard in these locations.



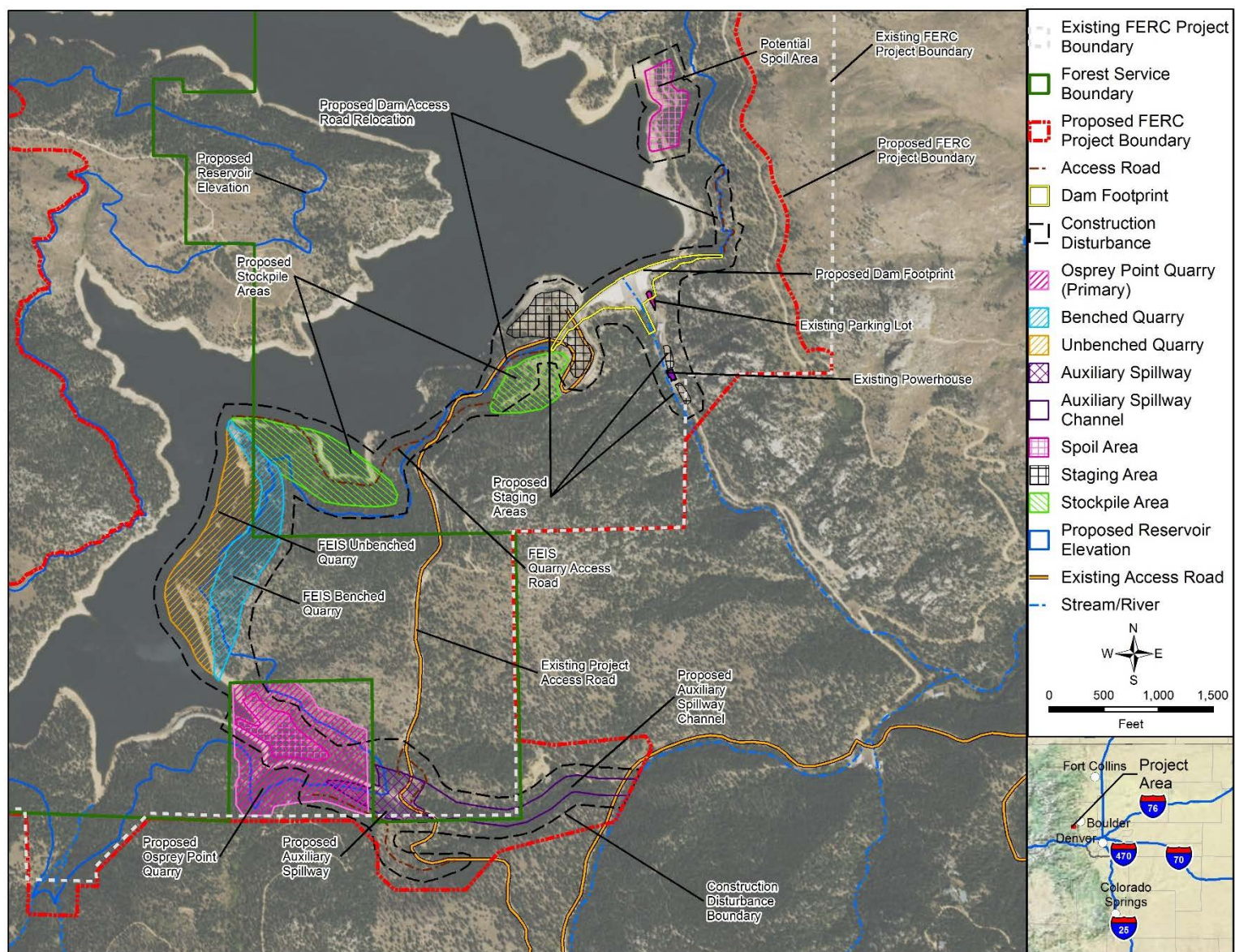


Figure 2. Location of proposed construction activities (Source: Denver Water, 2016, as modified by staff)

### Tree Removal and Disposal

Trees would be removed from around Gross Reservoir from the existing normal pool elevation of 7,282 feet up to an elevation of 7,410 feet, an area of approximately 465 acres. This includes the area that would be affected by inundation to the new reservoir elevation of 7,406 feet, which includes storage of the Environmental Pool, plus an additional 4 feet of elevation to account for other construction-related activity around the reservoir. Tree removal would minimize problems with floating debris, decaying vegetation, and potential water quality concerns. Denver Water would submit a final tree removal plan to FERC after coordination with the Forest Service, Colorado State Forest Service, Boulder and Jefferson Counties, and the local community at least 90 days prior to any tree-clearing activities around Gross Reservoir. Tree removal would likely require a combination of the following standard tree-clearing operations:

- Ground-based systems (e.g., hand-felling with rubber-tired grapple skidder and cable yarding). These systems would be used in areas where existing roads are in place or where temporary road construction along the shoreline is feasible.
- Helicopter yarding of cut trees, which would be conducted in areas where road access is not currently available or not possible to construct.
- Hydro-ax feller/buncher (rubber-tired tractor). Hydro-axing would be used in areas with poor access, small trees, steep slopes, and abundant rock, such as the upper reaches of Forsythe Canyon. The hydro-ax would maneuver around rocky areas and reduce the trees to small pieces that would readily decay in place.

Denver Water estimates tree removal would generate about 50,000 tons of forest residue. Air quality concerns and local regulations prohibit traditional slash and burn disposal of this residue. Therefore, Denver Water proposes to dispose of this material with a combination of the following measures:

- burning in an air curtain destructor;
- grinding whole trees and hauling chips to a landfill; and
- loading and hauling whole trees to a landfill.

Some of the forest residue could also be turned into marketable products, such as (saw-timber and firewood.), and the remaining unmarketable material would be disposed

of by a combination of the options mentioned above. Denver Water would explore opportunities to use some of the material to reduce the residue volume.

### **3.1.2 Changes in Project Operations**

As reviewed above in section 2.2 *Need for Power*, hydroelectric energy is only generated at the Gross Reservoir Project when flows are released for water supply needs, maintenance of water elevation limits in response to inflows, and other operational variables, and these operations are not within the Commission's jurisdiction. As part of the Moffat Collection System, Gross Reservoir is used to store and release native flows from upper South Boulder Creek, as well as water diverted from the West Slope of the Rocky Mountains through the Moffat Collection System's Moffat Tunnel. When Gross Reservoir storage is less than 12,000 acre-feet, there is a potential dam safety issue related to rocks and sediment possibly being transported to the outlet works and causing damage. In addition, the transported sediment could impact aquatic life in lower South Boulder Creek below the dam. For these reasons, the bottom 12,000 acre-feet of Gross Reservoir storage is a minimum pool that is not relied on for water supply purposes. To avoid spilling, Denver Water reduces West Slope importations as Gross Reservoir is about to reach full capacity. Gross Reservoir typically stores the most water in June during spring runoff.

Denver Water indicates that expansion of the Moffat Collection System would generally result in the following changes in operation of the system:

- Diversions via the Moffat Collection System would generally be higher during average and wet years (May through July) following a drought in order to fill the additional storage created at Gross Reservoir. During the winter months and during dry years, there would be little differences in diversions and operations in this part of the system.
- More water would be stored in Gross Reservoir during periods of drought. Denver Water would draw more water from Gross Reservoir to meet demand in the first year of a drought, as it also would from its other reservoirs.
- Denver Water would collect more native upper South Boulder Creek water for storage in Gross Reservoir.
- Denver Water would draw more water from Gross Reservoir for delivery to the Moffat Water Treatment Plant, particularly in the winter months, because the treatment plant would continue to operate at a minimum level during that time.

### **3.1.3 Proposed Changes to Licensed Project Description**

Consistent with the proposed project modifications described above, Denver Water proposes modifying the license to include the following project description:

“Project works consisting of: (1) a 471-foot-high, curved roller compacted concrete gravity dam with a crest length of 1,940 feet, including a primary uncontrolled ogee-crested spillway section at elevation 7,406 feet msl; (2) either an auxiliary spillway or a saddle dam; (3) an approximately 842-acre reservoir with a storage capacity of 118,811 acre-feet at full pool; (4) existing low-level outlet works with an inlet elevation at 6,990 feet msl and consisting of a 25-foot by 25-foot concrete box intake structure with trash rack, an 8-foot-diameter concrete-lined tunnel transitioning inside the valve vault to a 6-foot-diameter steel pipe conduit that branches into five smaller pipes before entering an existing 56-foot by 27-foot concrete outlet works and valve house; (5) an auxiliary outlet works with an inlet elevation of 7,150 feet msl and consisting of a 48-inch-diameter pipe and a 24-inch-diameter fixed cone valve (discharge valve) located on the right side of the dam; (6) an existing powerhouse located 440 feet downstream from the existing valve house and containing two 3,799-kW horizontal Francis turbines connected to two 4,050-kW synchronous generators; (7) an existing 580-foot-long by 66-inch-diameter buried penstock; (8) an existing tailrace structure integral with the powerhouse outlet works building; (9) an existing switchyard containing project transformers; (10) a quarry for on-site production of materials and temporary processing equipment, including a temporary batch plant; (11) a 1-mile-long, 25-kilovolt project transmission line, and (12) other appurtenant facilities.”

Currently, to the extent allowed by municipal water supply operations, Denver Water allows the City of Boulder to store in Gross Reservoir up to 2,500 acre-feet of water, referred to as “the Environmental Pool,” under an agreement known as the Denver-Boulder Agreement. Under the Agreement, at Boulder's request, Denver Water releases water from the Environmental Pool into South Boulder Creek November through April to ensure minimum flows and improve aquatic habitat further downstream at the South Boulder Creek Diversion. Because the purpose of the Agreement is to provide mitigation for Denver Water's water supply operations outside of the unit of development, operation and release of the Environmental Pool is not a condition of the project license.

### **3.1.4 Proposed Changes to License Articles**

In its license amendment request, Denver Water proposes amending Article 403. Article 403 specifies certain limits on changes in flows released by the project depending upon the magnitude of flows within the creek. Denver Water proposes that the article be amended to include a ramping rate tolerance of 5 cfs per hour.

Denver Water also proposes amending the project's approved Article 416 Recreation Management Plan<sup>5</sup> to accommodate an addendum, which was included with the amendment application as Attachment A-1. The addendum addresses changes to recreation facilities that would be necessary because of inundation at the proposed higher reservoir elevations.

Denver Water proposes deleting the following articles, because the articles are tied to the original construction of the project and are no longer pertinent, or because they stipulate environmental requirements that have either been completed or involve requirements that would be replaced as part of the proposed amendment.

- Article 202: Submit a new exhibit G showing the addition of Tracts 62 and 64 to the project boundary. This requirement has been completed.
- Article 203: File aperture cards of exhibit drawings. This requirement has been completed.
- Article 301: Construction start date. This requirement has been completed.
- Article 304: Cofferdam design submittals. This requirement has been completed.
- Article 401: Develop an erosion control plan in accordance with existing Forest Service conditions 104 and 106. This plan was developed and is in effect until the license is amended. New Forest Service section 4(e) condition 19 would require a new erosion control and reclamation plan.
- Article 402: Develop and implement a plan for dissolved oxygen (DO) and temperature monitoring for a minimum of 3 years. Denver Water has completed monitoring and reporting pursuant to this article, and has also continued such monitoring and reporting in recent years. Denver Water notes that, as part of its amendment request, it would conduct DO and temperature monitoring, consistent with monitoring that was done under the article, for 3 years after construction is complete as a protection, mitigation, and enhancement measure.
- Article 405: Develop a plan for rehabilitation and restoration of project lands disturbed by unmanaged recreation, in accordance with existing

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<sup>5</sup> Order Approving Recreation Management Plan Under Article 416, issued May 14, 2004 (107 FERC ¶62,145 (2004)).

Forest Service conditions 106 and 104. This plan was completed and is in effect until the license is amended. New Forest Service section 4(e) condition 24 requires new recreation management measures, monitoring and reports, and new Forest Service section 4(e) condition 19 requires a new erosion control and reclamation plan.

- Article 406: Develop a weed management plan in accordance with existing Forest Service conditions 107 and 108. This plan was completed and is in effect until the license is amended. New Forest Service section 4(e) condition 17 requires a new invasive and noxious weed species management plan.
- Article 408: Project transmission line construction. This requirement has been completed.
- Article 409: Installation of gates and Winiger Ridge Recreation Management Plan. This plan was completed and is in effect until the license is amended. New Forest Service section 4(e) condition 24 requires new Winiger Ridge recreation management measures and monitoring.
- Article 411: One-time payment for Endangered Fish Species Fund. The requirements of this article have been completed.
- Article 412: Plan for participation in Platte River Recovery Implementation Program. The requirements under this plan have been completed.
- Article 413: The 3-year interim period of the Platte River Basin Endangered Species Recovery Implementation Program. The requirements of this article have been completed.
- Article 420: Acquire permanent public access to Winiger Gulch Inlet Recreation area. This requirement has been completed.

### **3.1.5 Denver Water's Proposed Environmental Mitigation Measures**

Denver Water proposes to implement a series of environmental mitigation measures as part of its proposed license amendment. As noted after each description below, some of these measures were partly or wholly designed to address conditions required by the Forest Service through preliminary conditions filed under section 4(e) of the FPA, and conditions identified by the Colorado Department of Public Health and Environment (Colorado DPHE) through its water quality certification (WQC) under the



CWA. The Forest Service 4(e) conditions and Colorado DPHE WQC conditions are specifically addressed in section 4.2 *Statutory Compliance*.

### Geology and Soils

- Finalize a tree removal plan. The tree removal plan would determine preferred removal and disposal methods through consultation with the Forest Service, Colorado State Forest Service, Boulder and Jefferson Counties, and the local community. A final plan would be prepared and filed with the Commission for approval prior to land clearing activities (addresses Forest Service 4(e) condition 27).
- If the Final EIS quarry, which would occupy Forest Service lands, is developed, finalize a Pit Development and Reclamation Plan, pursuant to Forest Service 4(e) condition 26, to include quarry operation and reclamation, and obtain a Forest Service Mineral Materials Permit. Denver Water indicates that it would develop the plan in consultation with the Forest Service and the Colorado Division of Reclamation, Mining, and Safety, and that the plan would be filed with the Commission prior to ground disturbing or construction activities associated with pit development on Forest Service lands (addresses Forest Service 4(e) condition 26).
- If the Osprey Point quarry, which would occupy Denver Water land, is developed, finalize a Quarry Operation Plan to include quarry development and operation activities, and a Quarry Reclamation Plan to include quarry mitigation techniques for areas above the new normal water line, if any. Denver Water would consult with Boulder County and the Mine Safety and Training Program arm of the Colorado Division of Reclamation, Mining, and Safety to develop quarry operation procedures and with the Corps, Boulder County and the Colorado Division of Reclamation, Mining, and Safety to develop reclamation measures for Denver Water land. Denver Water would submit the final plans to the Commission.
- Develop a Stormwater Management Plan that would specify best management practices (BMPs) and inspection requirements to reduce pollutants in stormwater runoff from the construction sites. BMPs would be used to address issues including erosion control, stockpiling of materials, dust control, revegetation, materials handling, and fuel containment.
- Develop an Erosion Control and Reclamation Plan addressing ground disturbance on Forest Service lands associated with the proposed project (addresses Forest Service 4(e) condition 19).

## Water Quality

- Finalize a tree removal plan, as described above, to minimize water quality impacts from organic matter by removing vegetation in the inundation area (addresses Forest Service 4(e) condition 27).
- Monitor continuous stream temperature at four locations in South Boulder Creek (one location upstream of Gross Reservoir and three locations downstream) (addresses WQC condition 6).
- Monitor concentrations of metals and hardness at three locations in South Boulder Creek (two locations upstream of Gross Reservoir and one location downstream) (addresses WQC conditions 14 and 15).
- Monitor temperature and DO in Gross Reservoir outflow consistent with the approved Article 402 DO Monitoring Plan<sup>6</sup> for 3 years after construction of the proposed project is complete. The purpose of the monitoring is to ensure that stream flows downstream from the project maintain adequate temperature and DO levels (addresses WQC conditions 6 and 12).
- At least 1 year prior to the initial fill of the enlarged reservoir, file with FERC a revision to its approved South Boulder Creek Channel Stability Monitoring Plan<sup>7</sup> developed in consultation with the Forest Service and Colorado Parks and Wildlife (addresses Forest Service 4(e) condition 25).
- Store a 5,000 acre-foot Environmental Pool in Gross Reservoir for use in augmenting downstream flows during low-flow periods, in accordance with an off-license agreement with the Cities of Boulder and Lafayette. Further explanation of the Environmental Pool is in section 3.5.1.3 *Off-License Intergovernmental Agreement on Environmental Flows*, below.

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<sup>6</sup> Order Modifying and Approving Dissolved Oxygen and Temperature Monitoring Plan Pursuant to Article 402, issued June 25, 2002 (99 FERC ¶ 62,222).

<sup>7</sup> Order Modifying and Approving Channel Stability Monitoring Plan Under Ordering Paragraph (D), issued August 24, 2004 (108 FERC ¶ 62,194).



### Fisheries and Aquatic Resources

- Develop an Aquatic Invasive Species Monitoring and Management Plan, to include a public education component and BMPs for project-related activities (partially addresses Forest Service 4(e) condition 17).
- Monitor the health of aquatic macroinvertebrates at three sites downstream from Gross Reservoir (addresses WQC condition 12).

### Terrestrial Resources

- Revegetate and reclaim Forest Service lands with seed mixtures and mulch materials according to a new Reclamation and Revegetation Seed Mixes and Mulch Materials Plan (addresses Forest Service 4(e) condition 28).
- Develop an Invasive Plant and Noxious Weed Species Management Plan for Forest Service lands (partially addresses Forest Service 4(e) condition 17).
- Develop new Fire Management and Response Plan to reduce the risk of wildfires at and near Gross Reservoir (addresses Forest Service 4(e) condition 20).
- Replace the two existing osprey nest platforms in Gross Reservoir, and conduct pre-construction raptor surveys (addresses Forest Service 4(e) condition 21).
- Develop a Special Status Plants Relocation Plan to address impacts on special status plants on Forest Service lands (addresses Forest Service 4(e) condition 22).

### Recreation, Land Use, Noise, and Aesthetics

- Relocate recreation facilities that would be inundated to areas above the new normal water line of Gross Reservoir in accordance with the proposed addendum to the Recreation Management Plan (RMP) filed as a supplement to the amendment application. Any existing or planned trails that would be affected by construction activities would be replaced in-kind (addresses Forest Service 4(e) condition 24).
- Keep recreation facilities open as much as possible during construction without compromising public safety or construction progress. Denver Water would post notices about temporary restrictions and closures. Emergency access to Gross Reservoir would be maintained at all times.

- Provide parking for construction workers on Denver Water land at appropriate locations (e.g., stockpile and staging areas)
- Use engineering and administrative controls, which may include modifying the equipment or the work area to make it quieter, substituting existing equipment with quieter equipment, retrofitting existing equipment with mufflers, modifying backup alarm systems, and/or shutting down noisy equipment when not needed.
- Implement confined charge blasting for dam construction to minimize noise. Blasting would occur only during daylight hours, and a seismograph would be used to monitor ground motions and air pressure (noise) vibrations produced from the blasting operations to ensure that acceleration thresholds are not exceeded.
- Exchange 12 acres of Denver Water's surplus land outside the FERC project boundary for 12 acres of Miramonte Land Corporation, LLC, land. Denver Water would submit to FERC a copy of the final agreement and documentation showing proof of property rights transfers, including a license granted to Miramonte by Denver Water to use a private Denver Water road within the FERC project boundary as an emergency access road.
- Continue to comply with existing license article 414 for visual resource protection. Prior to ground-disturbing or construction activities on Forest Service lands, prepare an addendum to the approved Visual Resources Management Plan to address visual effects from developing an on-site quarry, including reclamation treatments and measures for reshaping and revegetating disturbed areas to blend with surrounding visual characteristics of the landscape (addresses Forest Service 4(e) condition 23).
- For the Osprey Point quarry, which is not on Forest Service lands, Denver Water would include in its Quarry Reclamation Plan, described above, measures to address visual effects.
- Restore all staging areas and temporary disturbances to approximate pre-existing conditions following construction.
- Minimize upward diffusion of light at the construction site by ensuring yard lights used for nighttime lighting of facilities are downcast.

## Cultural Resources

- Execute a memorandum of agreement (MOA) with the Colorado State Historic Preservation Officer (Colorado SHPO) for the project that would memorialize agreed upon mitigation for the proposed action's adverse effect on two historic properties.
- Ensure that Denver Water develops and submits Historic American Engineering Record (HAER) documentation of the project dam, reservoir, and Resumption Flume to the National Park Service before those historic properties are adversely affected by the proposed action.
- Develop and implement a Historic Properties Management Plan (HPMP) to manage and protect cultural resources. The HPMP would include requirements for notifying FERC of unanticipated discoveries, procedures to be followed in the event of an emergency at the proposed project, and reporting requirements.

### **3.1.5.1 Measures Included in 2011 Fish and Wildlife Mitigation Plan**

In its application, Denver Water identifies certain measures contained in a Fish and Wildlife Mitigation Plan, dated June 9, 2011, that it developed with Colorado Parks and Wildlife for expansion of the Moffat Collection System Project. Several measures in the plan would provide mitigation for effects of enlargement of Gross Reservoir, and would be enforced through Colorado DPHE WQC conditions, Forest Service 4(e) conditions, and conditions of a Corps 404 permit.

- Monitor mercury in fish tissue in Gross Reservoir with assistance from Colorado DPHE and Colorado Parks and Wildlife. If the fish tissue analysis indicates that a Fish Consumption Advisory is required, Denver Water would work with Colorado DPHE and Colorado Parks and Wildlife to provide public education, including the posting of fish consumption advisory signs at Gross Reservoir.
- Monitor general water quality parameters (nutrients, organic carbon, metals, major ions, temperature, and chlorophyll a) in Gross Reservoir and submit monitoring results annually to Colorado DPHE.
- Mitigate the permanent loss of jurisdictional wetlands through the use of credits from an approved wetland bank.
- Use pre-construction surveys to identify active nests of migratory birds within the project footprint and time activities to avoid breeding seasons.

- Contact the U.S. Fish and Wildlife Service (FWS), Office of Migratory Birds for permitting requirements prior to the removal or destruction of any migratory bird nests.

### **3.1.5.2 Off-License Measures in Settlement Agreement with Forest Service**

In addition to the measures described above, Denver Water proposes to convey the 539-acre Toll Property to the Forest Service to be administered and protected as part of the Roosevelt National Forest as mitigation for resource values that would be lost on Denver Water and Forest Service lands due to inundation and construction-related ground disturbance. Denver Water does not propose that this measure be incorporated into the project license.

### **3.1.5.3 Off-license Intergovernmental Agreement for Environmental Flows**

Through an off-license Intergovernmental Agreement signed by Denver Water and the Cities of Boulder and Lafayette on February 24, 2010, a 5,000 acre-foot Environmental Pool would be stored in Gross Reservoir for use in augmenting flows for downstream aquatic habitat during low-flow periods. The Environmental Pool would be filled with water provided by the cities of Boulder and Lafayette. The Intergovernmental Agreement would replace the off-license Denver-Boulder Agreement, which currently governs storage and release of a 2,500-acre-foot Environmental Pool.

## **3.2 NO-ACTION ALTERNATIVE**

The no-action alternative is a denial of Denver Water's proposal to amend the Gross Reservoir Project. Under the no-action alternative, Denver Water would not raise the height of the dam, increase storage capacity, or modify recreation facilities. Denver Water would continue to operate the hydroelectric facility under the terms and conditions of the 2001 FERC hydropower license, as amended in 2004. No new environmental measures would be implemented.

The no-action alternative would likely require Denver Water to use a combination of nonstructural strategies to meet the need for additional water supply in the future.

## **4.0 CONSULTATION AND COMPLIANCE**

### **4.1 PRE-FILING CONSULTATION**

The Commission's regulations (18 Code of Federal Regulations [CFR] § 4.38) require that licensees consult with appropriate resource agencies, tribes, and other entities before filing an application for a non-capacity amendment to a license. This consultation is the first step in complying with the Fish and Wildlife Coordination Act, ESA, NHPA,

and other federal statutes. Pre-filing consultation for a non-capacity amendment must be complete and documented according to the Commission's regulations.

#### **4.1.1 Consultation**

In its pre-filing consultation, beginning in May 2008, the licensee consulted with the Forest Service, FWS, the U.S. Environmental Protection Agency, U.S. Bureau of Indian Affairs, U.S. Bureau of Reclamation, BLM, Colorado Water Conservation Board, Colorado Department of Public Works, Colorado Division of Water Resources, Colorado State Historical Office of Archaeology and Historic Preservation, multiple tribal organizations, and more than 150 public interest groups. Denver Water issued notice that the initial consultation document was available for review on June 18, 2008; hosted a site visit on July 29, 2008; and held three public meetings, two occurring on July 29, 2008, and one on July 30, 2008. The Forest Service requested Denver Water conduct nine studies to inform development of the draft license application. Denver Water did not agree to implement the studies, and the Forest Service referred the dispute to FERC's Office of Energy Projects for resolution. Denver Water submitted its response for dispute resolution to FERC on June 16, 2009. FERC provided a decision on the Forest Service study request on November 30, 2009, concluding that the nine requested studies did not need to be adopted as part of the proposed license amendment process.

Denver Water filed its draft license amendment application on October 30, 2009, beginning the second stage of consultation. After the comment period on the draft application ended, Denver Water continued to meet with stakeholders to share information and attempt to resolve disputes. Denver Water also gathered additional construction-related information and prepared its final license amendment application, which was filed on November 25, 2016.

#### **4.1.2 Comments on the License Amendment Application**

On February 1, 2017, the Commission issued a public notice of the application for the proposed project. The notice set a 60-day period during which interventions, comments, motions to intervene, protests, recommendations, terms and conditions, and fishway prescriptions could be filed, ending on April 2, 2017. It also established an additional 45-day period in which replies to comments could be filed.

Table 1 summarizes the responses filed pursuant to the 60-day notice. In addition, Denver Water filed a response to comments on May 16, 2017.

Table 1. Responses filed pursuant to the Commission’s public notice of the amendment application.

<b>Entity</b>	<b>Filing Date</b>	<b>Filing Type</b>
Cherry Creek Valley Water and Sanitation District	March 3, 2017	Comments
City of Glendale, Colorado	March 6, 2017	Comments
Consolidated Mutual Water Supply Company	March 8, 2017	Comments
City of Arvada	March 8, 2017	Comments
Crestview Water and Sanitation District	March 13, 2017	Comments
City of Lafayette	March 13, 2017	Comments
Kaplan, Kirsch, Rockwell LLP on behalf of Miramonte Colorado LLC	March 14, 2017	Comments
Lakehurst Water and Sanitation District	March 15, 2017	Comments
Arvada Economic Development Association	March 16, 2017	Comments
Cherry Creek Village Water District	March 17, 2017	Comments
Beverly Kurtz	March 18, 2017	Comments
North Table Mountain Water and Sanitation District	March 20, 2017	Comments
Forest Service-Rocky Mountain Region	March 21, 2017	Intervention
Scott Vargo	March 21, 2017	Comments
Denver Metro Chamber of Commerce	March 21, 2017	Comments
Deborrah Pilon	March 22, 2017	Comments
Bear Creek Water and Sanitation District	March 23, 2017	Comments
Eagle Park Reservoir Company, Clinton Ditch and Reservoir Company	March 24, 2017	Comments
Department of the Interior	March 24, 2017	Comments, terms and conditions, and fishway prescriptions
Boulder County Board of Commissioners	March 24, 2017	Motion to Intervene and Comments
South-East Englewood Water District	March 27, 2017	Comments

<b>Entity</b>	<b>Filing Date</b>	<b>Filing Type</b>
South Metro Water Supply Authority	March 27, 2017	Comments
Forest Service-Rocky Mountain Region, including Arapaho-Roosevelt National Forest and Pawnee National Grassland	March 27, 2017	Preliminary terms and conditions
Valley Water District	March 27, 2017	Comments
Holly Hills Water and Sanitation District	March 28, 2017	Comments
Middle Park Water Conservancy District	March 28, 2017	Comments
Xcel Energy	March 28, 2017	Comments
Winter Park Water & Sanitation District	March 29, 2017	Comments
Williams, Turner & Holmes, P.C., on behalf of: Grand Valley Water Users' Association, the Orchard Mesa Irrigation District, and Ute Water Conservancy District	March 30, 2017	Comments
The Greenway Foundation	March 30, 2017	Comments
Colorado River Water Conservation District	March 30, 2017	Comments
The Environmental Group	March 30, 2017	Comments
Marian Trowbridge	March 31, 2017	Comments
Northern Colorado Water Conservancy District	March 31, 2017	Comments
Aurora Water	April 3, 2017	Comments
Summit County	April 3, 2017	Comments
South Metro Denver Chamber	April 3, 2017	Comments
Teagen Blakey	April 4, 2017	Comments
Yvonne Short	April 4, 2017	Comments
Platte Canyon Water and Sanitation District	April 4, 2017	Comments
Southwest Metropolitan Water and Sanitation District	April 5, 2017	Comments
David Bahr	April 5, 2017	Comments
R Reynolds, Eldorado Springs, CO	April 6, 2017	Comments
Colorado Department of Natural Resources	April 10, 2017	Comments
GF Properties Group, LLC	April 10, 2017	Comments

Most of the comments filed in response to the notice expressing support of Denver Water's proposal focused on issues that were already covered in the 2014 Final EIS. These issues included: water conservation measures are not enough to address water needs, and increased storage would benefit the overall water system; support for the Colorado River Cooperative Agreement; enlargement of Gross Reservoir would provide critical storage for a reliable supply; generation of clean, renewable hydropower; increased protection and preparedness for potential wildfires, droughts, and other natural disasters; a net environmental benefit for customers on both the eastern and western side of the Continental Divide; and proposed adaptive management ensures flexibility to provide water from multiple sources when needed.

Many of the comments objecting to or expressing concerns regarding Denver Water's proposal also focused on issues already covered in the 2014 Final EIS, such as the overall expansion of the Moffat Collection System. Those comments that did not focus on the amendment application are outside the scope of this Supplemental EA. Examples of such issues include: (1) adequacy of the alternatives considered in the Final EIS; (2) accuracy of projected water demand and the need to enlarge the Moffat Collection System; (3) imbalance between Denver Water's north water system (Moffat Collection System) and its south water system; (4) increased protection and preparedness for potential water emergencies; (5) effects of climate change on water system operations; and (6) water availability and ability to fill the reservoir to capacity of the water treatment system. Comments outside of the scope of the Supplemental EA are not addressed further.

Comments received that are within the scope of this Supplemental EA are summarized below by topic and are addressed in section 5.0 *Environmental Analysis*.

#### Geology - Seismicity

- Earthquake potential due to a larger reservoir.

#### Water Quality

- Impacts of increased mercury in the reservoir from methylation as a result of the project.

#### Wetlands

- Wetland and riparian mitigation should occur within the South Boulder Creek watershed.



### Wildlife Habitat and Mitigation for Tree Loss

- Project includes insufficient mitigation to replace the loss of 465 acres of critical habitat around the reservoir for wildlife being displaced including deer, elk, moose, coyote, bobcat, mountain lion, water fowl, and innumerable bird species.
- Destruction of more than 200,000 trees must be mitigated, and the method of cutting and disposal of the trees must be described.
- Burning of more than 200,000 trees would have a carbon impact that may exceed the carbon impact of the construction of the remainder of the project. There is no viable market in the vicinity for wood products derived from the trees that would be removed, and the applicant has provided no plan for addressing this issue.
- Forest acreage lost through inundation should be compensated with like amounts of additional forest protection as compensatory mitigation.
- Construction traffic and quarry operations would create noise, dust, and disturbance to wildlife populations.

### Recreation

- Closures to boating, fishing, hiking, picnicking, and other visitor activities are not adequately addressed.
- A license reopener to address impacts on recreation if the reservoir does not fill in most years should be included.

### Aesthetics and Land Use

- Substituting undeveloped lands in a different county (Toll Property) would not mitigate the damage to scenic values, such as the inundation of Forsythe Falls or sound impacts on wildlife or residents during the proposed 3-year on-site quarry operation, or the 24-hour concrete plant operations.
- A land trade between landowners and Denver Water for about 15 acres to replace that which is to be condemned and to replace the lower road that provides critical access and is within the FERC permit boundary should be considered.

- Fencing to protect property from increased visitation must be provided closer to the property and fire mitigation efforts must be included.
- Effects on residents and recreationalists from viewing a barren shoreline with the reservoir less than half full at least half the time must be addressed.

#### Construction, Roads, and Traffic

- Public safety concerns associated with up to 50 truck trips a day must be addressed in terms of noise, slowing of traffic, dust, road width, and the hazards to drivers, pedestrians, motorcyclists, and bicyclists.
- Haul studies and impacts on traffic and local roads must be analyzed and mitigated.
- Roads that would be affected must be clearly identified by the applicant.
- Discussion of the impacts that would be caused by workers driving to and from the project site each day must be included.
- Several references in the application appear out of date: a 10-year old regional transportation plan (Metro Vision 2030 Plan), which was replaced by the 2040 Regional Transportation Plan in 2015; 10-year old financial data related to the Colorado Department of Transportation (Colorado DOT); and reference to plans that do not exist for the Colorado DOT to add lanes to two state highways that would be used to bring workers and supplies to and from the project site (Colorado State Highway [SH] 72 and SH 93).

#### **4.1.3 Denver Water's Response to Comments**

On May 16, 2017, Denver Water filed a response to the comments filed on the Commission's February 1, 2017 public notice. Denver Water included as attachments to its filing a noise impact report (Gross Dam Noise Impact Report; Denver Water 2017a), a draft traffic control plan (draft Traffic Control Plan; Denver Water 2015), and a memorandum evaluating its measures to minimize and avoid impacts related to the quarry (Final Memorandum: Evaluation of Denver Water's Final Quarry Location Report; URS 2017). In its filing, Denver Water reviewed that comments on purpose and need for the overall expansion of the Moffat Collection System were thoroughly addressed in the 2014 Final EIS. We agree, and note that comments on these issues are also outside of the scope of this Supplemental EA, as explained in section 2.3 *Scope of This Supplemental Environmental Assessment* above, and are not addressed further. Denver Water's responses to comments relative to the proposed license amendment before the Commission are organized by topic and summarized below. We considered

Denver Water's responses in our review, and in addressing comments in section 5.0 *Environmental Analysis*.

### Property and Access

Regarding comments on access to properties in Miramonte, Denver Water reviewed that it is meeting with Miramonte representatives to develop a Memorandum of Agreement (MOA) and exploring alternatives to condemnation of land, such as exchanging real property interests. Denver Water gave examples of specific measures that are being considered, including within an MOA, to protect and control access, and protect properties in Miramonte. Denver Water indicates that it would submit a copy of any final MOA with Miramonte to the Commission to demonstrate resolution of the issues raised by Miramonte.

Denver Water reviews that, based on comments from Miramonte, Boulder County and others concerning the location of the proposed Osprey point quarry and proximity to residential areas, it commissioned its attached Gross Dam Noise Impact Report (Denver Water 2017a), to better understand what the anticipated noise levels associated with the proposed quarry operations at Osprey Point, and other dam construction activities. The study verified the conclusions found in the Final EIS, affirming that noise levels from both the EIS quarry and the Osprey Point quarry would be below local noise ordinances. Denver Water reviewed that it would still work with local communities, including Miramonte, to develop measures to monitor, minimize, and mitigate noise disturbance during construction. Denver Water noted that, while locating the quarry at Osprey Point may have greater temporary noise impacts to some landowners, it may have less impact on others, and would provide a temporary benefit of shielding the view of the quarry from some residences and allowing all or nearly all of the quarry to be submerged at most new higher reservoir levels. Denver Water also reviewed that it is proposing to include the local community in the development and finalization of several plans, including a traffic management plan and a tree removal plan, to minimize disturbances caused by construction activities.

Specific to comments regarding property values, Denver Water stated that it has not found that there would be any diminishment in property values or loss of use resulting from construction or operation of the proposed project.

### Trees and Habitat

In response to comments about removal of vegetation in the proposed inundation zone, Denver Water reviewed that the Final EIS analyzed impacts associated with tree loss and included the types of activities used for clearing and removal. Denver Water indicates that the methods to be used in certain locations have not been determined, and its tree removal plan, to include such methods, would be finalized with input from relevant agencies and local governments.

In response to comments on destruction of land for the Osprey Point quarry, and adverse effects of sound and dust pollution from quarry operations, Denver Water noted that its Settlement Agreement with the Forest Service includes agreements with the Forest Service on all project-related, ground-disturbing activities, including the quarry, through 4(e) conditions that Denver Water would be required to follow.

Denver Water responded to comments on public safety and impacts on residential traffic hazards by indicating that safety would be a priority during construction as the public continues to use adjacent lands and the reservoir for recreation. Denver Water referenced the safety plans it continues to comply with pursuant to the requirements of the project license, and the plans it has proposed that address public safety during construction, such as the its Traffic Management Plan.

### Recreation

Denver Water also responded to comments on recreation impacts, including loss of scenic areas, inundation of areas such as Forsythe Falls, and closures to boating, fishing, hiking, picnicking and other visitor activities. Denver Water noted that, its proposed Recreation Management Plan Addendum (RMP Addendum) included in its application, identifies recreation facilities that would need to be relocated and where the facilities would be relocated to. It also notes the Final EIS analyzed all ground-disturbing impacts of the project, including construction and relocation of recreation facilities.

Denver Water also addressed comments regarding the mitigative adequacy of its planned transfer of the 539-acre Toll Property to the Forest Service. Denver Water reviewed that the transfer is proposed to offset impacts caused by inundation of lands and as mitigation for effects of the quarry, construction of the saddle dam, and staging and stockpile areas on National Forest System land that cannot be otherwise mitigated. Regarding comments that the transfer is not adequate mitigation because the property is in a different county, Denver Water responded that the property is in the South Boulder Creek watershed, and is in fact appropriately located to mitigate effects at Gross Reservoir.

Denver Water reviewed that the Toll Property includes 43 acres of wetlands, 253 acres of riparian habitat, and over 5.5 miles of stream. In comparison, the proposed project would inundate 280 acres of Forest Service land, 2 acres of wetlands, 4 acres of riparian habitat, and 5.7 miles of stream. Additionally, the Colorado National Heritage Program (Colorado NHP) classifies the Toll property as “very high biodiversity” while only a small portion of the area affected by the proposed project is classified as biodiverse by the Colorado NHP. Further, Denver Water notes that the Toll Property contains scenic vistas and opportunities for solitude, opportunities for remote high-elevation hiking and backpacking, and non-motorized access to the James Peak

Wilderness and Continental Divide Trail, and it contains jurisdictional wetlands and riparian areas that would be protected through the Forest Service management.

### Transportation

Denver Water provided responses to a number of issues related to, or specific to transportation, including traffic burden, traffic control, travel times and road restrictions, weight of the trucks and noise, odors, and dust, and road maintenance and road improvements.

Denver Water reviewed that its draft Traffic Control Plan (Denver Water 2015) is an example of the traffic control plan it would finalize with Colorado DOT, Boulder County, and affected community members, and then file for Commission approval to address traffic concerns. Denver Water indicated that a jointly-developed plan would include commitments for travel times, roads used or restricted from use, road maintenance, road improvements and other measures to minimize associated impacts from trucks, such as noise, odors, dust, as well as safety measures that could include a shuttle for workers. It also noted that some aspects of trucking specific to tree removal would be addressed in a jointly-developed finalized tree removal plan.

Denver Water reviewed that traffic volume would already be reduced from what was calculated in the Final EIS by a calculated 16,900 trucks through its current plan to produce all aggregate on site at the Osprey Point quarry. Denver Water reviewed information on traffic it had already included with its amendment application, including detailed traffic studies examining the ability of haul trucks to navigate the roads to Gross Reservoir, turn-out locations and practicality, hauling alternatives, and use of trucks to haul tree debris and slash and deliver road base material. Denver Water pointed to a project website, <http://www.GrossReservoir.org>, which describes traffic studies and results.

### Seismicity

Denver Water noted that effects to seismicity resulting from an enlarged reservoir, had been discussed in the 2014 Final EIS, and that there are no identified active faults in the project area. Denver Water also noted that construction and operation of the current project has not resulted in any increase in recorded seismic activity. Denver Water reviewed that reservoir-induced seismicity is not a potential failure mode for the current dam. It also indicated that it would utilize the Commission's seismic hazard evaluation guidelines when designing the raised dam.

## 4.2 STATUTORY COMPLIANCE

### 4.2.1 Federal Power Act Section 4(e)

Section 4(e) of the FPA provides that any license issued by the Commission for a project within a federal reservation shall be subject to and contain such conditions as the Secretary of the responsible federal land management agency deems necessary for the adequate protection and use of the reservation. Thus, any 4(e) condition that meets the requirements of the law must be included in any license issued by the Commission. The existing license for the project contains Forest Service 4(e) conditions that were issued on February 7, 2001, and included in the license as Appendix A.

On September 9, 2016, Denver Water and the Forest Service executed a Settlement Agreement regarding Denver Water's proposal to enlarge the Moffat Collection System. The Settlement Agreement included 30 Forest Service section 4(e) mandatory conditions that the Forest Service would file as part of this license amendment proceeding. It also contained an extensive off-license agreement detailing a number of environmental commitments Denver Water would fulfill at locations throughout the Moffat Collection System. The Forest Service formally filed its 30 preliminary 4(e) conditions with the Commission on March 27, 2017.

The Forest Service organized its preliminary 4(e) conditions in three groups. Part I, Standard Administrative Conditions, contains conditions 1 through 16. These conditions are primarily administrative, and the Forest Service indicates they are necessary for administration of National Forest System lands. Part II, Standard Resource Conditions, contains conditions 17 through 20, which the Forest Service indicates are necessary for protection and utilization of National Forest System lands. Part III, Project-Specific Conditions, contains conditions 21 through 30, which the Forest Service indicates are specifically related to the Denver Water's current proposal. The full text of all 30 preliminary conditions are attached to this Supplemental EA as Appendix A. Conditions 17 through 29 would help protect resources that could be affected by work associated with enlargement of Gross Reservoir or operation of the enlarged reservoir, and are summarized below. These conditions are addressed, as appropriate, in the resource sections of this Supplemental EA. As noted at the end of each summary, some of these conditions would add new requirements to the project license, some would modify existing requirements, and some would replace existing requirements.

- Condition No. 17: Invasive Species Management. Within 1 year of the license amendment issuance and at least 90 days before ground-disturbing or construction activities, file with the Commission: (1) an aquatic invasive species management and monitoring plan and (2) an invasive plant and noxious weed species management plan. The aquatic invasive species plan includes public education components, such as signage and information pamphlets at designated public boat

accesses, and BMPs for project-related activities. The invasive plant and weed plan includes surveys for species included on the Forest Service and Colorado Department of Agriculture Noxious Weed List. Both plans would remain in effect for the remaining term of license, and include treatment, monitoring, and reporting elements. (Replaces existing conditions 107 and 108; complements Article 406).

- Condition No. 18: Special Status Species and Sensitive Areas. Prepare and submit a biological evaluation (BE) to the Forest Service for review and approval when the Forest Service determines that proposed actions may affect Forest Service special status species or their habitat on Forest Service land. The condition does not require a BE for the construction and ground-disturbing activities under the license amendment, but would cover the remaining term of license. (New condition).
- Condition No. 19: Erosion Control and Reclamation. Within 2 years of the effective date of the amended license and at least 90 days before ground-disturbing or construction activities, file with the Commission an erosion control and reclamation plan that provides direction for treating erosion, controlling sedimentation, and reclaiming disturbed sites on project-affected Forest Service land during the remaining term of license. (Replaces condition 104; complements Article 401).
- Condition No. 20: Fire Management and Response Plan. Within 2 years of the effective date of the amended license and at least 90 days before ground-disturbing or construction activities, file with the Commission a fire management and response plan. The plan would detail Denver Water's responsibility for the prevention (including fuels treatment), reporting, emergency response, and investigation of fires on Forest Service land related to project operations. (New condition; complements Article 407).
- Condition No. 21: Raptor Protection Measures. Prior to reservoir inundation, replace the two existing osprey nest platforms located in the inundation area of Gross Reservoir, either on top of suitable trees or on poles. Conduct any tree cutting or removal authorized by the Forest Service prior to March 1 or after July 31 to prevent raptors (and other birds) from nesting on-site during tree clearing and to avoid destruction of or disturbance to active nests during the breeding season. If tree cutting or removal begins between March 1 and July 31, conduct surveys on Forest Service land for raptor nests, including hawks, falcons, and owls, prior to the start of land-disturbing activities and, if raptor nests are found, alter tree cutting or removal timing until chicks have fledged. (Replaces condition 104).

- Condition No. 22: Special Status Plants Relocation Plan. Within 2 years of the effective date of the amended license and at least 2 years before tree removal within inundation areas, file with the Commission a special status plants relocation plan for addressing impacts on special status plants on Forest Service land. The plan would detail how Denver Water would collect and transport Forest Service special status plant species found on Forest Service land within the new inundation area and new areas to be disturbed for the relocated recreation facilities. The plan includes specific relocation quantities for wild sarsaparilla, Dewey sedge, Sprengel's sedge, enchantress's nightshade, tall blue lettuce, Maryland sanicle and false melic, as detailed in Appendix A of the preliminary section 4(e) terms. (New condition; complements Article 410).
- Condition No. 23: Visual Resource Protection Plan. At least 90 days before ground-disturbing or construction activities on Forest Service land authorized by the license amendment, file with the Commission an addendum to the current Visual Resource Protection Plan (approved by FERC on May 22, 2003), that includes: (1) measures for mitigating visual impacts from project-related construction activities on Forest Service land; (2) measures for reshaping and revegetation of disturbed areas to blend with surrounding visual characteristics on Forest Service land; and (3) a maintenance schedule. (Replaces condition 105; complements Article 414).
- Condition No. 24: Recreation Management Plan. Implement the addendum to the existing plan under license Article 416, submitted with the final license amendment application. Beginning on the effective date of the amended license, manage activities to minimize the potential for bear/human interactions including trash management, signing to inform workers and visitors on bear activity, and proper behavior to reduce potential for attracting bears. Conduct annual monitoring of recreation use and report finding every 3 years. If the Forest Service determines there is a need, develop and file with the Commission a recreation adaptive management plan for Winiger Ridge. Provide fishing line receptacles at five locations as described in the plan amendment. (Replaces condition 106; complements Article 416).
- Condition No. 25: Channel Instability and Bank Erosion. At least 1 year prior to the initial filling of the enlarged reservoir, file with the Commission a revised South Boulder Creek Channel Stability Monitoring Plan. The revised plan would include two new monitoring reaches established during the dam construction period. The plan would include monitoring, as detailed in Appendix A of the preliminary section 4(e) conditions, to determine if increased flows are affecting channel morphology between the East portal and Gross Reservoir. (Replaces condition 110).



- Condition No. 26: Pit Development and Reclamation Plan. At least 90 days before ground-disturbing or construction activities associated with quarry pit development on Forest Service land, file with the Commission a pit development and reclamation plan. The plan would address: (1) development, construction, operation, reclamation and rehabilitation of the quarry on affected Forest Service land; (2) location, activity, amount of surface activity, reclamation measures, safety measures, and measures to protect and minimize impacts on natural resources; and (3) transportation management during construction, describing how construction traffic would be managed to minimize disruption on Forest Service roads and provide for visitor safety. (New condition).
- Condition No. 27: Tree Removal Plan. At least 90 days prior to tree removal within the inundation area of the enlarged reservoir, file with the Commission a tree removal plan. The plan would address the removal of trees around Gross Reservoir to maximize product utilization and minimize traffic and environmental effects. The plan would address: (1) roads to be improved, constructed, and used for tree removal activities; (2) restoring roads to pre-project conditions; (3) travel management considerations such as prevention of public use of temporary roads created for tree removal; (3) transportation management during tree removal activities; and (4) how project-related traffic would be managed to minimize disruption on Forest Service roads and provide for visitor safety. The plan's schedule for tree removal would consider, among other items, key winter range timing for elk (December 1 through March 30) and raptor nesting season (varies depending on species). (New condition).
- Condition No. 28: Reclamation and Revegetation Seed Mixes and Mulch Materials. Consult with the Forest Service on seed mixes and mulch materials used for all project reclamation and revegetation activities on Forest Service land. Seed mixes and mulch materials used for revegetation and reclamation would be subject to prior Forest Service review and approval. (New condition).
- Condition No. 29: Public Safety and Law Enforcement. After project components are implemented, file with the Commission an update to the Public Safety and Law Enforcement Plan. (New condition; complements Article 418).

#### **4.2.2 Federal Power Act Section 18**

Section 18 of the FPA states that the Commission is to require construction, operation, and maintenance by a licensee of such fishways as may be prescribed by the Secretaries of Commerce or Interior.

In its March 24, 2017 filing, the Department of the Interior (Interior), on behalf of the FWS, indicated that it currently lacks sufficient information to support filing a

prescription for fishways. Interior stated that it therefore exercises its statutory authority pursuant to section 18 of the FPA by preliminarily reserving authority to prescribe the construction, operation, and maintenance of fishways in the future, and it provided wording reserving its authority to be included in any license amendment that may be issued.

#### **4.2.3 Clean Water Act Section 404**

Under section 404 of the federal CWA, the Corps reviews permits for projects proposing to deposit or discharge dredge or fill material into waters of the United States, including wetlands, and projects must receive authorization for any such activities. Applicable discharges include return water from dredged material disposed on upland property, and generally any fill material, such as rock, sand, or dirt.

Denver Water applied to the Corps for a CWA section 404 permit to discharge fill material into South Boulder Creek during work to increase the height of the Gross Reservoir Project's Gross Dam that would be necessary in order to enlarge the Moffat Collection System. South Boulder Creek is a "water of the United States," as defined under the CWA. The Corps determined that an analysis of the potential effects of the enlargement of the Moffat Collection System and its reasonable alternatives was necessary to provide full public disclosure and to aid in decision making. As noted above, the Corps prepared an EIS to evaluate project effects and issued a Final EIS on April 25, 2014. The Corps issued its Record of Decision on July 6, 2017, but has yet to issue a section 404 permit.

#### **4.2.4 Clean Water Act Section 401**

The CWA gives authority to each state to issue a section 401 WQC for any project that needs a federal section 404 permit. Additionally, an applicant is required to obtain a WQC for any activity that may result in a discharge into navigable waters. The WQC is verification by the state that the project would not violate water quality standards.

Colorado DPHE issued a WQC for the licensing of the Gross Reservoir Project on September 3, 1997, and the conditions of that WQC are attached to the project license issued March 16, 2001 as Appendix B.

Denver Water filed an application with Colorado DPHE for WQC for the proposed enlargement of the Moffat Collection System, including enlargement of Gross Reservoir, on April 29, 2015. Colorado DPHE noticed the application for a 30-day public comment period, which closed on July 31, 2015, and subsequently issued the WQC on June 23, 2016. The June 23, 2016 WQC includes 16 conditions, which are attached to this Supplemental EA as Appendix B.

The WQC includes conditions that address water quality at locations throughout the Moffat Collection System. Commission staff reviewed the conditions contained in the WQC and determined that conditions 1 through 5 and conditions 7 through 11 do not have a nexus to the FERC-licensed Gross Reservoir Project or the proposed amendment of license, and are not analyzed in this Supplemental EA. The WQC conditions that do have a nexus to the Commission's action are summarized below.

- Condition 6: Monitor continuous stream temperature at four locations in South Boulder Creek, including (1) South Boulder Creek above Gross Reservoir at Pinecliffe; (2) Gross Reservoir Outlet (FERC monitoring location); (3) South Boulder Creek at a location between the reservoir outlet and the diversion point (to match the corresponding site for sampling benthic macroinvertebrates); and (4) South Boulder Creek at the diversion structure. Monitoring at these sites would begin later than 1 year after the date of issuance of the Corps' 404 permit or the FERC license, whichever is later, and would continue for not less than 5 years after the project becomes fully operational.
- Condition 12: Monitor aquatic communities at three sites in South Boulder Creek below Gross Reservoir, including (1) South Boulder Creek immediately downstream of Gross Reservoir; (2) South Boulder Creek at a location between the reservoir outlet and the diversion point for the municipal water supply; and (3) South Boulder Creek upstream of the diversion point and the lentic zone it creates. Monitoring would include sampling benthic macroinvertebrates using Colorado DPHE methods and calculating multi-metric index (MMI) scores. If monitoring of aquatic life demonstrates that the project is responsible for degradation of aquatic life (as indicated with the MMI), Denver Water would be required to develop a mitigation plan.
- Condition 13: Work with Colorado DPHE to support a biennial program to monitor mercury in fish tissue in Gross Reservoir. The sampling effort for Gross Reservoir would begin in the first field season after the enlarged reservoir has filled and continue for 5 more years. If mercury levels fall below the level of concern for the last 3 years of sampling, Denver Water's monitoring obligation would end. If there is bioaccumulation of mercury in fish tissue at the end of the 5-year period, the obligation for monitoring would be extended for an additional 5 years. If fish tissue analyses show that a fish consumption advisory is required, Denver Water would work with the Technical Advisory Team 34 of the Colorado Fish Consumption Advisory Committee to provide public education including the posting of signs with associated consumption advisories.
- Condition 14: Monitor concentrations of total recoverable metals, dissolved metals, and hardness at the following sites: (1) South Boulder Creek above Moffat Tunnel outfall; (2) South Boulder Creek at Pinecliffe; and (3) South Boulder Creek at the diversion structure. Collect samples monthly except where winter conditions prevent access. Monitoring at these sites would begin no later than the

date of issuance for the Corps' 404 permit or the amended FERC license, whichever is later, and continue for 5 years after the project becomes fully operational. Denver Water would submit the data annually to Colorado DPHE, along with a report documenting exceedances of the nutrient standards, by April 1 following each calendar year of sampling.

- Condition 15: If monitoring indicates an impairment to water quality, perform investigations to determine what contribution operation of the project has made to the impairment. Denver Water would submit the investigation report to Colorado DPHE within 12 months after the impairment is detected. If the Colorado DPHE concludes that operation of the project is primarily responsible for the impairment, Denver Water would prepare a mitigation plan.
- Condition 16: Monitor water quality in Gross Reservoir beginning no later than the ice-free season following issuance of the Corps' 404 permit or the amended FERC license, whichever is later, and continue for 5 years after the project becomes fully operational. Denver Water would submit monitoring data to Colorado DPHE annually by April 1 following each calendar year of sampling. Sampling would occur monthly during the ice-free season and at a site in deep water near the dam. Analysis would include general field parameters, nutrients and biological collections, major ions, and metals.

#### **4.2.5 Endangered Species Act**

Section 7 of the ESA requires federal agencies to ensure their actions are not likely to jeopardize the continued existence of federally-listed threatened or endangered species, or result in the destruction or adverse modification of the critical habitat of such species.

The Corps conducted extensive consultation under section 7 of the ESA with FWS on Denver Water's proposed expansion of the Moffat Collection System. Part of this consultation included the effects of the action before the Commission involving the proposed enlargement of Gross Reservoir and amendment of the project license.

The Corps initiated consultation under ESA section 7 on February 20, 2009, when it provided FWS with a Biological Assessment (BA) on expansion of the Moffat Collection System. The FWS then issued a Biological Opinion (BO) for the action on July 31, 2009. However, after review of the Corps' October 30, 2009 Draft EIS and additional species information, the FWS determined that reinitiation of section 7 consultation was warranted. The Corps therefore provided FWS with revised information in a series of BAs for expansion of the Moffat Collection System, and the FWS issued three BOs. In a BO issued December 6, 2013, FWS addressed effects to federally-listed species associated with flow depletions on the Colorado and Platte Rivers, and to threatened Preble's meadow jumping mouse in Colorado. On January 29, 2016, FWS issued a BO that reviewed effects from operation of the proposed 5,000 acre-foot Environmental Pool on listed species in the Platte River in Nebraska. On June 17, 2016,

FWS issued a BO that reviewed the effects of stream diversions on the west slope of the Rocky Mountains, in the upper Colorado River system, to federally-listed threatened greenback cutthroat trout.

The December 6, 2013 BO addressed the effects of the action before the Commission involving Gross Reservoir. In the December 6, 2013 BO, the FWS concurred with the Corp's determination that enlarging Gross Reservoir is not likely to adversely affect the Preble's meadow jumping mouse because, although it has the potential to occur in the project area, it is not known or expected to be present. The June 17, 2016 BO specific to greenback cutthroat trout clarified that, due to stocking of hybrid trout in Gross Reservoir in 2002 and 2004, any greenback cutthroat present in Gross Reservoir is not considered a protected population under the ESA.

The occurrence of federally-listed species at the Gross Reservoir Project is provided in section 5.1.6 *Threatened and Endangered Species*.

#### **4.2.6 National Historic Preservation Act**

Under section 106 of the NHPA,<sup>8</sup> and its implementing regulations,<sup>9</sup> federal agencies must take into account the effect of any proposed undertaking on properties listed or eligible for listing in the National Register of Historic Places (National Register), which are defined as historic properties, and afford the Advisory Council on Historic Preservation (Advisory Council) a reasonable opportunity to comment on the undertaking. The proposed action would adversely affect two historic properties that are eligible for listing on the National Register: the dam and reservoir itself (5BL10210), and the Resumption Flume (5BL7019.1).

Commission staff proposes to execute a memorandum of agreement (MOA) with the Colorado SHPO for the project that would memorialize agreed-upon mitigation for the proposed action's adverse effect on these two historic properties. Commission staff developed a draft MOA with the Colorado SHPO and licensee which was included with the licensee's application. Pursuant to section 106, the Commission would also notify the Advisory Council of the proposed action's adverse effect, provide a copy of the draft MOA memorializing the agreed-upon mitigation, and ask the Advisory Council if it wishes to comment or participate in the undertaking.

The draft MOA states that the Commission, subsequent to any authorization of the proposed amendment, and prior to project construction activities, would ensure that the measures stipulated in the agreement are carried out, including, but not limited to:

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<sup>8</sup> 16 U.S.C. § 470 (2012).

<sup>9</sup> 36 C.F.R. Part 800 (2017).

(1) development and submittal of HAER documentation of the project dam, reservoir, and Resumption Flume to the National Park Service; and (2) development of an HPMP for the entire Gross Reservoir Project for Commission approval. The HPMP would be prepared in accordance with the Commission's and Advisory Council guidance and would contain measures to avoid, protect, or resolve any adverse effects on historic properties within the project's area of potential effects (APE) over the remaining term of the project license.

#### **4.2.7 Water Rights Act**

The license application submitted by Denver Water in 1998 states that Colorado is a prior appropriation state. Denver Water owns water rights that may be stored and released from Gross Reservoir in accordance with state law. Water delivered to Gross Reservoir comes from two different sources: West Slope diversions via the Moffat Tunnel and native flows in South Boulder Creek. The enlarged Gross Reservoir would store water diverted under the following existing water rights:

- South Boulder Creek: Denver Water can store up to 113,078 acre-feet of water from South Boulder Creek under a decree entered in C.A. 12111, Boulder County District Court, dated September 28, 1953.
- Fraser River Diversion Project: Denver Water can store up to 113,078 acre-feet of water diverted from the Fraser River and its tributaries through the Moffat Tunnel under decrees entered in C.A. 657, Grand County District Court, dated November 11, 1937, and April 15, 1946.
- Cabin Meadow Creek Collection System: Denver Water diverts from the Cabin Meadow Creek System pursuant to an agreement with the City of Englewood and Cyprus Climax Metals Company dated August 11, 1995, and under decrees entered in C.A. 657, dated November 11, 1937; Case No. W-750-78, dated January 17, 1980; and C.A. 1430, dated November 7, 1974.
- Williams Fork Diversion Project: Denver Water diverts water from the Williams Fork River and its tributaries under a decree entered in C.A. 657, dated November 11, 1937. Denver Water transports this water for direct use or storage in its municipal water system, including Gross Reservoir.

The Constitution of Colorado delegates specific authorities to home rule cities. Denver is a home rule city and, per the state constitution, the City and County of Denver may “maintain, conduct, and operate water works, light plants, [and] power plants ....” The Charter of the City and County of Denver specifically authorizes Denver Water to generate and sell electrical energy. Operation of the hydroelectric project and water supply facility is in compliance with Colorado state law and the Charter of the City and County of Denver.

Denver Water currently holds all necessary water rights to fill the enlarged reservoir. Water rights for the 5,000-acre-foot Environmental Pool that would be stored and released under an off-license Intergovernmental Agreement between Denver Water and the Cities of Boulder and Lafayette would be the responsibility of the cities of Boulder and Lafayette. No new conveyance structures or changes to existing conveyance structures are needed.

## **5.0 ENVIRONMENTAL ANALYSIS**

The 2014 Final EIS analyzed many of the environmental effects of enlarging Gross Reservoir as part of enlarging the Moffat Collection System, such as inundation to new maximum water levels and construction activities. However, some information, such as final determinations of quarry sites and other construction activities, and plans to modify license-required recreation facilities, was not available at the time the Final EIS was issued. The Commission must consider these project details and associated effects under NEPA as it reviews the effects of Denver Water's proposal to amend its license for the Gross Reservoir Project. Therefore, the scope of our analysis in this Supplemental EA is generally limited to the following: (1) revisions in certain details of dam raise construction activities, including relocation of the on-site quarry; (2) potential elimination of the previously-proposed auxiliary spillway and replacement with a saddle dam; (3) certain aspects of tree clearing and inundation to new maximum reservoir elevation of 7,406 feet msl not addressed in the Final EIS; (4) effects of changes in project operation including revisions to the ramping rates required under the license; (5) modifications to project recreation facilities required under the license; (6) modification to the project boundary; (7) effects of Denver Water's proposed environmental mitigation measures; and (8) effects of Denver Water's compliance with statutory requirements.

Information in the descriptions of affected environment in the resource sections below is drawn from the 2014 Final EIS and its appendices; Denver Water's November 25, 2016 license amendment application, its March 24, 2017 response to additional information request, and its May 16, 2017 response to comments, as well as the appendices and attachments to those filings.

### **5.1 GENERAL DESCRIPTION OF GROSS RESERVOIR PROJECT AREA**

The general description of the areas surrounding Gross Reservoir provided in the Final EIS remains unchanged.

#### **5.1.1 Geology and Soils**

The 2014 Final EIS (sections 5.5.1.1 and 5.6.1.1) reviewed effects on geology and soil resources associated with Denver Water's proposal to raise Gross Dam and enlarge Gross Reservoir, finding that moderate, direct, permanent impacts on local geology would occur through loss of materials used for dam raise construction and loss of some material through inundation. It also found that minor, indirect permanent impacts could occur along the rim of the reservoir through instability and erosion due to the increased water elevations. The Final EIS found that about 465 acres of soil could be permanently affected by raising Gross Dam, enlarging Gross Reservoir, and work on related facilities. This includes the removal of trees around the reservoir from the current pool elevation of 7,282 feet msl up to an elevation of 7,410 feet msl. The Final EIS found that about 89 acres of soil could be temporarily affected through construction activities, and that soil



erosion from construction and other soil-disturbing activities could increase runoff and erosion rates and sedimentation in receiving waters. The Final EIS determined that certain mitigation measures proposed by Denver Water, including an Erosion Control and Reclamation Plan, and measures required by the state would reduce effects on these resources.

The Final EIS also evaluated the installation of an auxiliary spillway at Osprey Point to enable the enlargement of the reservoir at a topographic low point, and development of a discharge channel downstream of the spillway to guide flows to an established downstream channel.

Since issuance of the 2014 Final EIS, Denver Water has changed the location of the proposed on-site quarry that would supply material for the expansion of Gross Dam, and it has determined that the additional spillway capacity of an auxiliary spillway may not be needed. If the auxiliary spillway is not needed, Denver Water would install a saddle dam where the auxiliary spillway was to be located, and the discharge channel would also not be needed. In the following section, our review includes we review these changes and their effects on geology and soils.

#### **5.1.1.1 Affected Environment**

The description of affected environment pertaining to geology and soils provided in the Final EIS remains unchanged, but the location of the proposed quarry differs from the location evaluated in the Final EIS. In the Final EIS, the Corps evaluated a potential quarry location on Forest Service lands within the Roosevelt National Forest on the eastern bank of the reservoir. Based on preliminary site investigations, the original quarry site was estimated to be able to provide 426,000 cubic yards of the necessary fine aggregate material needed for construction of the proposed dam expansion. The quarry was to be a benched quarry, and a portion of the quarry site would not be submerged when the reservoir was filled to the proposed maximum elevation of 7,406 feet msl.

In the amendment application, Denver Water included information from additional site investigations that showed that the Final EIS quarry site, which would partly occupy Forest Service lands, could provide all 796,000 cubic yards of aggregate material needed for construction, but it also included evaluation of an alternative quarry site at Osprey Point, located on the southeastern side of the reservoir, entirely on Denver Water lands. The new quarry location was also determined to be capable of providing all of the fine aggregate needed.

The amendment application also noted that an auxiliary spillway might not be needed at Osprey Point, in which case a saddle dam would be installed instead to address a topographic low point on the periphery of the enlarged reservoir. If the spillway is not needed, the downstream discharge channel would not be needed. This would be determined as the result of flood studies during final design.

### **5.1.1.2 Environmental Effects and Mitigation**

The Final EIS evaluated potential effects related to the modification of Gross Dam, including construction, quarry, spoil and laydown areas; tree removal in areas that would be inundated by the enlargement of the reservoir; and relocation of recreational facilities.<sup>10</sup> The Final EIS also evaluated proposed measures to prevent erosion, including the development of a Soil Erosion Control Plan.

As stated above, in the amendment application, Denver Water proposed a new primary quarry location at Osprey Point, located entirely on Denver Water lands. Denver Water included in its application a comparison of the effects of the Final EIS quarry site and the Osprey Point site on geology and soils in the vicinity of the project.<sup>11</sup> The comparison found that use of either quarry site would result in a permanent unavoidable adverse effect on geology due to the removal of bedrock, sand, and gravel deposits and alteration of topography. The comparison also found that use of either site would result in permanent unavoidable adverse effects to soil resources due to the removal of surface soils and alteration of topography. However, Denver Water noted that soils at the Final EIS quarry site have a severe erosion potential, while soils at the Osprey Point quarry site have a moderate to severe water erosion hazard potential. The Osprey Point site is also less susceptible to erosion than the Final EIS site due to the steeper slopes of the Final EIS site. The Osprey Point quarry site would have a smaller disturbed area (16 acres versus 29 acres). Based on this information, we believe that use of the Osprey Point quarry site, as currently proposed, instead of the quarry site examined in the Final EIS, would result in less negative impact to geology and soils in the project area. In addition, use of the Osprey Point quarry site would eliminate effects on geology and soils on Roosevelt National Forest lands.

Regardless of location, development and use of quarry sites would result in the generation of dust that could also enter project waters or be carried away from the quarry site by trucks and wind. Denver Water would develop a Fugitive Dust Control Plan to reduce and control these effects as a component of the state permitting process.

The analysis in the Final EIS for installation of a spillway at Osprey Point and a discharge channel essentially included the potential effects of construction of a saddle dam. The area of disturbance involved for installation of a saddle dam would be smaller because there would be no need to develop a downstream discharge channel for a spillway.

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<sup>10</sup> See Attachment E-5 to the amendment application, “Analysis of Quarry Areas for the Proposed Gross Reservoir Expansion” (April 2016).

<sup>11</sup> Final Quarry Location Report (Denver Water. 2016a)..

Denver Water would develop a Stormwater Management Plan, an Erosion Control and Reclamation Plan, and a Quarry Operation Plan and a Quarry Reclamation Plan that would reduce, control, or mitigate potential soil erosion resulting from the development, use, and final condition of the Osprey Point quarry site. Denver proposes to consult with Boulder County and the Mine Safety and Training Program arm of the Colorado Division of Reclamation, Mining, and Safety to develop quarry operation procedures and with the Corps, Boulder County, and the Colorado Division of Reclamation, Mining, and Safety to develop reclamation measures for Denver Water land. The final plans should be completed following completion of agency consultation, and then filed with the Commission for approval.

Denver Water noted that, if it is not able to obtain all of the material necessary from the Osprey Point quarry. If this were to happen, Denver Water would develop a Pit Development and Reclamation Plan, in consultation with the Forest Service and the Colorado Division of Reclamation, Mining, and Safety pursuant to Forest Service 4(e) condition 26, and file it with the Commission before ground-disturbance or construction activities associated with quarry development on Forest Service lands.

Denver Water's implementation of its Stormwater Management Plan, Erosion Control and Reclamation Plan, Quarry Operation Plan and Quarry Reclamation Plan, and its compliance with Forest Service 4(e) conditions 19 (Erosion Control and Reclamation), 26 (Pit Development and Reclamation Plan), and 28 (Reclamation and Revegetation Seed Mixes and Mulch Materials), would significantly reduce effects to geology and soils in the project area. Effects to geology and soils from tree removal, reservoir enlargement, and relocation of recreation facilities would also be reduced through Denver Water's implementation of a tree removal plan, to be finalized in consultation with the agencies, and its compliance with the Forest Service 4(e) conditions.<sup>12</sup> Effects to local soils would also be reduced through the Erosion and Sediment and Control Plan Denver Water would need to file with the Commission's San Francisco Regional Office. Land-disturbing work associated with the amendment would not be allowed to begin until the plan is approved by the Regional Office.

Overall, effects on geology and soils under an approval of Denver Water's license amendment would not be significant enough to cause effects determined in the Final EIS for the project area to be exceeded.

Regarding the comment on the Commission's public notice that earthquake potential of enlargement of the reservoir needs to be analyzed, we note that seismicity was addressed in the 2014 Final EIS, and in Denver Water's response to comments. The project is located in a seismically inactive area and a significant earthquake is unlikely

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<sup>12</sup> A draft tree removal plan was included as Attachment E-6 to Denver Water's amendment application.

near the project. Further, as stated in the Final EIS, due to geology in the area and the depth of faults beneath the reservoir, the proposed enlargement of the reservoir would, at most, have a negligible impact on seismicity, and seismic studies would be conducted in the design and construction phases.

### **5.1.2 Water Quantity and Flows**

The 2014 Final EIS for enlargement of the Moffat Collection System reviewed effects on water quantity and flows in sections 5.1.1 and 5.4.1. The proposed dam raise would allow storage in Gross Reservoir to increase from 41,811 to 118,811 acre-feet, an increase of 77,000 acre-feet. The normal maximum water elevation would increase from 7,282 to 7,406 feet msl, and the surface area of the reservoir would increase from 418 acres to 842 acres. These figures include storage of the 5,000 acre-foot Environmental Pool.

The Final EIS found that, from April through November, the annual pattern of reservoir fluctuation in level and content would be similar to that of full use of the existing system. The reservoir would be at its lowest at the end of April, reach its highest level in August, and would be drawn down through the fall and winter. Reservoir contents increase on average from December through February, because, under the existing system, the Moffat Water Treatment Plant does not operate in the winter months. However, under the enlarged system, Gross Reservoir contents would drop steadily by about 4,000 acre-feet per month during the winter mostly because the treatment plant would be operating at a minimum of 30 million gallons per day. Differences in reservoir volume under the enlarged system would be greatest in wet years following a drought, when the enlarged capacity of Gross Reservoir would allow more water to be stored. Average monthly storage would be greatest after enlargement of the system at the end of July (about 102,500 acre-feet), and lowest at the end of April (about 69,500 acre-feet). In dry years, monthly storage during summer months would be lower than average because the reservoir would be drawn on more heavily during a drought. In wet years, monthly storage during summer months would be higher than average. Increases in modeled reservoir surface elevations for the enlarged system compared with full use of the existing system ranged from approximately 94 to 126 feet, with no months in which the elevations would be lower than under existing system. For five modeled dry years, increases in reservoir surface elevations ranged from approximately 99 to 131 feet. For the five modeled wet years, increases in elevations ranged from approximately 106 to 136 feet.

Under the enlarged system, the average annual evaporative loss would be approximately 1,000 acre-feet compared with approximately 500 acre-feet under full use of the existing system.

As summarized in Final EIS appendices H-7 and M-1, average annual reservoir inflows in South Boulder Creek as measured at the Pinecliffe gage, operated by the

Colorado Division of Water Resources and located approximately 2.5 miles above Gross Reservoir, would increase, after enlargement of the system, from 108,752 acre-feet to a calculated 119,036 acre-feet, a difference of approximately 9 percent. Monthly average flow rates at the Pinecliffe gage would increase by a maximum of 119.9 cfs (20 percent) in June and decrease by a maximum of 1.2 cfs (3 percent) in November. In dry years, monthly average flows would increase by a maximum of 16 cfs (11 percent) in July and decrease by a maximum of 2.4 cfs (8 percent) in November. In wet years, monthly average flows would increase by a maximum of 175.3 cfs (39 percent) in June and decrease by a maximum of 2.5 cfs (6 percent) in November.

According to Appendix H-7 of the Final EIS, enlargement of the system would increase average annual outflows from Gross Reservoir downstream to South Boulder Creek from 114,079 acre-feet to a calculated 123,757 acre-feet, a difference of approximately 8 percent. As explained in Final EIS Appendix M-2, releases from the Environmental Pool under the off-license Intergovernmental Agreement would essentially re-time downstream releases, slightly changing average downstream flows at certain times for environmental mitigation purposes. During mid-April through June, flows would be decreased at times when extra reservoir storage capacity is available. From July through March, flows would be increased to meet instream flow targets. On average, this operation would result in decreases in flows of up to 12 cfs in May, and increases in flows of up to 4 cfs December through March. Flows would be decreased more in wet years than dry years. The maximum decrease in flows due to the new Environmental Pool operation was estimated to be 75 cfs, and the maximum increase would be 7 cfs.

The Final EIS determined that, overall, enlargement of the Moffat Collection System would have beneficial effects on the storage of water and its availability for municipal use, and on instream flows downstream of the dam under most conditions. The only aspect of Denver Water's amendment that was not addressed in the Final EIS is the proposed change to license Article 403, which involves ramping rate limits for flows downstream of Gross Dam. Therefore, we address effects of the proposed change in ramping rates below.

Storage of the Environmental Pool under the off-license agreement also would provide additional beneficial effects on the aquatic species in Gross Reservoir, because the additional storage would provide more area and volume to sustain these organisms, thus providing more habitat. In South Boulder Creek downstream of the Denver Water diversion, the changes in flow with the Environmental Pool would also provide beneficial effects on aquatic life. The Environmental Pool would slightly reduce peak runoff flows and slightly increase low winter flows. Both of these changes in the stream hydrology are common mechanisms for increasing habitat availability for aquatic organisms.

### **5.1.2.1 Affected Environment**

The Final EIS provides includes a complete description of water quantity and flows that would be affected by Denver Water's amendment proposal, and it addresses those effects, as summarized above. However, the Final EIS did not specifically address the ramping rate requirements of license Article 403, or Denver Water's request in its amendment application to modify those ramping rates. Denver Water currently limits changes in flow releases to South Boulder Creek below Gross Dam in accordance with license Article 403. Article 403 requires the license to limit downramping rates to between 20 cfs per hour and 50 cfs per hour depending upon the current flows in the creek downstream of the project. The article requires Denver Water to limit upramping and downramping changes in flow releases to South Boulder Creek based on flows currently in the creek below Gross Dam. The ramping rate limits were made part of the license as the result of recommendations by the FWS and the Colorado Division of Wildlife,<sup>13</sup> for the protection of aquatic species below the project.

### **5.1.2.2 Environmental Effects and Mitigation**

Amendment of Article 403 to modify the ramping rate requirements as requested by Denver Water would slightly modify the flow regime in South Boulder Creek below Gross Dam by allowing for a tolerance of 5 cfs per hour. When flows in the creek are greater than 100 cfs, the maximum allowable downramping rate would effectively change from 50 cfs to 55 cfs per hour. When flows in the creek are between 40 and 100 cfs, the maximum allowable downramping rate would effectively change from 30 cfs to 35 cfs per hour. When flows in the creek are less than 40 cfs, the maximum allowable downramping rate would effectively change from 20 cfs to 25 cfs per hour. At all flows, allowable upramping rates would effectively change from 50 cfs to 55 cfs. These changes would not significantly affect water quantity or flows resources. Possible effects of the requested change in ramping rates to fisheries and aquatic resources in Boulder Creek are discussed in section 5.1.4 below.

Our review indicates that none of the physical or operational changes proposed by Denver Water in its amendment request, to include the proposed change in Article 403 ramping rates, would cause effects to water quantity or flows in the project area to exceed the levels determined in the Final EIS.

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<sup>13</sup> Colorado DOW merged with Colorado State Parks to form Colorado Parks and Wildlife in 2011.

### **5.1.3 Water Quality**

The Final EIS for enlargement of the Moffat Collection System reviewed effects to water quality associated with enlargement of Gross Reservoir (Final EIS section 4.6.2.1) and changes in channel morphology and modifications to flows in South Boulder Creek (Final EIS section 4.6.3.10.6).

The Final EIS found that the proposed additional 72,000 acre-feet of storage in the reservoir would result in virtually no change in the depth of the epilimnion. It would result in a substantial increase in the depth and volume of the hypolimnion during summer stratification, and a shift on the order of a month later for the summer stratification period. CE-QUAL-W2 modeling<sup>14</sup> (Hydros Consulting, 2013)<sup>15</sup> of the proposed additional 72,000 acre-feet of storage predicted cooler summer outflow temperatures, resulting in a maximum outflow temperature of 9°C (Celsius), in comparison to 14.6°C under existing conditions. The Final EIS also found short-term, minor increases in productivity would occur in the reservoir, and corresponding short-term, negligible to minor increases in productivity in South Boulder Creek downstream. No anoxic conditions or increases in methylmercury concentrations were predicted in the reservoir over the long term. The Final EIS found that the enlargement of the Moffat Collection System with the 72,000 acre-foot enlargement of Gross Reservoir could cause erosive forces that could increase the need for localized bank stabilization in South Boulder Creek upstream of Gross Reservoir, but it could decrease erosive forces in South Boulder Creek downstream of Gross Reservoir. The review in Appendix M of the Final EIS did not identify any specific effects to water quality from operation of the proposed Environmental Pool.

The Final EIS did not address positive effects to water quality that would result from implementation of several plans Denver Water would finalize under its proposal, or its compliance with conditions in the WQC issued by Colorado DPHE or 4(e) conditions stipulated by the Forest Service.

#### **5.1.3.1 Affected Environment**

The Final EIS includes a complete description of water quality that would be affected by Denver Water's amendment proposal, and it addresses those effects, as summarized above. However, we note that, since publication of the Final EIS, the U.S. Environmental Protection Agency has approved the 2014/2016 303(d) list (5 CCR 1002-

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<sup>14</sup> Appendix E-5 of the Final EIS.

<sup>15</sup> CE-QUAL-W2 is a two-dimensional hydrodynamic and water quality model.

93),<sup>16</sup> which includes South Boulder Creek 303(d) listings for cadmium from the source to the outlet of Gross Reservoir and cadmium and arsenic from the outlet of Gross Reservoir to South Boulder Road.

### **5.1.3.2 Environmental Effects and Mitigation**

Denver Water would minimize water quality impacts in Gross Reservoir and downstream that could be caused by decomposition of organic matter when the reservoir is filled to its new higher elevation by implementing a finalized tree removal plan. Denver Water indicates in its application that the plan would address Forest Service condition 27, and that the plan would be finalized in consultation with the Forest Service, Colorado State Forest, Boulder and Jefferson Counties and then filed with the Commission for approval.

Monitoring water quality in Gross Reservoir (WQC condition 16)<sup>17</sup> at a deep-water site near the dam would provide documentation of water quality conditions in the enlarged Gross Reservoir. Monitoring would start during the first ice-free season and continue for 5 years after the project is fully operational, would identify any effects from construction, inundating of new land, and operating the enlarged reservoir. In addition, monitoring metals and hardness in South Boulder Creek (WQC condition 14)<sup>18</sup> would identify any unexpected adverse effects of the project on metals in South Boulder Creek. If project-caused metal impairments are identified in South Boulder Creek, WQC condition 15 provides for an assessment and approach to resolve any project-caused impairments.

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<sup>16</sup> The current U.S. Environmental Protection Agency-approved 303(d) list is available at [https://www.colorado.gov/pacific/sites/default/files/93\\_2016%2811%29.pdf](https://www.colorado.gov/pacific/sites/default/files/93_2016%2811%29.pdf). Accessed August 28, 2017.

<sup>17</sup> WQC condition 16 requires monitoring vertical profiles of temperature, DO, conductance, pH, turbidity; Secchi depth; total Kjeldahl nitrogen, ammonia-nitrogen, nitrite+nitrate nitrogen, orthophosphorus, total phosphorus, dissolved organic carbon, and chlorophyll-*a*; calcium, magnesium, chloride, potassium, sodium, and sulfate; total recoverable form of iron, arsenic, and chromium; and dissolved form of arsenic, boron, cadmium, chromium, copper, iron, lead, manganese, nickel, selenium, silver, uranium, and zinc.

<sup>18</sup> WQC condition 14 includes monitoring total recoverable form of iron, arsenic, and chromium; and dissolved form of arsenic, boron, cadmium, chromium, copper, iron, lead, manganese, nickel, selenium, silver, uranium, and zinc.



Monitoring accumulation of mercury in Gross Reservoir fish (WQC condition 13) is discussed below in section 5.1.4.2.

Denver Water would monitor DO and temperature under its approved Article 402 Dissolved Oxygen and Temperature Monitoring Plan, which includes monitoring within 500 feet of the tailrace below Gross Reservoir at 1-hour intervals, and notifying Colorado DPHE, Colorado Parks and Wildlife, and FWS if DO does not meet the applicable state criteria of 7.0 mg/L for coldwater fish spawning and 6.0 mg/L for the remainder of the year.

Denver Water would also collect water temperature data at 15-minute intervals under WQC condition 6 at the Gross Reservoir outlet and at three South Boulder Creek sites (at Pinecliffe, a location between the reservoir outlet and diversion point, and at the South Boulder diversion structure). These data would confirm the predicted temperature regime<sup>19</sup> and provide temperature data to confirm conclusions on the longitudinal extent of temperature effects on aquatic communities in the reservoir. In addition, DO and temperature data collected at the established site for the Dissolved Oxygen and Temperature Monitoring Plan would be directly comparable to measurements made between 2010 and 2013 (Denver Water, 2012, 2013, 2014).

Implementation of Denver Water's proposal to revise its approved South Boulder Creek Channel Stability Monitoring Plan, would document channel conditions, focusing on channel instability and erosion in South Boulder Creek upstream of Gross Reservoir. The results of monitoring under this plan would be used to determine whether Denver Water would need to meet with the Forest Service to discuss the need for restoration and the preparation of any needed restoration plan(s). Incorporating the aforementioned monitoring and associated consultation for South Boulder Creek's channel stability upstream of Gross Reservoir would help to mitigate the possibility of changes in channel erosion and any potential need for localized bank stabilization in this reach.

In review, we find that the Final EIS adequately addresses the effects to water quality that would occur under Denver Water's amendment proposal. Finalizing a tree removal plan pursuant to Forest Service condition 27, in consultation with the agencies, followed by Commission approval of the plan as described in section 5.1.1 *Geology and Soils*, would help reduce effects to water quality. Denver Water's Stormwater Management Plan, Erosion Control and Reclamation Plan, Quarry Operation Plan and Quarry Reclamation Plan, with the agency consultation and Commission approval as also described in section 5.1.1, would increase protection of water quality. Together with Denver Water's compliance with Forest Service 4(e) conditions 19 (Erosion Control and Reclamation), 26 (Pit Development and Reclamation Plan), and 28 (Reclamation and

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<sup>19</sup> See Final EIS section 4.6.2.1 and CE-QUAL-W2 modeling results.

Revegetation Seed Mixes and Mulch Materials), any effects to water quality in the project area should be significantly reduced effects to geology and soils in the project area. Further, the water quality monitoring Denver Water would perform pursuant to its approved Dissolved Oxygen and Temperature Monitoring Plan, and bank stability monitoring it would perform, both pursuant to the Forest Service 4(e) conditions and WQC conditions would provide further protection of water quality at the project, during and after construction and enlargement of the reservoir. In addition, as noted in section 5.1.1 *Geology and Soils*, Denver Water would need to file an Erosion and Sediment Control Plan with the Commission's San Francisco Regional Office for approval prior to any land-disturbing activity. Erosion and sediment control measures in this plan would also help to reduce possible impacts to water quality through erosion and sedimentation.

Therefore, we find that an approval of Denver Water's amendment request should not would result in effects to water quality in the project area beyond those determined in the Final EIS, and should in fact reduce effects to water quality in the project area.

#### **5.1.4 Fisheries and Aquatic Resources**

The Final EIS for enlargement of the Moffat Collection System reviewed effects to fisheries and aquatic resources associated with enlargement of Gross Reservoir (Final EIS section 4.6.2.1). The Final EIS found that enlargement of the reservoir would cause a short-term, beneficial increase in reservoir productivity that would result in higher fish densities. It also found that the additional shoreline habitat resulting from the enlargement would increase reservoir fish population fish diversity and abundance through increases in available habitat.

The Final EIS identified adverse impacts that would occur to fisheries and aquatic resources through flooding of reaches of Forsythe Canyon, Winiger Gulch, and South Boulder Creek upstream from where these streams meet Gross Reservoir. The Final EIS also found that short-term increases in methylmercury levels would be expected in tissue of fishes in Gross Reservoir. The Final EIS did not identify any substantial negative effects to these resources through construction activity.

Within South Boulder Creek downstream of Gross Dam, the Final EIS determined that the expansion of the Moffat Collection System would overall have minor, beneficial impacts to fisheries and aquatic resources because flows downstream in South Boulder Creek would be higher in winter and peak flows would be reduced. It also found that overall cooler water temperatures would be provided downstream of Gross Dam, which would limit fish growth and survival. The Final EIS determined that certain mitigation measures proposed by Denver Water, including operations of the Environmental Pool, a Fish and Wildlife Mitigation Plan, and a Fish and Wildlife Enhancement Plan would benefit fish and aquatic resources.

The Final EIS did not specifically examine effects to fisheries and aquatic resources from several actions tied to Denver Water's proposal to enlarge Gross Reservoir and amendment of the project license. These include effects of reservoir enlargement on fish habitat, tributary access by fish, changes in fish entrainment, management of aquatic invasive and nuisance species, or Denver Water's proposal to amend license Article 403 to allow a 5 cfs ramping rate tolerance. The Final EIS also did not review benefits to fisheries and aquatic resources that would be provided by Denver Water's compliance with certain Forest Service 4(e) conditions and conditions of the WQC.

#### **5.1.4.1 Affected Environment**

The fishery and aquatic resources within Gross Reservoir and its tributaries are described in Final EIS section 3.11.2, and those in South Boulder Creek are described in Final EIS section 3.11.6. The information in those sections adequately describes the resources that would be affected under Denver Water's proposal to enlarge Gross Reservoir and amend the project license. Specific details on these resources necessary to discuss effects of Denver Water's proposal are included in the analysis below.

#### **5.1.4.2 Environmental Effects and Mitigation**

##### Gross Reservoir

##### *Reservoir Fish Habitat and Erosion, Turbidity and Sedimentation*

The steep shoreline slopes that surround Gross Reservoir exhibit slight erodibility (Final EIS section 3.6.1.1). The limited existing shallow shoreline aquatic habitat would be subject to disturbance, siltation and increases in turbidity that could occur from shoreline erosion during both tree clearing and reservoir filling. Precipitation and other factors would affect the degree of erosion and the amount of habitat affected by turbidity and sedimentation, and the timing of such effects. Fishes and other motile aquatic organisms that occupy affected nearshore habitats and littoral areas would likely move to nearby areas of the reservoir with suitable habitat. However, once the reservoir is filled, shoreline erosion and any resulting turbidity and sedimentation would likely occur at rates similar to existing conditions, and new nearshore aquatic habitat would be created. Any adverse effects to aquatic habitat from increases in turbidity and sedimentation caused by tree clearing and initial reservoir filling would vary by location according to areas of disturbance, and would be temporary. Any such effects would be minimized in several ways, including those already described above in sections 5.1.1 *Geology and Soils* and 5.1.3 *Water Quality*. As described in those sections, Denver Water would follow measures contained in a finalized tree removal plan to help address water quality effects tied to tree removal, and a finalized Quarry Operation Plan to address effects of quarry development, spoil areas, operation, and reclamation. As also described in those sections, Denver Water would follow a Stormwater Management Plan,

Erosion Control and Reclamation Plan, and Quarry Reclamation Plan, each of which would help protect water quality and therefore fisheries and aquatic resources. Finalizing these plans in consultation with the agencies, followed by approval by the Commission before any ground-disturbing activity as described in the sections above, would help protect fisheries and aquatic resources. Compliance with the Forest Service conditions and WQC conditions involving erosion, turbidity, and sedimentation would further help protect fisheries and aquatic resources. Finally, effects to these resources would also be reduced Denver Water's compliance with an Erosion and Sediment Control Plan it must file with the Commission's San Francisco Regional Office prior to any ground-disturbing activity.

### *Reservoir Fish Tributary Habitat and Access*

The Final EIS reported that, of the tributaries to Gross Reservoir, only Winiger Gulch and South Boulder Creek carried flows adequate to support fish populations. These fishes included species that exhibit fluvial and adfluvial life histories, such as brook trout, brown trout, rainbow trout, cutthroat trout, white sucker, and longnose sucker (Final EIS sections 3.11.2.1 and 3.11.6.5).

Reaches of Winiger Gulch and South Boulder Creek immediately above where they now flow into the reservoir would be inundated with an expanded reservoir, depending on the reservoir level at a given time. The new maximum new water elevation, including the 6 feet of elevation that would be occupied by the Environmental Pool, would flood as much as 2,160 feet of upstream channel in Winiger Gulch, and approximately 5,000 feet of upstream channel in South Boulder Creek, changing much of the habitat in those areas from lotic to lentic habitat. The length of affected reaches would vary by water elevations at different seasonal storage elevations, as discussed below. Affected areas would be less suitable for fishes and macroinvertebrates that normally inhabit lotic stream habitat. It would also negatively affect fishes, such as those identified above, which use lentic habitat for spawning and rearing.

Specifically, water levels in Gross Reservoir after the reservoir enlargement would be lowest in April. The reservoir would then begin to fill in May, and would be highest from June through September. It would then decrease from October through March. Because water levels would be increasing in May through June, when rainbow trout and sucker spawning occurs, spawning areas for these species near the mouths of Winiger Gulch and South Boulder Creek would not likely be affected. Eggs of rainbow trout and suckers require flowing water to provide and replenish oxygen to survive; therefore, already incubating eggs would be deprived of oxygen and likely be lost as lotic habitat transforms into lacustrine habitat. Spawning areas and eggs of brook trout and brown trout, which also require flowing water for oxygenation, would largely be unaffected, because brook and brown trout spawn in October and November when reservoir water

levels would generally be decreasing. Surviving trout and sucker fry would move to suitable areas of the tributary to rear.

Seasonal reservoir fluctuations at the new, higher reservoir elevations could also affect fish passage into tributary streams through the creation of fish passage barriers, such as vertical drops at tributary mouths formed by head cutting or delta formation. However, this already occurs to some degree as reservoir levels vary under current operation, so it is difficult to say whether such problems would be similar to, or would exceed existing conditions.

The current benthic macroinvertebrate community supports rearing juvenile trout and suckers. However, when reservoir water levels are increased and inundate tributary streams, the macroinvertebrate communities in those streams would likely shift to species that prefer lentic conditions. When reservoir water levels decrease, rheophilic<sup>20</sup> benthic macroinvertebrates would recolonize previously-inundated areas, displacing those that prefer lentic environments. Therefore, effects of reservoir filling and operations on benthic macroinvertebrates would be temporary and minor.

Overall, reservoir filling and operation using the new increased elevations could have short-term minor localized negative effects on some fisheries and macroinvertebrates in the first seasons in which the reservoir is filled to its new higher elevation. However, any such temporary effects would likely be outweighed by beneficial long-term effects of increases in available reservoir habitat area.

#### *Littoral and Pelagic Reservoir Fish Habitat Area*

Raising the maximum reservoir elevation from 7,282 feet to 7,406 feet, would increase the surface area of the reservoir from 418 acres to as much as 842 acres, and increase the total length of the reservoir shoreline from 11 miles to as much as 14 miles. This would result in the development of as much as 3 additional miles of littoral shoreline aquatic habitat, which would benefit those fish species that currently utilize littoral areas. Similarly, increasing the maximum storage capacity of the reservoir from 41,811 acre-feet to 118,811 acre-feet would create additional pelagic habitat, benefiting fish that utilize open-water habitat areas. Overall, the effect of reservoir enlargement on littoral and pelagic species would be long-term and beneficial.

#### *Methylmercury in Reservoir Fishes*

Bioaccumulation of mercury in tissue of reservoir fishes is a concern in Colorado. Erosion of organic material in soils has been found to be central to mercury availability in hydroelectric reservoirs, and is positively correlated with presence of methylmercury, the

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<sup>20</sup> Rheophilic species are those that live in flowing or fast-moving water.

bioavailable form of mercury (Rodger et al., 1995). Enlarging Gross Reservoir would inundate vegetated shoreline areas, resulting in decomposition of large amounts of organic material. Methylmercury could then bioaccumulate and biomagnify in tissue of fish in Gross Reservoir. Denver Water would clear trees and vegetation in accordance with a finalized tree removal plan, as discussed earlier. The finalized tree removal plan should include measures that would greatly reduce the amount of organic material that could contribute to bioavailable methylmercury. In addition, WQC condition 13 requires Denver Water to sample fish in Gross Reservoir to assess mercury levels in fish tissue to help determine whether fish consumption advisories would be necessary to protect human health. Collectively, implementation of Denver Water's tree removal plan and compliance with WQC condition 13 would reduce the likelihood of significant elevations in mercury levels in fish, and would also help to protect human health.

### *Reservoir Fish Entrainment*

Fish entrainment at hydroelectric projects can significantly and adversely affect fish populations, depending on a number of factors, including species of fish present, habitat, and configuration of a project. Currently, there is no evidence of significant levels of entrainment at the Gross Reservoir Project. This is likely due to the location of the intakes. The intakes are centered at an elevation of 6,992 feet, 290 feet below the current normal water surface elevation of the reservoir (7,282 feet). The proposed enlargement of the reservoir would raise the normal water level to 7,406 feet, and would extend the depth of the intake to 414 feet. When the reservoir would be at the lowest elevation of 7,335 feet in April, the centerline of the intake would be at a depth of 343 feet. Few fish would be found at depths of 300 to 400 feet and exposed to entrainment. Because the depth of the intakes would increase when the reservoir elevation is raised, the level of fish entrainment when compared to existing conditions would be very unlikely to increase. Therefore, there is no need to consider additional measures to protect fish from entrainment, or consider to mitigation for fish entrainment at this time.

### *Effects of Quarry Features on Reservoir Fish Movement*

Denver Water indicates that, at the new normal maximum water level of 7,406 feet, the Osprey Point quarry would be inundated by the expanded reservoir. However, we cannot fully assess whether any areas disturbed during quarry operation and remaining after quarry reclamation might be exposed when the reservoir is refilled but is below the new normal maximum level. Therefore, we cannot discern whether any remaining elements of the quarry could cause isolated standing areas of water that would be disconnected from the rest of the reservoir, possibly resulting in fish stranding. Denver Water states that a final Quarry Operation Plan final Quarry Reclamation Plan would be developed which would address final quarry configuration, in consultation with the Commission's Division of Dam Safety and Inspections and the resource agencies. As indicated above, we recommend that these plans be approved by the Commission. To

help ensure prevention of fish stranding in the quarry area, these plans, when filed for Commission approval, should include evidence that any remaining quarry features would not create isolated standing areas of water that would be disconnected from the rest of the reservoir at expected operating levels.

### South Boulder Creek

As reviewed in Colorado DPHE's WQC, releases from Gross Reservoir to South Boulder Creek are already colder in summer than natural flows, because the reservoir stratifies by temperature in summer and releases are drawn from the deep, colder hypolimnion. Currently, that cold water is usually exhausted by the end of the summer. Enlargement of Gross Reservoir would increase the volume of the cold hypolimnetic water, and modeling predicts that it would therefore increase the time over which this cold hypolimnetic water would be released in summer. Modeling of the temperatures predicted that the reservoir enlargement would also further reduce maximum temperatures of releases to the Creek by about six degrees. Therefore the reservoir enlargement would have minor negative long-term seasonal effects to fish fry and adults in South Boulder Creek downstream of the project.

Denver Water would release flows downstream to South Boulder Creek from a 5,000-acre-foot Environmental Pool included in the increased reservoir elevation in accordance with an off-license Intergovernmental Agreement, as described in section 3.1.5 *Denver Water's Proposed Environmental Mitigation Measures*. As described in section 5.1.2 *Water Quantity and Flows* above, these releases would essentially re-time average downstream releases at certain times. This would result in moderate beneficial effects to the aquatic life in South Boulder Creek in part by increasing low winter flows by up to 88 cfs. This re-timing would also slightly reduce peak runoff flows. These changes would increase habitat depth and area during low flow periods, and reduce stress on aquatic animals by reducing water velocities that could otherwise flush organisms from preferred habitats. Operation of the enlarged reservoir to include changes in releases pursuant to the off-license Intergovernmental Agreement would have positive long-term seasonal effects to fisheries and aquatic resources, helping to offset any effects of reservoir enlargement.

Denver Water would work to identify and address any effects of the reservoir enlargement on fish and aquatic resources in South Boulder Creek through its Dissolved Oxygen and Temperature Monitoring Plan, and compliance with mitigation and monitoring required through 4(e) condition 6, as discussed in section 5.1.3 *Water Quality*. Also, WQC condition 12 requires Denver Water to monitor benthic macroinvertebrates downstream of Gross Dam. These monitoring efforts would identify how operation with the enlarged reservoir affects downstream water quality, benthic macroinvertebrates, and by extension fish populations, and whether changes in project operation may be needed to protect aquatic life in South Boulder Creek below Gross Dam.

### *Ramping Rate Modification*

As part of its license amendment request, Denver Water asks that the ramping rates governing allowable changes in release rates to South Boulder Creek under Article 403 be modified so that it can better comply with the requirements. Article 403 currently specifies the following maximum ramping rates:

- (1) downramp no more than 50 cfs per hour when flows in South Boulder Creek downstream of the project are greater than 100 cfs;
- (2) downramp no more than 30 cfs per hour when flows in South Boulder Creek downstream of the project are between 40 cfs and 100 cfs;
- (3) downramp no more than 20 cfs per hour when flows in South Boulder Creek downstream of the project are less than 40 cfs; and
- (4) upramp no more than 50 cfs per hour at all flows.

Denver Water requests that license Article 403 be amended to include a ramping rate tolerance of 5 cfs per hour. Denver Water consulted with FWS and Colorado Parks and Wildlife regarding the addition of a 5-cfs tolerance to the requirements. Both agencies concurred with Denver Water's request. Based on our own review and the agencies' concurrence with the change, adding a 5 cfs tolerance to the project's ramping rate requirements should not result in any significant adverse effects to fisheries and aquatic resources in South Boulder Creek.

### Aquatic Invasive and Nuisance Species

Section 3.11.1.7 of the Final EIS identified the nuisance and aquatic invasive species that have the potential to occur in the project area. These include the parasite *Myxobolus cerebralis*, which causes whirling disease in salmonid fishes; New Zealand mudsnail, zebra mussels, and quagga mussels; and the filamentous algae didymo *Didymosphenia geminata*. Of these, whirling disease and New Zealand mudsnail have already been documented in the project area. Forest Service 4(e) condition 17 requires Denver Water to develop, in consultation with the Forest Service, FWS, and Colorado Parks and Wildlife, an aquatic invasive species management and monitoring plan, which includes provisions for reporting monitoring results and for developing modifications to the plan if the status of aquatic invasive species in the project area changes. While condition 17 is not one of the conditions that the Forest Service identifies as being specific to Denver Water's proposal, compliance with the condition would help to identify, monitor, and control changes in invasive species that may be tied to enlargement of Gross Reservoir, and would therefore have long-term benefits to fish and aquatic resources.



### Aquatic Sensitive Species

Sections 3.10 and 5.10 of the Final EIS described and evaluated the aquatic sensitive species that could occur and be affected by the project. Forest Service 4(e) condition 18 requires Denver Water to prepare a BE for any future proposed actions, other than the currently-proposed construction and ground-disturbing activities associated with enlargement of Gross Reservoir, that may affect Forest Service special status species. Within any BE prepared under the condition, Denver Water would develop and implement, with approval from the Forest Service, procedures to monitor and minimize adverse effects on Forest Service special status species. While condition 18 is not one of the conditions that the Forest Service identifies as being specific to Denver Water's proposal, compliance with the condition would help minimize effects of future actions on Forest Service special status aquatic species.

#### **5.1.5 Terrestrial Resources**

The 2014 Final EIS reviewed and evaluated effects on terrestrial resources with Denver Water's proposal to raise Gross Dam and enlarge Gross Reservoir (Final EIS sections 5.7.1 through 5.10.1). The Final EIS found that moderate direct temporary and permanent loss or conversion of vegetation communities would occur as a result of construction and restoration work, and reservoir inundation. The Final EIS also found a minor increase in the potential for spread or introduction of invasive plant species in the drawdown area and temporary disturbance areas. However, the Final EIS found that Denver Water's proposal is not likely to increase spread of mountain pine beetle or increase risk of forest wildfire in the project area. Minor permanent effects on riparian and wetland habitats would be mitigated through Denver Water's proposed BMPs, credits from an approved wetland bank, and operation of the proposed 5,000 acre-foot Environmental Pool.

The Final EIS found inundation of the enlarged reservoir would result in moderate, direct long-term effects on wildlife and associated habitat through the permanent loss or modification of range, migration corridor use, and winter concentration areas for large mammals such as elk. It found that temporary wildlife displacement during construction, especially on the east side of reservoir, would occur, but that these effects would not likely be adversely or permanently affect overall wildlife populations. Nesting avian species may be affected during construction but these effects would be minor and short-term. Also, although some minor, long-term loss of habitat for forest birds would occur, operation of the reservoir would provide beneficial loafing and foraging habitat for resident and migratory waterfowl.

Although the Final EIS analyzed effects of operation of the Environmental Pool and Denver Water's proposed relocation of recreational features, it did not consider effects associated with the new Osprey Point quarry site proposed in Denver Water's amendment application. Since issuance of the Final EIS in 2014, the Forest Service

provided 4(e) conditions relevant to terrestrial resources that require plans and measures for road use, invasive species management, erosion control, fire management, tree removal, site restoration, and BEs for future proposed actions. In the following section, we evaluate and discuss these topics as they relate to effects on terrestrial resources.

#### **5.1.5.1 Affected Environment**

The Final EIS includes a complete description of terrestrial resources, including vegetation, wetlands, and wildlife, in the Gross Reservoir area that would be affected by Denver Water's amendment proposal (Final EIS sections 3.7 to 3.10), and it addresses those effects, as summarized above. However, as explained below, Denver Water identifies in its amendment application special status wildlife species not included in the Final EIS that have the potential to occur in the project area.

#### **5.1.5.2 Environmental Effects and Mitigation**

##### Vegetation

Effects on upland vegetation, including sensitive plant communities, from the modification of Gross Dam and associated actions were evaluated in section 5.7 of the Final EIS. As noted in the Final EIS, effects on vegetation would occur from tree clearing and inundation associated with dam enlargement. Also, there would be a potential for noxious weeds to spread after ground disturbances, and annual lowering of reservoir levels could result in changes to vegetation community structure and composition.

The Final EIS analyzed effects of proposed operation of the Environmental Pool, relocation of recreational features, and use of a quarry partially on Forest Service land, but it did not consider effects changes to effects that would result from moving the quarry to Osprey Point, as now proposed by Denver Water. The amendment application included a comparison of the effects of locating the quarry considered in the Final EIS and locating it at Osprey Point, and it reviews that, regardless of quarry site, the proposed project would result in a permanent, unavoidable, adverse effect on botanical resources due to some removal of vegetation around the reservoir and alteration of topography. However, as discussed earlier in this Supplemental EA in section 5.1.1, *Geology and Soils*, the Osprey Point quarry site would have less disturbance on vegetation due to its location within the normally-inundated area of the reservoir, and location entirely on Denver Water lands would reduce effects on lands of Roosevelt National Forest. Use of the Osprey Point quarry site would slightly lessen the moderate and permanent effects of vegetation from tree removal on 508 acres of land described in section 5.7 of the Final EIS.

Several commenters responding to the Commission's public notice indicated the need for more information on methods that would be used for cutting and disposal of

trees. Commenters also expressed concern for adequate mitigation for the significant loss of trees and forest acreage, and wildlife habitat, around the reservoir. To reduce and mitigate effects to these resources as much as possible, Denver Water would need to finalize details of tree cutting and disposal and related work in a series of plans required by the Forest Service, as summarized in section 4.2.1 *Federal Power Act Section 4(e)*. These plans would be developed in consultation with the Forest Service and other specified entities and approved by the Forest Service before any ground-disturbing activity, including a Tree Removal Plan (condition 27), Pit Development and Reclamation Plan (condition 26), Erosion Control and Reclamation (condition 19), Reclamation and Revegetation Seed Mixes and Mulch Materials (condition 28), (Invasive Species Management conditions 17), and (Fire Management and Response Plan condition 20).

Loss of forest and habitat would also be mitigated through Denver Water's off-license conveyance of the 539-acre Toll Property to the Forest Service, to be administered and protected as part of the Roosevelt National Forest, as noted in section 3.1.5.2 *Off-License Measures in Agreement with Forest Service*, and would be accessible to the public. The parcels in the Toll Property are surrounded by the Roosevelt National Forest and contain diverse vegetation types, including forest, grassland, wetland, fens, wet meadows, pond, stream, and riparian habitat. The Toll Property includes valuable wildlife habitat, including elk and mule deer summer range and migration corridors, as well as habitat or potential habitat for a number of other species, including Forest Service sensitive species.

#### Riparian and Wetland Habitats

Effects on riparian and wetland habitats, as described in section 5.8 of the Final EIS, would occur primarily through tree clearing and inundation associated with dam enlargement, annual lowering of reservoir levels, and changes in streamflow. The Final EIS found that 4.08 acres of riparian habitat and 1.95 acres of wetland habitat would be permanently affected, and 0.04 acre of riparian habitat and 0.12 acre of wetland habitat would be temporarily affected, by the proposed work at Gross Dam, the reservoir, and related facilities. Effects identified in the Final EIS to wetland hydrology and/or function associated with construction access and staging areas would be short-term. Disturbance, which would occur in temporary use areas and construction access roads, would be relatively minor and localized. Following construction, reconstruction and restoration measures included in Denver Water's proposal and required by certain Forest Service conditions would help reestablish affected hydrology and restore affected wetland and riparian vegetation. Herbaceous wetlands would re-establish relatively quickly, while impacts on riparian woodland would take much longer to restore.

During project operations when the reservoir is refilled to its new higher elevations, some aquatic and terrestrial vegetation types would reestablish in the new

inundation zone during seasonal reservoir fluctuations. Wetlands that currently exist along the edge of the reservoir would be inundated when the reservoir is filled to higher levels. However, new wetlands are likely to form in upstream fingers of the expanded reservoir, which would be sustained by shallow groundwater, similar to current conditions.

As noted in the Final EIS, Denver Water would address and mitigate effects on riparian and wetland habitats through proposed BMPs, credits from an approved wetland mitigation bank, and operation of the proposed Environmental Pool which would enhance low flows in South Boulder Creek downstream of Gross Dam, providing a minor benefit to riparian vegetation. As discussed above, Denver water would also, through its off-license agreement with the Forest Service, convey the 539-acre Toll Property to the Forest Service, to be administered and protected as part of the Roosevelt National Forest. This would provide permanent off-site mitigation by preserving about 43 acres of high-quality wetlands and fens. Effects on wetlands in the Gross Reservoir area would be consistent with the findings in the Final EIS.

### Special Status Plants

Enlargement of Gross Reservoir would affect several plant species of local concern in the Arapaho and Roosevelt National Forests. These include wild sarsaparilla (*Aralia nudicaulis*), Dewey sedge (*Carex deweyana*), Sprengel's sedge (*Carex sprengelii*), enchantress's nightshade (*Circaea alpine*), tall blue lettuce (*Lactuca biennis*), Maryland sanicle (*Sanicula marilandica*), and false melic (*Schizachne purpurascens*). Five fern species that could be affected are brackenfern (*Pteridium aquilinum*), forked spleenwort (*Asplenium septentrionale*), male fern (*Dryopteris filix-mas*), Rocky Mountain polypody (*Polypodium saximontanum*), and Oregon cliff fern (*Woodsia oregana* spp. *cathcartiana*). Table 5.10 of the Final EIS shows the estimated number of individuals of each species anticipated that would be affected at the Gross Reservoir Project. Effects would occur primarily during tree clearing, and during inundation associated with reservoir enlargement. Although the new quarry site at Osprey Point was not analyzed in the Final EIS, no additional effects on special status plants would occur because the quarry would be located entirely within the reservoir inundation zone.

Denver Water would address and mitigate effects on special status plants through its proposed BMPs, and pre-construction surveys, identification of buffers, and relocation of plants through its proposed Special Status Plants Relocation Plan that it would develop to supplement its approved Article 410 Rare and Sensitive Plant Species Protection Plan.<sup>21</sup> The measures to protect special status plants would be developed in consultation with, and approval of, the Forest Service to comply with Forest Service 4(e) conditions

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<sup>21</sup> Order Approving Rare and Sensitive Plant Species Protection Plan Pursuant to Article 410, issued January 15, 2004 (106 FERC ¶ 62,026).

18 (Special Status Species and Sensitive Areas) and 22 (Special Status Plants Relocation Plan). The off-license conveyance of the 539-acre Toll Property to the Forest Service, to be administered and protected as part of the Roosevelt National Forest, would provide further mitigation for effects to special status plants. With compliance with these plans and measures, effects to sensitive plants in the Gross Reservoir Project area would not exceed the minor, short-term effects identified in the Final EIS.

### Wildlife

Section 3.9.1 of the Final EIS identified the wildlife species potentially present within Gross Reservoir project vicinity, including those species present within the Osprey Point quarry area. Effects of the proposed modification of the Gross Dam and associated actions on wildlife were evaluated in section 5.9.1 of the Final EIS. As noted in the Final EIS, direct and indirect effects on wildlife, such as the loss or degradation of habitat and disturbance or displacement of wildlife, would occur from reservoir enlargement, quarry operation, and relocation of recreation areas.

Inundation of additional shoreline could reduce opportunities for wildlife foraging, nesting, movement, and other daily or seasonal behavior. Shorelines, including along South Boulder Creek and nearby tributaries, would become inundated from the Environmental Pool elevation, which may create an additional barrier to movement and habitat fragmentation for smaller sized mammals that would have to travel longer distances to move around the new inundation zones. However, the enlarged reservoir would create additional open water foraging habitat that would benefit some species such as raptors, waterfowl, bats, and aquatic furbearers. Following the initial filling of the reservoir, most affected animal species animals would modify their home ranges and foraging practices to account for the new reservoir level. Therefore, effects on wildlife would be moderate but short-term, dissipating over time, and are consistent with the determinations in the Final EIS.

Development and use of the new quarry site at Osprey Point, located entirely within the inundation zone of the reservoir rather than on Forest Service lands would, generally, reduce short-term, moderate noise impacts related to construction activities, blasting, and traffic effects to wildlife. Other short-term direct impacts to wildlife, such as potential collisions with haul trucks and other vehicles along construction access routes, also would be reduced through use of the new quarry location. Although a significant portion of the truck traffic required for transport of aggregate materials from off-site locations would no longer necessary, some collisions with wildlife could still occur, but would have less of an effect on local wildlife populations in the project area. Further, because the new quarry site would be located entirely on Denver Water lands, effects on Roosevelt National Forest lands would be greatly reduced.

Effects to wildlife and wildlife habitat in the Gross Reservoir Project area would also be reduced and mitigated through development of the plans and measures required by the Forest Service, described earlier in this section, as well as utilizing specific raptor protection measures (through condition 21) and the off-license conveyance of the 539-acre Toll Property to the Forest Service, as described earlier. Compliance with these requirements would reduce effects to wildlife identified for the Gross Reservoir Project area in the Final EIS, and resulting in overall minor, beneficial effects.

### Special Status Wildlife

The Final EIS addressed effects of construction and operation on special status wildlife species, including sensitive bird species such as raptors and migratory birds.<sup>22</sup> As explained in its amendment application, Denver Water proposes to replace the two existing osprey nest platforms on Gross Reservoir to mitigate for nesting tree loss from reservoir enlargement. Denver Water would also conduct pre-construction raptor surveys and contact FWS's Office of Migratory Birds for permitting requirements before the removal or destruction of any nests, consistent with Forest Service 4(e) condition 21 (raptor protection measures).

Additional protection for nesting sensitive bird species would include scheduling of tree clearing of trees around the reservoir outside of the breeding season in accordance requirements in the Tree Removal Plan required by Forest Service 4(e) condition 27. If an active nest is located, protective buffer zones would be established to avoid disturbance while nesting. Buffer zones and seasonal timing restrictions would be developed in consultation with the Forest Service and Colorado Parks and Wildlife to avoid direct disturbance. These restrictions and mitigation measures would avoid or minimize effects on special status raptors. Potential disturbance to nesting avian species during construction would be considered minor and short-term. Also, while some minor long-term loss of habitat for forest birds would occur from tree clearing, operation of the reservoir would provide beneficial loafing and foraging habitat for resident and migratory waterfowl.

Section 3.9.1 of the Final EIS identifies the big game species present in the vicinity of Gross Reservoir. Increasing the dam height, including establishing the proposed Environmental Pool, would enlarge the surface area of the reservoir from 418 acres to 842 acres, resulting in a loss of 465 acres of elk winter range and migration corridor and 269 acres of winter concentration area. Elk migration corridors and severe winter range are separate categories, but proposed construction and operation impacts would occur in both habitats. However, direct loss of elk winter concentration areas and

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<sup>22</sup> Species that are federally-listed as threatened or endangered under the ESA are addressed below in section 5.1.6, *Threatened and Endangered Species*.

severe winter range in the Gross Reservoir area would be less than 2 percent of these habitats.

Mule deer herds inhabiting the Gross Reservoir area are not likely to be adversely affected by the reservoir enlargement because no crucial seasonal habitats are present, and the affected area represents a very small part of the overall habitat. The proposed project would not affect mule deer winter concentration areas, severe winter range, or migration corridors, but would affect about 544 acres of mule deer summer range that would have a temporary minor effect on the mule deer herd. Because there is available habitat elsewhere in the project vicinity and neither species depends on riparian or wetland habitat, overall effects on elk and mule deer populations would be temporary and minor. Mountain lion and black bear habitat would be minimally affected because the impacted area represents only a small portion of the typical home range occupied by individuals of these species.

Forest Service 4(e) condition 27 (Tree Removal Plan) includes measures to consider key winter range timing for elk (December 1 through March 30) to protect big game. Year-round construction activities at the dam and nearby Osprey Point quarry would temporarily displace big game from the eastern side of the reservoir, but this is not likely to adversely affect overall populations because the migration corridor extends around the reservoir, including the north, west, and south shores. Construction activities, including Osprey Point quarry activity, on the east side of the reservoir could affect use patterns of these game species temporarily. However, movement of elk and mule deer near the reservoir would be diverted to the west side of the reservoir where most of the corridor is unlikely to be affected. This displacement would occur each winter during the construction period for 4 years. During operation, big game are unlikely to exhibit any changes in behavior from current conditions.

As indicated above, effects to wildlife and wildlife habitat in the Gross Reservoir Project area, including special-status species, would be reduced and mitigated through development of the plans and measures required by the Forest Service, and the off-license conveyance of the 539-acre Toll Property to the Forest Service.

Overall, we find that approval of Denver Water's license amendment would not cause effects to terrestrial resources in the Gross Reservoir Project area to exceed those determined in the Final EIS, and effects would in fact be minimized through Denver Water's compliance with the plans and measures referenced above.

#### **5.1.6 Threatened and Endangered Species**

The Final EIS reviewed federally-listed threatened and endangered species that have the potential to occur, or have been documented, in the Gross Reservoir area (Final EIS section 3.10). The only species identified in the Final EIS were the threatened

Preble's meadow jumping mouse (*Zapus hudsonius preblei*), and threatened greenback cutthroat trout (*Onchorhynchus clarki stomias*).

#### Preble's Meadow Jumping Mouse

The Final EIS reviewed that Preble's meadow jumping mouse inhabits well-developed plains riparian vegetation with adjacent, undisturbed upland grassland communities and nearby water sources. The mouse is native only to the Rocky Mountains-Great Plains interface of eastern Colorado and southeastern Wyoming, and the western boundary of its distribution is limited to areas below 7,600 feet in elevation. In Colorado, the mouse is known to occur in seven counties: Weld, Larimer, Boulder, Jefferson, Douglas, Elbert, and El Paso. There is no designated critical habitat in the Gross Reservoir area. The Final EIS reviewed that, in September 2005, three areas in the Gross Reservoir Project area were evaluated for potential habitat suitability for the mouse: Forsythe Canyon, Winiger Gulch, and the Gross Reservoir inlet on South Boulder Creek. Of the three locations at Gross Reservoir, only Winiger Gulch was found to have suitable habitat. However, the affected areas at Winiger Gulch are near the upper elevation limit of the mouse's distribution in Colorado; also, any population in Winiger Gulch would have been isolated from known downstream populations, below Gross Reservoir along South Boulder Creek, by construction of Gross Reservoir for more than 50 years. Therefore, any population that did inhabit upper Winiger Gulch prior to construction is now likely extinct. In section 5.10.1.1, the Final EIS indicated that Preble's meadow jumping mouse is not known or expected to be present at Gross Reservoir, and would not be likely to be adversely by the proposed construction and reservoir enlargement.

#### Greenback Cutthroat Trout

The Final EIS reviewed that greenback cutthroat trout are found primarily in headwater streams in the Arkansas River and South Platte River drainages, with suitable habitat consisting of clear, swift-flowing, gravelly headwater mountain streams and lakes with cover such as overhanging banks and vegetation. Currently, the most stable populations are within the South Platte drainage in Rocky Mountain National Park. Critical habitat has not been designated for greenback cutthroat trout. The Final EIS reviewed that greenback cutthroat trout have been stocked in Gross Reservoir in 2002 and 2004, but that net sampling in 2007 did not find any fish, and that they seem to be relatively rare if still present. However, problems have been discovered with the genetic purity of a number of greenback cutthroat trout populations, and it is likely that the fish stocked at Gross Reservoir were hybrids of greenback and Colorado River cutthroat trout. Because of this, Gross Reservoir is not considered to be a recovery water for federally-listed greenback cutthroat trout.



#### **5.1.6.1 Environmental Effects and Mitigation**

The description of occurrence of federally-listed species at Gross Reservoir and possible effects of the Commission action provided in the 2014 Final EIS remains accurate.

Regarding threatened greenback cutthroat trout, the FWS, in its June 17, 2016 BO, clarified that any greenback cutthroat present in Gross Reservoir are not considered a protected population under the ESA. Regarding threatened Preble's meadow jumping mouse, The FWS, in its December 6, 2013 BO, concurred with the Corps' determination that enlarging Gross Reservoir is not likely to adversely affect the Preble's meadow jumping mouse because, although it has the potential to occur in the project area, it is not known or expected to be present. Based on our review of the information, we conclude that Denver Water's proposed action before the Commission involving raising Gross Dam and Denver Water's proposal to enlarge Gross Reservoir is not likely to adversely affect Preble's meadow jumping mouse.

#### **5.1.7 Recreation Resources**

The 2014 Final EIS determined that there would be temporary effects on recreation associated with Denver Water's proposal to raise Gross Dam and enlarge Gross Reservoir (Final EIS sections 5.15.1) primarily because of inundation at six of the nine recreation access sites required by the approved Article 416 RMP. Since issuance of the 2014 Final EIS, Denver Water has worked to finalize the relocation of recreation facilities that would be inundated and made specific proposals as part of its license amendment application.

In Appendix M-2, the Final EIS found that proposed operation of the Environmental Pool would have a minor adverse effect on recreation, specifically kayaking, on South Boulder Creek, through periods of reduced flows. Flows are projected to decrease by as much as 12 cfs at both the outflow from Gross Reservoir and at the Eldorado gage in May with operation of the Environmental Pool. May is a primary use period for kayaking along South Boulder Creek, and the optimum flow range for kayaking is 150 to 300 cfs. A reduction of 12 cfs would reduce flows from 148 cfs under the proposed action without the Environmental Pool to 136 cfs with the Environmental Pool.

##### **5.1.7.1 Affected Environment**

The description of existing recreation resources provided in section 3.15 of the Final EIS remains unchanged, with the exception of the Rocky Point recreation site. As noted in the project's approved Article 416 RMP, the Forest Service has closed public access to the Rocky Point recreation site as a result of conflicts and inappropriate behavior. Existing facilities at Rocky Point now consist of a vehicular turn-around area

and informational signage. The signage includes notification that public access to Gross Reservoir at this location is closed, and a map directing recreationists to the other project recreation opportunities. The facilities at Rocky Point would not be affected by the proposed action.

The Final EIS evaluated the effects of inundation and relocation of six of the nine license-required recreation sites, and the expanded surface area and shorelines around the reservoir available for recreation. As Denver Water explains in its license amendment application, it would relocate all facilities within the Dam Recreation Area, Haul Road Recreation Area, and Peninsula Recreation Area. Denver Water would relocate some of the facilities at Winiger Gulch Inlet, Winiger Ridge Access and Recreation Area, and South Boulder Creek Inlet to higher elevations in close proximity to the existing locations because portions of the facilities would be inundated by enlargement of the reservoir. Denver Water would also construct two new areas: Scenic Ridge Trail and Upper

Viewshed Trail. The existing North Shore Recreation Area and South Boulder Creek Recreation Access (Outlet) would not be affected. See Figure 3 below for the locations of the facilities discussed here.

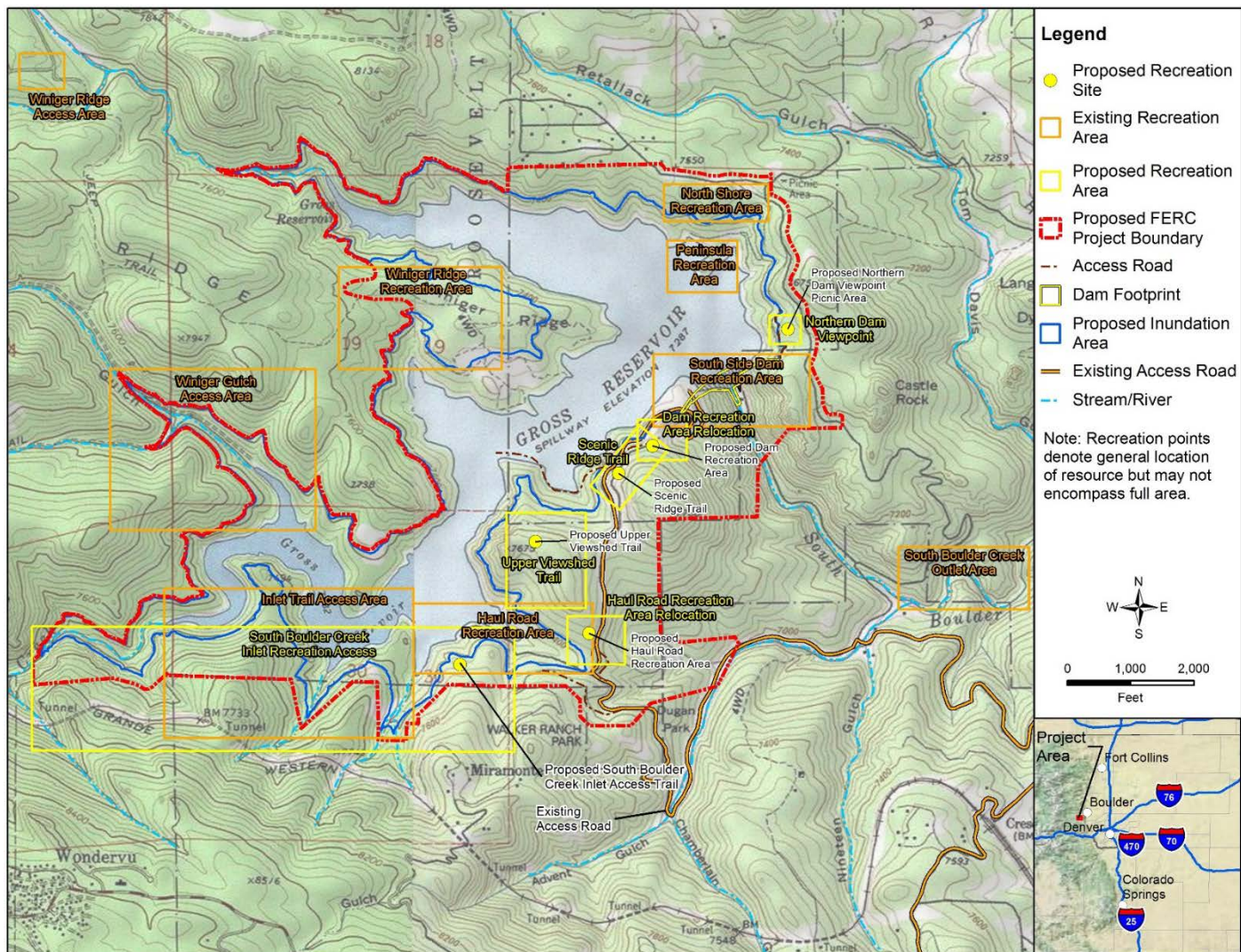


Figure 3. Recreation resources of the Gross Reservoir Project (Source: Denver Water, 2016, as modified by staff)

### 5.1.7.2 Environmental Effects and Mitigation

Denver Water would relocate all license-required recreation facilities affected by the proposed enlargement of Gross Reservoir to areas above the new normal maximum water surface elevation, and it would construct two new recreation sites, to allow for the continuation of current recreation opportunities. Denver Water indicates that the relocations would be completed during the final clean-up and restoration phases of construction. Each relocated recreation area would provide for the specific opportunities and facilities outlined in the project's approved Article 416 RMP.

Denver Water's implementation of the measures in its proposed addendum to the Article 416 RMP, including the measures required by Forest Service condition 24 (Recreation Management Plan), would minimize effects to recreation during construction and reservoir refilling, and help ensure recreation opportunities at the project are similarly provided after completion of construction and reservoir refilling.

Scheduling the relocation work near the end of construction would allow the current recreation sites to remain open as long as possible before relocation, minimizing impacts on visitors. Relocation of the sites, and creation of amenities at the new locations equal to those required in the approved RMP, would not create any significant adverse effects on recreation and other uses of nearby lands and waters.

Several commenters responding to the Commission's public notice of Denver Water's application expressed concerns that effects to recreation resulting from closure and relocation of recreation facilities were not adequately addressed. One commenter requested that a license reopener be provided to address impacts on recreation if the reservoir does not fill in most years. Such impacts could include visibility of some elements of the Osprey Point quarry site when the reservoir is not completely full to its new maximum elevation. Upon review, we find that any such effects would be similar to those already identified in the Final EIS in sections 4.6.15 and 5.15. However, to help identify and address effects to recreation at the project, including those expressed in the comments, we recommend that recreation monitoring and reporting that now occurs pursuant to the project license be modified. Currently, approved Article 417 Recreation Monitoring Plan<sup>23</sup> requires Denver Water to monitor recreation use at the project annually and then file a report, to include public and agency consultation, for Commission approval every six years. The reports are to discuss adequacy of recreation facilities at the project, and discuss changes to recreation needs identified during monitoring. To further ensure adequacy of recreation at the project after the maximum reservoir elevation is increased, we recommend that any approval of Denver Water's application include modification of the approved monitoring plan to require that the

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<sup>23</sup> Order Modifying and Approving Recreation Monitoring Plan, issued June 8, 2004 (107 FERC ¶62,214).

monitoring reports be prepared and filed for Commission approval every three years, for the first twelve years after completion of construction. We note that Forest Service condition 24 includes addition of a similar monitoring and reporting requirement, citing an addendum to existing Article 416. Requiring the additional monitoring and reporting through either article would help address the concerns and our recommendation.

In addition, amendment of the project's approved Article 418 Public Safety and Law Enforcement Plan,<sup>24</sup> in compliance with Forest Service condition 29, would further reduce effects to, and add to protection of, recreational opportunities at the project. Amendment of the project's approved Article 414 Visual Resources Protection Plan,<sup>25</sup> in compliance with Forest Service condition 23, would benefit visual resources associated with recreation.

Overall, we find that effects to recreation at the Gross Reservoir Project would be consistent in level and duration with those identified in the Final EIS, and would be reduced by an approval of Denver Water's amendment request, to include our recommendation, and Denver Water's compliance with the Forest Service conditions involving recreation resources.

#### **5.1.8 Land Use**

The 2014 Final EIS (section 5.16.1) found that effects to land use in the Gross Reservoir Project area as a result of Denver Water's proposal would be minor, with the exception of planned relocation of some recreational facilities.

Denver Water's amendment application includes modifications to the licensed project boundary, which was not discussed in the Final EIS. Denver Water proposes to remove 324 acres of Forest Service lands, thereby reducing the total amount of federal lands within the project boundary to approximately 688 acres. This amount includes the addition of approximately three acres of National Forest System lands to the area within the project boundary, which are necessary to accommodate the South Boulder Creek Inlet Access Trail along the southwestern portion of the project boundary and the reservoir enlargement along the western portion. The proposed change in the project boundary also adds 40 acres of Denver Water lands, while removing approximately 68 acres of Denver Water land that would no longer be needed for project purposes. That leaves

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<sup>24</sup> Order Approving Safety and Law Enforcement Plan Pursuant to Article 418, issued August 23, 2004 (108 FERC ¶ 62,192).

<sup>25</sup> Order Approving Visual Resources Protection Plan Under Article 414, issued May 22, 2003 (103 FERC ¶ 62,105).

approximately 738 acres of Denver Water land remaining in the project boundary.<sup>26</sup> In addition, Denver Water proposes to add 12 acres of private land to the project boundary. With these changes, the project boundary would encompass all project features, including the enlarged reservoir, and any other lands needed for operation and maintenance of the proposed project. Below we discuss potential effects on land use.

#### **5.1.8.1 Affected Environment**

Denver Water proposes to modify the project boundary as currently licensed to add National Forest System, Denver Water, and private lands needed to accommodate the enlargement of the dam and reservoir as well as for the South Boulder Creek Inlet Access Trail. Denver Water also proposes to remove National Forest System and Denver Water lands that would not be needed for project purposes.

The proposed project boundary would include about 12 acres of undeveloped, privately owned property along the southwestern edge of the project that is currently owned by the Miramonte Land Corporation LLC. Inclusion of these lands would be necessary because of temporary impacts from tree removal and construction-related activities and permanent impacts from inundation. Denver Water has been working with Miramonte Land Corporation LLC to acquire this property through a land transfer and anticipates completing a settlement agreement prior to construction.<sup>27</sup>

#### **5.1.8.2 Environmental Effects and Mitigation**

The Final EIS evaluated a quarry site on Forest Service lands that would provide a portion of the needed aggregate material for project construction. In its amendment application, Denver Water identifies and evaluates an alternative quarry site, at Osprey Point, which would be entirely on lands owned by Denver Water and would be within the area that would be inundated by Gross Reservoir. The quarry site evaluated in the Final EIS was located on approximately five acres of Denver Water land and 24 acres of National Forest System lands.<sup>28</sup> The quarry at Osprey Point would be accessed in the dry, when the reservoir is drawn down during the work period. Denver Water believes that the Osprey Point quarry could provide all of the needed quarry material for the proposed work, thereby eliminating the quarrying effects to Roosevelt National Forest lands described in the Final EIS. However, Denver Water noted that, if it is unable to get

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<sup>26</sup> See Table A-2 and Attachment 2 of Denver Water's March 24, 2017 filing with the Commission.

<sup>27</sup> See Attachment 2 of Denver Water's March 24, 2017 filing with the Commission.

<sup>28</sup> Page 9 of Final Memorandum: Evaluation of Denver Water's Final Quarry Location Report; (URS 2017).



all of the material from the quarry on Denver Water lands, it may need to develop some portion of the other site. Regardless of the quarry location, the effect on land use would not change. However, after refilling of the reservoir, most of the Osprey Point quarry would be submerged below the new high water line, but the FEIS quarry would have an approximately 250-foot tall high wall above the water surface. Denver Water did note that some portions of the quarried area at Osprey Point may still be exposed above the maximum reservoir elevation, and portions of the quarry site would be exposed during lake level fluctuations during project operations, but the majority would be submerged.

The Final EIS evaluated the installation of an auxiliary spillway at Osprey Point, with a downstream discharge channel. Denver Water states in its amendment application that the auxiliary spillway may not be needed, but a saddle dam would still be required to address a topographic low point on the edge of the enlarged reservoir. The need for a spillway would be determined in final design. The area of disturbance would be smaller if only a saddle dam is required.

Denver Water also proposes to modify the project boundary as currently licensed to add lands needed to accommodate the enlargement of the dam and reservoir as well as the modified South Boulder Creek Inlet Access Trail. Denver Water also would remove lands that would not be needed for project purposes. The lands being removed from the boundary would be either Forest Service lands or Denver Water lands, and their use character would not change. The general character of the lands that would be incorporated into the project boundary would remain the same, including the 12 acres of land that Denver Water is seeking to acquire from Miramonte Land Corporation LLC. The three additional acres of National Forest System lands for the trail and reservoir enlargement would incur temporary disturbances during the tree removal phase of the project, as well as some permanent impacts arising from the inundation associated with the reservoir enlargement.

Overall, effects on land use under an approval of Denver Water's license amendment would be minor, and would not be significant enough to cause effects determined in the Final EIS to be exceeded.

#### **5.1.9 Transportation, Traffic, and Public Safety**

The 2014 Final EIS reviewed effects on transportation, traffic, and public safety associated with Denver Water's proposal to raise Gross Dam and enlarge Gross Reservoir (Final EIS section 5.16.1). The analysis in the Final EIS was based on the assumption that, in addition to all other materials and equipment needed for the construction of the dam and enlargement of the reservoir, approximately 370,000 cubic yards of aggregate would be trucked to the construction site at the dam. This estimate was based on the preliminary estimate of how much aggregate material could be obtained from a quarry site on Forest Service lands within the footprint of the proposed reservoir enlargement.

In summary, the Final EIS found that there would be temporary, minor to moderate effects on traffic operations during construction.

Since issuance of the 2014 Final EIS, Denver Water conducted additional on-site investigations that determined that all of the aggregate material can be obtained on-site, either from the Final EIS quarry location or from another site at Osprey Point. As such, a significant portion of the truck traffic required for transport of construction materials from off-site locations is no longer necessary.

#### **5.1.9.1 Affected Environment**

The Final EIS presented background information pertaining to transportation, traffic, and public safety for the project area (section 3.12). Construction of the proposed project would require the use of local roads in the vicinity of the reservoir and dam, as well as other local and major connecting roads and highways for transport of construction materials.

The most direct route to Gross Reservoir is from SH 72 (Coal Creek Canyon Drive), a two-lane paved roadway. SH 72 runs from Interstate Route 70 (I-70) in Wheat Ridge, connects to Colorado Highway 119 (SH 119) south of Nederland, and continues north. From SH 72, County Road (CR) 77S (Gross Dam Road) in Crescent Village leads to the reservoir. Approaching the dam, Gross Dam Road is an unpaved road with numerous sharp curves and steep grades. Gross Dam Road splits to provide access to the Dam and Haul Road Recreation Areas to the west, and CR 77 (Flagstaff Road) provides access to the reservoir from Boulder. Additional access to Gross Reservoir can be obtained from CRs 97, 132, and 68, and by four-wheel drive roads on Forest Service lands. However, these routes are also unpaved roads and have much longer travel times than the SH 72 route. The Union Pacific rail line also travels near Gross Reservoir.

#### **5.1.9.2 Environmental Effects and Mitigation**

Potential effects of transportation on roadways in the project area are associated with temporary construction traffic, ongoing maintenance and operations of project facilities, and recreational traffic at Gross Reservoir. Other transportation issues include construction workforce, construction equipment, haul trucks, and roadway standards and surface conditions. Section 5.12.1 of the Final EIS provides estimates of construction-related impacts for the proposed action, including the Final EIS quarry site, which would occur over a total 4.1-year (49-month) period during construction and expansion of the dam.

When the Final EIS was prepared, Denver Water had estimated that only a portion (426,000 cubic yards of the total 796,000 cubic yards needed) of the aggregate needed could be extracted from a quarry site to be located on Forest Service land in the existing reservoir, with the remaining aggregate material trucked in from Fort Upton, Colorado



(northeast of Denver), about 50 miles from the site. The potential route would use the following roads in Colorado: SH 52; I-25; SHs E-470, 128, 93, and 72; and CR 77S. Materials from the quarry site on Forest Service land would be transported on local roads and CR 77S. Based on this assumption, the number of deliveries was estimated to range on average from 22 deliveries (44 vehicle trips) per day, up to a peak of 37 deliveries (74 vehicle trips) per day.

Flyash material would be transported to the project site from the Jim Bridger coal-fired power plant in Point of Rocks, Wyoming (southwestern Wyoming), approximately 350 miles away from the site. The potential route would use the following roads in Colorado: US Highway 287; I-25; SHs E-470, 128, 93, and 72; and CR 77S. Cement would be transported from Portland, Colorado (south-central Colorado), about 144.9 miles from the site. The potential route would use the following roads in Colorado: SH 115; I-25; SH 470; I-70; SHs 58, SH 93, and 72; and CR 77S.

In its license application, Denver Water stated that subsequent investigations determined that all of the aggregate material could be derived onsite, thereby eliminating the need to truck aggregate material from the off-site location. With this significant change, Denver Water estimates that 6,552 truck trips would be necessary to haul only the materials that cannot be produced on-site (cement and flyash) from an off-site location. This represents an approximate 72% reduction from the approximate 23,452 truck trips estimate that can be calculated based on data in the FEIS. This would greatly reduce the traffic to the project site on local roads, and therefore, greatly reduce effects on local roadways. However, it is important to note that regardless of the quarry location, the estimates for certain types of traffic that are not associated with deliveries, including construction workforce travel trips, construction equipment travel trips, and tree removal and disposal, traffic impacts discussed in section 5.12.1 of the Final EIS would remain unchanged.

For the proposed action, numerous on-site road segments would need to be abandoned and relocated, or would be newly constructed, in order to facilitate construction operations. Road segments would need to be relocated out of the proposed reservoir inundation boundary and out of the proposed footprints for the dam enlargement and spillway facilities. An updated Erosion Control and Reclamation Plan (Forest Service 4(e) Condition 19) and a Road Maintenance Plan (Forest Service 4(e) Condition 10) would address requirements for road work on Forest Service lands. Access to the dam would be available using the existing Project Access Road. However, minor road relocations would be necessary at the north and south dam abutments. These relocated road segments would be gravel surfaced and approximately 30-50 feet wide. Post-construction, abandoned road segments above the new normal water line would be restored using techniques such as re-grading and seeding. No other roads in the proposed project area would need permanent improvements.

To work towards minimizing effects of project construction on transportation, Denver Water developed its draft Traffic Control Plan (Denver Water 2015). The plan was developed to address the concerns related to truck traffic and to increase public awareness of trucking in the corridor. As discussed above, Denver Water plans to submit a final Traffic Management Plan to the Commission after incorporating input from stakeholders. Denver Water indicates that it developed its draft Traffic Control Plan to stimulate the discussions in that collaborative process. The draft Traffic Control Plan provides a basic understanding of the existing traffic conditions along SH 72 and an overview of the material hauling and construction traffic and the impacts caused by both. It recommends traffic control devices that will alert the public when active hauling is ongoing and when and where flagging operations are ongoing and only permit one-way travel on a roadway. These devices include dynamic signs that can change messages and static signs with flashing beacons that can be turned on or off during active hauling hours. The draft Traffic Control Plan contains recommendations for the maintenance of striping along SH 72 and supervision of these activities. It also addresses how to handle additional maintenance items such as the condition of the roadway surface and the presence of dust. The final Traffic Management Plan, once developed, would be submitted for Commission approval.

Several commenters expressed concerns about the number of vehicles that would use local roads during the 4.1-year construction period, and the effects of that increased traffic. Boulder County expressed concern that Denver Water used outdated reports that discuss planned road improvements for some of the roadways that would be used during construction. In particular, it referred to the Denver Regional Transportation Plan 2030—issued in 2005, and 2035—issued in 2011, which have now been superseded by the 2040 plan, issued in 2015. Although the references were not the most recent plans, review of the 2040 Plan reveals that the roadways in question are still listed in the plan, so the information is still relevant. Although it is not known if the roadways would be improved before construction begins, the information referenced by Denver Water is correct.

Boulder County stated that Denver Water did not discuss the effects of worker commuting traffic. However, this information was reviewed in table 3.3.12-2 of Denver Water’s amendment application Exhibit E, and in table 5.12-1 in the Final EIS.

The updated information Denver Water provided in the amendment application, as discussed above, indicates that the use of an on-site quarry to obtain all of the aggregate material needed for construction would significantly reduce the transportation-related effects presented in the Final EIS.

Beverly Kurtz raised concerns about dust pollution from the quarry operations and the effects on residents and wildlife. Denver Water proposes BMPs to address dust in its draft Traffic Control Plan for control of erosion and sedimentation, and it also proposes

to prepare a Fugitive Dust Control Plan. Denver Water indicates that BMPs in its final Traffic Management Plan would include measures such as application of water to reduce dust along project roadways. Also, Denver Water's proposed Quarry Operation Plan and Quarry Reclamation Plan would include measures to reduce, control, and/or mitigate effects of quarry development and operations, as well as final grading of the quarry site. In addition, Denver Water would include in its final tree removal plan (Forest Service 4(e) Condition 28) measures to address road construction, road improvements, and hauling associated with tree removal.

Several commenters expressed concerns about traffic safety on local roadways due to the size of the vehicles that would be using the roadways, the number of vehicles, and the existing roadway conditions. Denver Water identified the roadways that would be used to bring workers and materials to the construction site. As discussed, Denver Water proposes to develop a Traffic Management Plan and to address effects of construction on project and local roadways and a Road Maintenance Plan for effects of construction on Forest Service lands and roads. Forest Service 4(e) condition 29 would require Denver Water to review its existing Public Safety and Law Enforcement Plan following construction and revise the plan as necessary, in consultation with the Forest Service, to address any new concerns on Forest Service lands. This measure would ensure any new safety hazards associated with the new reservoir level and modifications to project roads would be identified and addressed as appropriate.

In addition, Denver Water proposes to restrict vehicles associated with mass concrete placement from using Flagstaff Road. Denver Water proposes to provide public notices for project-related road closures and timelines for construction activities associated with the project. Denver Water proposes to develop a road maintenance plan for use, maintenance, reconstruction, and relocation of roads on Forest Service lands that are used for project purposes, including portions of Miramonte Road and Gross Dam Road that would be relocated. Finally, Denver Water proposes to provide parking for construction workers on Denver Water land at appropriate locations (e.g., stockpile and staging areas). These measures would help to reduce project effects on transportation, traffic, and public safety during the construction period.

Overall, effects on transportation, traffic, and public safety arising from the proposed action are mostly consistent with those identified in the Final EIS. However, Denver Water being able to obtain all of the needed aggregate from an onsite quarry would significantly reduce (by 72%) the need to truck in material from locations about 50 miles from the construction site. The FEIS concluded that the "temporary moderate indirect impacts to traffic operations" would "pose no significant indirect impacts" to transportation. Therefore, approval of Denver Water's license amendment, in consideration of the new on-site quarry location and the implementation of a finalized Traffic Management Plan, Erosion Control and Reclamation Plan, Road Maintenance

Plan, and Tree Removal Plan would reduce effects to transportation and traffic from those identified in the Final EIS.

#### **5.1.10 Aesthetics**

The 2014 Final EIS reviewed effects on aesthetic resources associated with Denver Water's proposal to raise Gross Dam and enlarge Gross Reservoir (Final EIS sections 5.17.1 (Visual Aesthetics) and 5.14.1 (Noise)).

In the amendment application, Denver Water proposes to change the location of the proposed on-site quarry and states that flooding studies during final design may determine that the auxiliary spillway originally proposed and evaluated in the Final EIS may not be needed and would be replaced by a saddle dam. Below we review these changes and their effects on aesthetic resources.

##### **5.1.10.1 Affected Environment**

###### Visual Aesthetics

The description of visual resources in the project area provided in the Final EIS (section 3.17) evaluated a potential quarry location on Forest Service lands on the east bank of the reservoir. In its amendment application, Denver Water proposes a new quarry site at Osprey Point on the southeastern side of the reservoir, entirely on Denver Water lands and capable of supplying all of the fine aggregate needed for the proposed project. Once construction is complete, the quarry site would either be completely submerged or a portion of the high wall would be exposed by up to 55 feet. This would be determined in final design. Further, the quarry site may at times be exposed during project operations, as the reservoir level fluctuates over the course of each year, and through dry years when there may be less water in the reservoir.

The Final EIS discussed the installation of an auxiliary spillway at a topographic low point at Osprey Point. The amendment application states that final design would dictate if the spillway is needed, and if not, a saddle dam would replace the auxiliary spillway to address the topographic low point, and a downstream discharge channel would not be needed.

###### Noise

In the Final EIS, the Corps presented the appropriate federal and state noise standards and measurement methods (section 3.14.1). The Final EIS also included the results of a baseline noise survey that was conducted at the Gross Reservoir study area as part of the Commission's relicensing proceeding in 1997.

## **5.1.10.2 Environmental Effects and Mitigation**

### Visual Aesthetics

The Final EIS found that the effects of construction on visual resources would be short-term (4.1 years) and result in direct, major adverse effects on visual resources. The visual character after construction would be comparable to current conditions, but the enlarged reservoir would be more of a dominant topographic feature. Reservoir level fluctuations would be similar to current conditions.

A portion of the original quarry high wall would have been visible above the water line of the enlarged reservoir. Denver Water has developed two quarry site layouts: a more optimistic layout would result in the quarry being completely submerged at the new maximum reservoir elevation 7,406 feet msl, and the more conservative layout would result in up to 55 feet of high wall exposed at that elevation. The final layout would be selected during the final design of the project. Regardless of the quarry site selected (Final EIS site or Osprey Point), or the layout selected, a portion of the quarry site would be exposed during normal project operations when the reservoir level is lower than the normal maximum reservoir elevation of 7,406 feet msl.

The Osprey Point site would also eliminate effects on Roosevelt National Forest lands because the quarry would be entirely on Denver Water lands. As such, the new proposed quarry location would result in an improvement over the potential effects on aesthetics analyzed in the Final EIS.

Implementation of the amended Visual Resources Protection Plan as proposed by Denver Water and required by Forest Service 4(e) condition No. 23 would ensure the aesthetics of the project are managed throughout the term of the license. In addition, Denver Water proposes to minimize upward diffusion of light at the construction site by ensuring that yard lights used for nighttime lighting of facilities are downcast. This would reduce night sky effects from stray lighting.

Overall, the visual aesthetics issues and their effects identified, analyzed, and discussed above are consistent with the level and duration identified in the Final EIS. Therefore, the proposed project, along with our recommended measures to protect visual resources, may differ slightly from, but would not significantly change, the effects described in the Final EIS.

### Noise

In section 5.14.1 of the Final EIS, the Corps evaluated the effects of the proposed project on noise. As noted, the proposed use of a quarry on Denver Water's land would significantly reduce the number of vehicle trips to transport materials from off-site from

22 vehicle trips per day to 6 vehicle trips per day, therefore reducing construction-related noise effects.

The Final EIS found that the effects of construction on noise would be short-term (4.1 years), direct, moderate adverse effects. According to the final memorandum evaluating Denver Water's Final Quarry Location Report (URS 2017), the change in location to the Osprey Point quarry would result in similar, moderate, temporary noise impacts on and near the project site since the activities that would be used to produce sand and gravel aggregate on-site are similar to what was assumed for the impact analysis in the Final EIS. Similarly, the blasting frequency would increase from every three to four days (Final EIS Section 2.3.2.1) to up to one blast per day, but the timeframe (approximately the first year of aggregate processing and in the early phases of construction related to the dam foundation excavation) for blasting would be similar to that described in the Final EIS. Off-site noise impacts associated with haul trucks would be significantly reduced compared to what was presented in Sections 2.8.5 and 5.12 in the Final EIS. Noise effects during project operations would be comparable to current conditions.

In comments on the Final EIS, several individuals who live near the project expressed concerns about the noise throughout the duration of construction. As described in Denver Water's application, the noise impacts are anticipated to be temporary and moderate during on-site construction. The Osprey Point quarry is approximately 1,000 feet further from the closest (lakeshore) residential community as compared to the noise analysis performed for the impacts of the FEIS Quarry. The Osprey Point quarry would be approximately 1,000 feet closer to the seasonal private property owner (Miramonte) south of Gross Reservoir. Given the location of the Osprey Point quarry site, noise impacts from quarrying are anticipated to be similar to those impacts identified in the Final EIS.

Denver Water commissioned its Gross Dam Noise Impact Report (Denver Water 2017a) based on comments from Miramonte, Boulder County and others to better understand what the anticipated noise levels would be to neighbors from the proposed quarry operations at Osprey Point and the dam construction activities. Like the previous noise studies conducted by Denver Water, this study verified the conclusions of the Final EIS and established that noise levels at the Final EIS quarry and at the Osprey Point quarry would be below local noise ordinances. Nonetheless, Denver Water recognizes that any increase in noise levels above ambient will be a different environment than normal in this mountain community. Denver Water intends on using these noise studies as a tool to work with the local community, including Miramonte, to develop measures that aim to monitor, minimize, and mitigate noise disturbance during construction, to the extent reasonable and possible. For example, Denver Water is considering the use of project noise goals and potential forms of restitution when construction activities exceed those goals at determined monitoring locations. Denver Water also proposed in their

application to use engineering and administrative controls, which may include modifying the equipment or the work area to make it quieter, substituting existing equipment with quieter equipment, retro-fitting existing equipment with mufflers, modifying backup alarm systems, and/or shutting down noisy equipment when not needed. In addition, Denver Water proposed to implement confined charge blasting for dam construction to minimize noise. Blasting would occur only during daylight hours, and a seismograph would be used to monitor ground motions and air pressure (noise) vibrations produced from the blasting operations to ensure that acceleration thresholds are not exceeded. These measures would help to reduce noise effects due to construction activities.

Therefore, we find that based on noise impact information provided by Denver Water in their application, the use of the new Osprey Point quarry, the results of the February 2017 noise study provided by Denver Water in their May 16, 2017 filing, and the noise impact minimization measures Denver Water proposes, approval of Denver Water's license amendment would have similar noise effects to those identified in the Final EIS.

#### **5.1.11 Air Quality**

In the amendment application, Denver Water proposes to change the location of the proposed on-site quarry and states that flooding studies during final design may determine that the auxiliary spillway originally proposed and evaluated in the Final EIS may not be needed and would be replaced by a saddle dam. Below we review these changes and their effects on air quality.

##### **5.1.11.1 Affected Environment**

The Final EIS presented federal, state, and local air quality standards for the project area (section 3.13) as well as air quality data measured in the vicinity of the project. Denver Water's amendment application does not provide any new or different information related to air quality in the project area.

##### **5.1.11.2 Environmental Effects and Mitigation**

The Final EIS found that the effects of construction on air quality would be short-term (4.1 years), direct, and adverse, and hazardous air pollutants and greenhouse gas total emissions would be well below the major source status thresholds for permitting requirements. Air quality effects during project operations would be comparable to current conditions. The Final EIS presented an evaluation of the effects of project construction and operation of the enlarged reservoir (section 5.13). Short-term, direct air quality effects for the project would be related primarily to construction activities. Construction emissions include exhaust emissions from heavy-duty construction equipment, exhaust emissions from construction workers' vehicles and delivery vehicles, and fugitive dust emissions.

Total emissions from the expansion of the dam and 77,000 acre-foot expansion of the reservoir were calculated based on proposed equipment used over the 49-month (4.1-year) construction schedule and presented in the Final EIS.

Denver Water now proposes to use a different quarry area on its own land within the current reservoir area. The discussion of the effects on air quality in the license amendment application did not specifically discuss this change. However, Denver Water's Final Quarry Location Report (Denver Water 2016a) notes that the ability to obtain all of the aggregate material from an on-site quarry (regardless of the quarry site selected) would significantly reduce the number of vehicle trips to transport materials from off-site from 22 vehicle trips per day for aggregate, flyash, and cement to 6 vehicle trips per day for only flyash and cement, therefore reducing air quality effects during construction. While both the particulate matter measuring less than 10 microns in diameter (PM<sub>10</sub>) and 2.5 microns in diameter (PM<sub>2.5</sub>) are anticipated to increase from the FEIS Quarry site to the Osprey Point quarry site due to increased volume of rock crushed, the net total PM<sub>10</sub> emissions are estimated to significantly decrease because the decreased truck trips would more than compensate for the increased emissions from rock crushing. However, the net total PM<sub>2.5</sub> emissions are estimated to increase slightly because the mission increases from rock crushing would be larger than the emission decreases from truck trips.<sup>29</sup> However, both the total and average annual emissions for all criteria and hazardous pollutants, overall, would be reduced.

Prior to construction, Denver Water would obtain and comply with the necessary air quality permits and would also develop and implement a Fugitive Dust Control Plan that would include specific measures to minimize the generation of fugitive dust during construction. Therefore, based on the results of May 15, 2017 air quality study cited above, and considering the use of the currently-proposed Osprey Point quarry and implementation of the Fugitive Dust Control Plan, approval of Denver Water's application would represent an overall reduction in effects to air quality from those identified in the Final EIS.

#### **5.1.12 Cultural Resources**

The 2014 Final EIS reviewed effects on cultural resources associated with Denver Water's proposal to raise Gross Dam and enlarge Gross Reservoir (Final EIS section 5.18.1.1). The Final EIS found that major and permanent impacts on the dam and reservoir itself (site 5BL10210) and a portion of the Resumption Flume (site 5BL7019.1) would result from expansion of the dam, reservoir, and related facilities. It also found

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<sup>29</sup> See Table 1 of Final Memorandum: Evaluation of Denver Water's Final Quarry Location Report; (URS 2017).



that enlargement of Gross Reservoir would have no impacts on cultural or archaeological resources.

#### **5.1.12.1 Affected Environment**

The description of cultural resources provided in the Final EIS (section 3.18) remains unchanged. The APE for the action consists of the area to be affected by construction activities and highest proposed pool levels, plus a 100-foot buffer zone. The APE was intensively surveyed in 1997 for Denver Water's application for a new license, and a second survey was conducted in 2005 of areas that could be affected by reservoir enlargement that are outside of the relicensing APE (URS, 2006). By letter dated January 12, 2007, the Colorado SHPO concurred that only three cultural resources within the APE are eligible for listing in the National Register:

- 5BL455.2 Denver & Rio Grande Western Railroad Tunnel;
- 5BL7019.1 Resumption Flume; and
- 5BL10210 Gross Dam, Reservoir, Construction Features, Access Roads.

One additional site requires additional field data to determine its eligibility and remains potentially eligible: 5BL4796, Community of Miramonte.

The description of paleontological resources provided in the Final EIS (section 3.18) remains unchanged. The paleontological potential of the project area is rated as Class III and is unlikely to contain fossil materials. For this reason, paleontological surveys were not required.

#### **5.1.12.2 Environmental Effects and Mitigation**

The Final EIS evaluated potential effects of modification of Gross Dam and the enlargement of Gross Reservoir on cultural resources (section 5.18) and found that the dam and reservoir itself (5BL10210) and a portion of the Resumption Flume (5BL7019.1) would be adversely affected. To ensure the Commission remains in compliance with section 106 of the NHPA for the proposed action, the Commission, in conjunction with Denver Water and Colorado SHPO, prepared a draft MOA to take into account the effects of the proposed action on these two historic properties and memorialize agreed-upon mitigation for the effects. The Colorado SHPO and Commission would be signatory parties to the MOA, and Denver Water, the Corps, and the Forest Service would be concurring parties. The final MOA, and its terms, would be incorporated into the project license by the Commission's amendment order. The draft MOA calls for Denver Water to complete HAER documentation of Gross Dam and reservoir and the Resumption Flume before modification.

The Final EIS also found that no other cultural resources would be affected by modification of the dam and enlargement of the reservoir; however, the Final EIS did not assess the effects of other project-related activities on cultural resources, such as ongoing operation and maintenance of the project, public access, and recreation. To that end, in addition to HAER documentation of the dam and reservoir, the draft MOA calls for Denver Water to prepare an HPMP for the Gross Hydroelectric Project before beginning any construction activities that would affect the character-defining features that make these properties eligible for listing on the National Register. According to the draft MOA, the HPMP would contain measures for “considering and managing effects on historic properties of activities associated with constructing, operating, and maintaining the project for the remaining term of the license.” The HPMP would be prepared in consultation with the Colorado SHPO, Forest Service, and the Corps and would consider the Commission and Advisory Council’s joint document *Guidelines for the Development of Historic Properties Management Plans for FERC Hydroelectric Projects* (2002). In its amendment application, Denver Water explains that the HPMP would also include specific requirements for: (1) notifying the Commission in the case of unanticipated discoveries; (2) procedures to be followed in the event of an emergency at the project; and (3) reporting requirements for informing the Commission of the execution of the treatment plan developed in accordance with the PA for the proposed project’s adverse effects on the two historic properties. In accordance with the terms of the MOA, no construction activities would take place until after the HAER report is accepted by the Colorado SHPO and National Park Service and after the Commission has issued an order approving and implementing the HPMP.

Additionally, Article 415 of the project license requires Denver Water to consult with the Colorado SHPO, the Forest Service, and BLM about any discovered sites; prepare a plan to evaluate the significance of the sites; and develop measures to avoid or mitigate any impacts on resources determined to be eligible for inclusion in the National Register. That article would be updated and modified to accommodate the MOA and HPMP, which would now guide the management and protection of cultural resources and historic properties for the remainder of the project license. And although the Commission is not a party to the agreement, additional protection measures are found within the Programmatic Agreement (PA) that was fully executed on October 26, 2015, between Denver Water, the Corps, the Colorado SHPO, and the Forest Service and filed on July 24, 2017. The Northern Cheyenne Tribe, Northern Arapaho Tribe, Cheyenne-Arapaho Tribes of Oklahoma, Ute Mountain Tribe, and Boulder County Historic Preservation Advisory Board were invited to sign the PA as concurring parties.

Therefore, through execution of the MOA and preparation of an HPMP that addresses all eligible or potentially eligible resources identified within the project APE, approving Denver Water’s amendment application would not result in any new permanent or temporary impacts to cultural resources from those identified in the Final EIS.

## 6.0 CUMULATIVE EFFECTS

The Council on Environmental Quality's regulations for implementing NEPA at 50 CFR 1508.7 indicate that an action may cause cumulative impacts on the environment if its effects overlap in space or time with the effects of other past, present, or reasonably foreseeable future actions, regardless of the agency, company, or person undertaking the action. Cumulative effects can result from individually minor, but collectively significant, actions taking place over a period of time.

The Final EIS fully reviewed possible cumulative effects of expanding the Moffat Collection System in chapter 4.0. Specifically related to the enlargement of Gross Reservoir, the Final EIS identified cumulative effects on the following resources: groundwater (section 4.6.4.1); geology (section 4.6.5.1); soils (section 4.6.6.1); vegetation (section 4.6.7.1); riparian and wetland areas (section 4.6.8.1); wildlife (section 4.6.9.1); special status species (section 4.6.10.1); aquatic biological (section 4.6.11.1); transportation (section 4.6.12.1); air quality (section 4.6.13.1); noise (section 4.6.14.1); recreation (section 4.6.15.1); visual (4.6.17.1); cultural (section 4.6.18.1); socioeconomics (section 4.6.19.1), and hazardous materials (section 4.6.20.1). We have identified no cumulative effects outside of those identified in the Final EIS that would result from a Commission approval of Denver Water's proposal regarding the Gross Reservoir Project, including an amendment of the project license.

However, based on our review of the license amendment application, including Denver Water's proposed mitigation plans and its compliance with Forest Service 4(e) conditions and applicable WQC mandatory conditions, which were not included in the Final EIS, we conclude that approval of Denver Water's proposal would reduce effects to some resources in the Gross Reservoir Project area. As discussed in sections 5.0 *Environmental Analysis* and 8.0 *Conclusions and Recommendations* in this Supplemental EA, Denver Water's use of the Osprey Point quarry rather than the quarry analyzed in the Final EIS, would reduce effects to geology and soils, recreation, visual, land use, and transportation resources. Additionally, Denver Water would monitor water quality and aquatic biota, in compliance with WQC conditions, which would reduce effects on these resources. In compliance with Forest Service 4(e) conditions, Denver Water would develop and implement a series of plans, including an erosion control plan, invasive and noxious weed species management plan, tree removal plan, quarry reclamation plan, aquatic invasive species monitoring plan, fire management and response plan, special status plants relocation plan, amended recreation management plan, and traffic management plan. Implementation of these mitigation plans would reduce effects on geology and soils, aquatic biota, vegetation, wildlife, special status species, recreation, and transportation resources. These actions can be expected to reduce cumulative effects on these resources.

## **7.0 NO-ACTION ALTERNATIVE**

Under the No-action Alternative the Commission would deny Denver Water's application to amend the Gross Reservoir Project and increase the height of Gross Dam and the storage capacity of Gross Reservoir. Because enlargement of Gross Reservoir is a necessary component of Denver Water's plans to expand its Moffat Collection System, denial would require Denver Water to abandon its current plans to enlarge the Moffat System and seek alternate ways to increase water supplies for Denver and the surrounding area.

Denying Denver Water's application would leave the existing environment unchanged. Denver Water would be required to continue to operate the Gross Reservoir Project in accordance with the existing license. This would avoid any negative environmental effects associated with increasing the height of Gross Dam and the capacity of Gross Reservoir and amending the license, but would also preclude Denver Water from implementing associated mitigation measures as finalized with federal, state, and local entities. Denial would also prevent the generation of an additional annual 4.4 GWh of energy at the Gross Reservoir Project powerhouse.

## **8.0 CONCLUSIONS AND RECOMMENDATIONS**

Based on our independent review in this Supplemental EA, we recommend Commission approval of Denver Water's application to raise the project's Gross Dam, enlarge Gross Reservoir, and amend the project license. Our recommendation is based on our review of: (1) Denver Water's proposal; (2) information in the 2014 Final EIS applicable to the Gross Reservoir Project; (3) the benefits of Denver Water implementing its proposed environmental mitigation plans and complying with statutory requirements provided by resource agencies in this proceeding; and (4) agency and public comments filed in this proceeding. We do not recommend the No-Action alternative because it would prevent Denver Water from moving forward with expansion of the Moffat Collection System. Selection of the No-Action alternative would also prevent the incorporation into the license of the statutory environmental protection requirements provided by the resource agencies, which would benefit the environment in the project area through the life of the project license.

We find that effects specific to a Commission approval of Denver Water's proposal, would not cause effects to resources in the project area to exceed those identified in the Final EIS. Therefore, the preparation of an EIS to supplement the 2014 Final EIS is not required.

Below, we summarize the effect determinations we made in each resource section, and we provide our recommendations for certain requirements to be included in any approval of Denver Water's proposal to help ensure the protection of environmental resources.

## Geology and Soils

In this Supplemental EA, we did not identify any elements of Denver Water's proposal which would cause effects to geology and soil resources in the Gross Reservoir Project area to exceed the levels identified in the 2014 Final EIS. This includes Denver Water's proposed change in quarry locations and the proposed replacement of the planned auxiliary spillway with a saddle dam. However, use of the Osprey Point quarry within a dewatered area of Gross Reservoir, rather than a quarry at a terrestrial location, would reduce effects on geology and soils, and would also reduce effects on Forest Service lands. Effects would also be reduced through Denver Water's compliance with Forest Service 4(e) conditions 19 (Erosion Control and Reclamation), 26 (Pit Development and Reclamation Plan), and 28 (Reclamation and Revegetation Seed Mixes and Mulch Materials). Effects would be further reduced through measures in Denver Water's proposed Stormwater Management Plan, Erosion Control and Reclamation Plan, Quarry Operation Plan, Quarry Reclamation Plan, and Tree Removal Plan. To help reduce effects to geology and soils, and other resources as discussed in this Supplemental EA, we recommend that the final Quarry Operation Plan and/or Quarry Reclamation Plan include: (1) for protection of fisheries and aquatic resources, evidence that any remaining quarry features would not create isolated standing areas of water disconnected from the rest of the reservoir at expected operating levels; (2) for protection to boaters, evidence that any remaining quarry features would not create hazards to boaters at expected operating levels; (3) for protection of water quality, details of how erosion would be controlled during quarry operation, and measures that would be taken during reclamation to minimize erosion in the quarry area when quarry operations are complete and reservoir levels fluctuate during normal operation. To help ensure the effectiveness of these plans, we further recommend that any approval of Denver Water's proposal require that these three plans be finalized in consultation with the agencies identified in Denver Water's application, and entities required through applicable Forest Service conditions and then filed with the Commission for approval. To help ensure the effectiveness of the plans, no ground-disturbing or construction activities associated with the proposal should begin until the Commission approves the plans.

## Water Quantity and Flows

We did not identify any elements of Denver Water's proposal which would cause effects to water quantity and flows in the Gross Reservoir Project area to exceed the levels identified in the 2014 Final EIS. This includes Denver Water's proposal to add a 5 cfs tolerance to the ramping rate requirements of license Article 403, which would not significantly affect water quantity or flows.

## Water Quality

We did not identify any elements of Denver Water's proposal which would cause effects to water quality in the Gross Reservoir Project area to exceed the levels identified in the 2014 Final EIS. We found that effects to water quality through erosion, turbidity and sedimentation would be reduced through Denver Water's Tree Removal Plan, Stormwater Management Plan, Erosion Control and Reclamation Plan, Quarry Operation Plan, and Quarry Reclamation Plan, if, as we recommend, these plans are finalized in consultation with the agencies identified in its application and any entities required through applicable Forest Service conditions, and approved by the Commission before any land-disturbing activity, as described above. Effects would also be reduced by approval of an Erosion and Sediment Control Plan by the Commission's San Francisco Regional Office prior to any land-disturbing activity, as described above. The water quality monitoring Denver Water would perform is consistent with its approved Article 402 Dissolved Oxygen and Temperature Monitoring Plan and would help ensure protection of water quality. The bank stability monitoring it would perform, and its compliance with other relevant Forest Service 4(e) conditions and WQC conditions, would help ensure protection during and after construction and enlargement of the reservoir.

## Fisheries and Aquatic Resources

We did not identify any elements of Denver Water's proposal which would cause effects to fisheries and aquatic resources in the Gross Reservoir Project area to exceed the levels identified in the 2014 Final EIS. The elements we reviewed that were either not examined or not fully examined in the Final EIS, as necessary for the Commission's review of Denver Water's proposal, include changes in erosion, turbidity and sedimentation resulting from the use of the Osprey Point Quarry, changes in reservoir fish habitat and tributary access, and fish entrainment. Effects to fisheries and aquatic resources would be reduced from those identified in the Final EIS through Denver Water's implementation of its proposed plans identified in Water Quality above, and could be ensured if, as we recommend, the plans were finalized in consultation with the agencies identified in its application and other entities identified in applicable Forest Service conditions and approved by the Commission before any land-disturbing activity. Denver Water's compliance with the identified Forest Service 4(e) conditions and WQC conditions would further ensure protection of these resources. Approval of an Erosion and Sediment Control Plan by the Commission's San Francisco Regional Office prior to any land-disturbing or construction activities, as described above, would further reduce any effects to fisheries and aquatic resources.

## Terrestrial Resources

We did not identify any elements of Denver Water's proposal which would cause effects to terrestrial resources, to include vegetation and wetlands, wildlife, and special status species, in the Gross Reservoir Project area, to exceed the levels identified in the 2014 Final EIS.

We found that effects to these resource would be reduced from those identified in the Final EIS through Denver Water's current plan to use a quarry at Osprey Point rather than the site on Forest Service land as examined in the Final EIS. Effects to terrestrial resources would be reduced through implementation of mitigation measures proposed by Denver Water, including the plans identified above if, as we recommend, they are finalized in consultation with the agencies and other entities identified in its application, and any entities required through applicable Forest Service conditions, and approved by the Commission before any land-disturbing activity. Effects would be further reduced through the Reclamation and Revegetation Seed Mixes and Mulch Materials Plan, Invasive Plant and Noxious Weed Species Management, Fire Management and Response Plan, Road Management Plan, and Special Status Plants Relocation Plan Denver Water would prepare in compliance with certain Forest Service 4(e) conditions, and its compliance with other Forest Service conditions related to terrestrial resources, such as condition 18 (Special Status Species and Sensitive Areas), condition 21 (Raptor Protection Measures), and condition 26 (Pit Development and Reclamation Plan). In addition, Denver Water's off-license conveyance of the 539-acre Toll Property to the Forest Service, to be administered and protected as part of the Roosevelt National Forest, would further reduce overall effects to terrestrial resources in the project area.

Approval of an Erosion and Sediment Control Plan by the Commission's San Francisco Regional Office prior to any land-disturbing or construction activities, as described above, would further reduce effects to terrestrial resources by helping to control erosion.

## Threatened and Endangered Species

We did not identify any effects to federally-listed threatened or endangered species in the Gross Reservoir area beyond those identified in the Final EIS. The Preble's meadow jumping mouse is the only federally-listed species that could potentially occur in the area. However, based on our review, the mouse is not known or expected to be present, and we therefore agree with the Corps' determination, as agreed to by the FWS in its December 6, 2013 BO, that Denver Water's proposal to enlarge Gross Reservoir would not be likely to adversely affect Preble's meadow jumping mouse.

## Recreation Resources

We did not identify any elements of Denver Water's proposal which would cause effects to recreation resources in the Gross Reservoir Project area to exceed the levels identified in the 2014 Final EIS. We found that effects to recreation should be reduced through Denver Water's implementation of its proposed addendum to the project's approved Article 416 Recreation Management Plan, in compliance with Forest Service condition 24. Under the addendum, Denver Water would relocate some recreation facilities and would construct some new facilities. The work would be timed to minimize disruption to recreation. In addition, amendment of the project's approved Article 418 Public Safety and Law Enforcement Plan and its approved Article 414 Visual Resources Protection Plan, in compliance with conditions provided by the Forest Service would benefit recreation at the project.

To help ensure any effects to recreation from the enlargement of Gross Reservoir are addressed, we recommend that any approval of Denver Water's application include modification of the recreation monitoring and reporting requirements of the project's Article 417 Recreation Monitoring Plan, which currently requires Denver Water to monitor recreation use at the project annually and then file a report, to include public and agency consultation, for Commission approval every six years. Amending the plan to require that the reports be prepared and filed for Commission approval every three years, for the first twelve years after completion of construction, would help ensure any effects to recreation caused by reservoir enlargement are identified and addressed. This change in reporting would also address an element of Forest Service condition 24.

## Land Use

We did not identify any elements of Denver Water's proposal which would cause effects to land use in the Gross Reservoir Project area to exceed the levels identified in the 2014 Final EIS. Denver Water's proposal to modify the project boundary as currently licensed, to add lands needed to accommodate the enlargement of the dam and reservoir and the modified South Boulder Creek Inlet Access Trail, as well as remove lands that would not be needed for project purposes, would not change the character of these lands. The general character of the lands that would be incorporated into the project boundary would remain the same, including the 12 acres of private land that Denver Water is seeking to acquire from Miramonte Land Corporation LLC.

## Transportation, Traffic, and Public Safety

We did not identify any elements of Denver Water's proposal which would cause impacts to transportation, traffic, and public safety in the Gross Reservoir Project area to exceed the levels identified in the 2014 Final EIS. We found that effects to transportation should be reduced through Denver Water's use of on-site quarries and its proposed Traffic Management Plan, Erosion Control and Reclamation Plan (Forest



Service 4(e) condition 19), Road Maintenance Plan (Forest Service 4(e) condition 10) and Tree Removal Plan (Forest Service 4(e) condition 27). To help ensure the effectiveness of the plans, we recommend that Denver Water finalize these plans in consultation with the appropriate agencies, and other entities identified in its application, and in the applicable Forest Service conditions before any land-disturbing activity.

### Aesthetics

With regards to visual aesthetics, we did not identify any elements of Denver Water's proposal which would cause impacts in the Gross Reservoir Project area to exceed the levels identified in the 2014 Final EIS. Our review included Denver Water's proposed change in quarry locations and a replacement of the planned auxiliary spillway with a saddle dam. Use of the Osprey Point quarry would reduce effects on visual aesthetics and on Forest Service lands. Effects would also be reduced through Denver Water's compliance with Forest Service 4(e) condition 23 (Visual Resource Protection Plan). To help ensure the effectiveness of the plan, we recommend that the requirements of the project's approved Article 414 Visual Resource Protection Plan be modified to include measures for mitigating visual impacts from project construction activities on all project lands, including Forest Service lands.

We also did not identify any elements of Denver Water's proposal which would increase noise effects in the Gross Reservoir Project area beyond those identified in the 2014 Final EIS. The Final EIS found that the adverse effects of construction noise would be moderate and short-term (4.1 years). The change in location to the Osprey Point quarry would result in similar, moderate, temporary noise impacts on and near the project site since the activities used to produce sand and gravel aggregate on-site are similar to what was assumed for the impact analysis in the Final EIS. Off-site noise impacts associated with haul trucks would be significantly reduced, while noise effects during project operation, after construction is complete, would be comparable to current conditions.

Denver Water's February 2017 noise study verified the conclusions of the Final EIS and established that noise levels at the Final EIS quarry and at the Osprey Point quarry would be below local noise ordinances. Nonetheless, Denver Water recognizes that any increase in noise levels above ambient will be a different environment than normal in this mountain community and proposes to work with the local community and enact measures to monitor, minimize, and mitigate noise disturbance during construction. Implementation of Denver Water's proposed plans that include noise-mitigation measures, if finalized in consultation with the agencies and other entities identified in its application and any entities required through applicable Forest Service conditions, would help reduce noise effects.

## Air Quality

We did not identify any elements of Denver Water's proposal that would increase the overall level of effects to air quality at the Gross Reservoir Project area and cause them to exceed the levels identified in the 2014 Final EIS. We noted that Denver Water's proposed change in quarry locations and planned use of a saddle dam rather than an auxiliary spillway would overall, reduce emissions of criteria and hazardous air pollutants. Effects to air quality would be controlled through Denver Water's implementation of its proposed Fugitive Dust Control Plan, compliance with the air quality component of Forest Service condition 27 regarding the Tree Removal Plan, and compliance with all necessary air quality permits.

## Cultural Resources

We did not identify any elements of Denver Water's proposal, including amendment of the project license, which would increase effects to cultural resources at the project beyond those identified in the 2014 Final EIS. The Final EIS did not assess the effects of other project-related activities on cultural resources arising from ongoing operation and maintenance of the project, public access, and recreation. To that end, a draft MOA was developed that calls for Denver Water to prepare HAER documentation of the dam and reservoir and develop an HPMP for the project, both of which need to be completed before beginning any construction activities. The HPMP would generally contain measures for considering and managing effects on historic properties associated with constructing, operating, and maintaining the project for the remaining term of the license. Also, we recommend modification of Article 415 of the project license to accommodate the MOA and HPMP, which would guide the management and protection of cultural resources for the remainder of the project license.

## **8.1 UNAVOIDABLE ADVERSE EFFECTS**

The scope of analysis in this Supplemental EA, as explained earlier in section 2.3 *Scope of This Supplemental Environmental Assessment*, is limited to the following: (1) revisions in certain details of dam raise construction activities, including relocation of the on-site quarry; (2) potential elimination of the previously-proposed auxiliary spillway and replacement with a saddle dam; (3) certain aspects of tree clearing and inundation to a new maximum reservoir elevation of 7,406 feet msl not addressed in the Final EIS; (4) effects of changes in project operation including revisions to the ramping rates required under the license; (5) modifications to project recreation facilities required under the license; (6) modification to the project boundary; (7) effects of Denver Water's proposed environmental mitigation measures; and (8) effects of Denver Water's compliance with statutory requirements.

The Final EIS identified unavoidable adverse effects of Denver Water's proposed construction activities, including effects associated with quarrying of rock to supply

material for increasing the height of Gross Dam. Those unavoidable effects would occur primarily during the 4-year construction period and refill, and would involve localized increases in traffic, noise, dust, and loss of visual resources. However, use of the new on-site quarry site at Osprey Point as now proposed by Denver Water would result in reduction of these unavoidable adverse effects, although some effects would be more localized with the use of the new quarry location.

We found that the Final EIS did not identify some unavoidable effects on fisheries and aquatic resources. Project operations with the increased reservoir elevations would result in increased changes in reservoir levels over the course of the year as the reservoir fills in spring and is then slowly drawn down for water supply. Reservoir filling in the spring would inundate some previously free-flowing lotic habitat used for spawning by rainbow trout and suckers near the mouths of Winiger Gulch and South Boulder Creek into standing water habitat. It would further affect these fish through increased mortality of any eggs that are successfully deposited through reduced DO levels. Reservoir filling would also create habitat for lacustrine species, which would be subject to desiccation during periods of the year when the reservoir is being drawn down. These effects would continue for the term of the amended license.

The final EIS identified unavoidable loss of wildlife habitat, and we further quantified those effects here. Before filling the reservoir, Denver Water would remove about 508 acres of vegetation from the proposed quarry site and the new inundation area. These activities would have unavoidable effects on wildlife, which would relocate to other areas, potentially leaving dens, burrows, and nests and requiring shifts in home ranges for smaller animals. Some injury and/or mortality could also occur. These activities would also result in increases in traffic levels and noise, remove recreation resources, and affect visual resources. The new reservoir would permanently remove about 465 acres of elk winter range and migration corridor and 269 acres of winter concentration area. Following construction, areas cleared of vegetation would be inundated, wildlife would adapt to new distributions of habitat types, and existing traffic and noise levels would be restored. As such, these effects would be temporary, occurring during the 4-year construction period. These effects are consistent in the magnitude and duration as those identified in the Final EIS.

## **8.2 CONSISTENCY WITH COMPREHENSIVE PLANS**

Section 10(a)(2)(A) of the FPA, 16 U.S.C. §803(a)(2)(A), requires the Commission to consider the extent to which a project is consistent with the federal or state comprehensive plans for improving, developing, or conserving a waterway or waterways affected by the project. We reviewed four comprehensive plans that are applicable to the project, which is located in Colorado. No inconsistencies were found.

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Forest Service. 1997. Arapaho and Roosevelt National Forests, Pawnee National Grassland revised land and resource management plan. Department of Agriculture, Fort Collins, Colorado.

U.S. Fish and Wildlife Service. n.d. Fisheries USA: the recreational fisheries policy of the U.S. Fish and Wildlife Service. Washington, D.C.

## **9.0 FINDING OF NO SIGNIFICANT IMPACT**

If the proposed amendment to the Gross Reservoir Hydroelectric Project is approved with Denver Water's proposed measures, the project would continue to operate while providing protection and enhancements to water quality, aquatic resources, terrestrial resources, recreation, and cultural resources.

Based on our independent analysis, Denver Water's proposed modifications that were not assessed in the 2014 Final EIS, as mitigated by the environmental measures discussed in this Supplemental EA, would not constitute a major federal action significantly affecting the quality of the human environment.

## 10.0 LITERATURE CITED

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- Denver Water. 2017. Response to Additional Information Request (Supplemental) on the Gross Reservoir Hydroelectric Project (FERC Project No. 2035) License Amendment Application. March 24, 2017.
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- Denver Water. 2016a. Final Quarry Location Report: Impact Minimization and Avoidance Measures, Moffat Collection System Project, dated September 13, 2016. Included as Attachment E-4 to Denver Water's November 25, 2016 license amendment application.
- Denver Water. 2015. Gross Dam Reservoir Expansion: Traffic Control Plan, dated December 16, 2015. Included as Attachment 4 to Denver Water's response to comments, May 16, 2017.
- Hydros Consulting. 2013. Gross Reservoir Temperature Model: Model Development, Calibration, and Application for the Moffat Collection System EIS. September 27, 2013. Included as Appendix E-5 to the Corps' April 25, 2014 Final EIS.
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## **11.0 LIST OF PREPARERS**

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## **Appendix A**

### **Preliminary 4(e) Conditions for Amendment of the Gross Reservoir Project License**

**U.S. Department of Agriculture, Forest Service**

**Filed March 27, 2017**

#### **PART I: STANDARD ADMINISTRATIVE CONDITIONS**

##### **Condition No. 1 - Revision of Forest Service Conditions (REPLACES CONDITION NO. 111)**

Forest Service reserves the right, after notice and opportunity for comment, to revise these Section 4(e) conditions in order to provide for the protection and utilization of NFS land and resources. Situations in which revision of or addition to 4(e) conditions might be wanted include, but are not limited to, when new resource information becomes available or when the United States Fish and Wildlife Service issues a Final Biological Opinion for this Project or the Water Quality Control Division of the Colorado Department of Public Health and Environment issues a Clean Water Act Section 401 Certification for this Project, and any subsequent modification or amendment of the Federal Energy Regulatory Commission ("FERC or Commission") license.

##### **Condition No. 2 - Surrender of License or Transfer of Ownership (NEW CONDITION)**

Prior to any surrender of this license, Licensee shall provide assurance acceptable to the Forest Service that Licensee shall restore any project area directly affecting NFS land to a condition satisfactory to the Forest Service upon or after surrender of the license, as appropriate. To the extent restoration is required, Licensee shall prepare a restoration plan for Forest Service review and approval, which shall identify the measures to be taken to restore such NFS land and shall include adequate financial mechanisms to ensure performance of the restoration measures.

In the event of any transfer of the license or sale of the Project, Licensee shall assure that, in a manner satisfactory to Forest Service, Licensee or transferee shall provide for the costs of surrender and restoration. If deemed necessary by the Forest Service to assist it in evaluating Licensee's proposal, Licensee shall conduct an analysis, using



experts approved by the Forest Service, to estimate the potential costs associated with surrender and restoration of any project area directly affecting NFS land to Forest Service specifications. In addition, the Forest Service may require Licensee to pay for an independent audit of the transferee to assist the Forest Service in determining whether the transferee has the financial ability to fund the surrender and restoration work specified in the analysis.

**Condition No. 3 - Requirement to Obtain a Short-Term Forest Service Special Use Authorization (REPLACES CONDITION NO. 101)**

During the term of the license, if the Licensee proposes to perform any construction work not authorized under the license amendment, the Licensee shall obtain a short-term special use authorization prior to beginning any ground-disturbing activities on NFS land. Licensee shall be responsible for the costs the Forest Service incurs processing the special use authorization application per Cost Recovery regulations in 36 CFR 251.58, as revised and amended, or per federal law or regulations in effect at the time, unless the Forest Service agrees to a waiver of costs.

Licensee may commence ground-disturbing activities authorized by the short-term special use authorization no sooner than 60 days following the date Licensee files the Forest Service short-term special use authorization with the Commission, unless the Commission prescribes a different commencement schedule. In the event there is a conflict between any provisions of the license and any such Forest Service short-term special use authorization, the special use authorization shall prevail to the extent that the Forest Service, in consultation with the Commission, deems the terms of the special use authorization necessary to protect and utilize NFS resources.

A short term special use authorization will not be required by the Forest Service for the construction and ground-disturbing activities and routine operations and maintenance for the Project authorized under the license amendment. Subsequent ground-disturbing activities, non-routine maintenance and any additional new construction for the remainder term of the license shall be subject to this condition, as determined necessary by the Forest Service authorizing officer.

**Condition No. 4 - Forest Service Approval of Final Design Plans (REPLACES CONDITION NO. 101)**

Before any construction occurs on NFS land, Licensee shall obtain prior written approval from the Forest Service for all final design plans for Project components, which Forest Service determines could affect or potentially affect NFS resources. As part of such prior written approval, the Forest Service may require adjustments in final plans and facility locations to preclude or mitigate impacts and to assure that the Project is compatible with on-the-ground conditions. Should such adjustments be deemed by the Forest Service, the Commission, or the Licensee to be a substantial change, the

Licensee shall follow the procedures of Article 2 of the License. Changes to the license made pursuant to Article 2 or Article 3, shall be made subject to any new terms and conditions of the Secretary of Agriculture made pursuant to Section 4(e) of the Federal Power Act.

**Condition No. 5 - Compliance with Regulations (NEW CONDITION)**

Licensee shall comply with all applicable laws, regulations, and directives of the U.S. Department of Agriculture for activities on NFS land, and all applicable Federal laws, ordinances, regulations, and directives in regard to the area or operations on or directly affecting NFS land. Licensee shall comply with all applicable State, county, and municipal laws, ordinances, and/or regulations in regards to the area or operations on or directly affecting NFS land, to the extent those State, county, and municipal laws, ordinances or regulations are not preempted by Federal law.

**Condition No. 6 - Protection of United States Property (NEW CONDITION)**

Licensee, including any agents or employees of Licensee acting within the scope of their employment, shall protect the land, property, and interests of the United States from damage arising from activities authorized by the license, including but not limited to the Licensee's construction, maintenance, or operation of the Project works or the works appurtenant or accessory thereto under the license. The Licensee shall be liable for all injury, loss, or damage, including fire suppression, or other costs in connection with rehabilitation or restoration of natural resources associated with the activities authorized under this license. Licensee's liability for fire and other damages to NFS land shall be determined in accordance with the Federal Power Act and standard Form L-1 Articles 22 and 24.

As part of the occupancy and use of NFS land, Licensee has a continuing responsibility to reasonably identify and report all known or observed hazardous conditions on or directly affecting NFS land that could affect the improvements, resources, or pose a risk of injury to individuals. Licensee shall abate those conditions, except those caused by third parties or not related to the occupancy and use authorized by the license. Any non-emergency actions to abate such hazards on NFS land shall be performed after consultation with the Forest Service. In emergency situations, Licensee shall notify Forest Service of its actions as soon as possible, but not more than 48 hours after such actions have been taken. Whether or not Forest Service is notified or provides consultation, Licensee shall remain solely responsible for all abatement measures performed. Other hazards should be reported to the appropriate agency as soon as possible.

Licensee shall maintain all its improvements and premises on NFS land to standards of repair, orderliness, neatness, sanitation, and safety acceptable to the Forest Service. Licensee shall comply with all applicable Federal, State, and local laws regulations, and

directives, including but not limited to, the Federal Water Pollution Control Act, 33 U.S.C. 1251 et seq., the Resources Conservation and Recovery Act, 42 U.S.C. 6901 et seq., the Comprehensive Environmental Response, Control, and Liability Act, 42 U.S.C. 9601 et seq., and other relevant environmental laws, as well as public health and safety laws and other laws relating to the siting, construction, operation, and maintenance of any facility, improvement, or equipment. If on NFS land, disposal of all materials shall be at an approved location, except as otherwise agreed by Forest Service.

**Condition No. 7 - Existing Claims (NEW CONDITION)**

License shall be subject to all valid claims and existing rights of third parties. The United States is not liable to Licensee for the exercise of any such right or claim.

**Condition No. 8-Indemnification (NEW CONDITION)**

[Reserved: Indemnification not a part of the Settlement Agreement]

**Condition No. 9 -Access within the License Area (NEW CONDITION)**

The United States shall have unrestricted use of any part of the licensed area on NFS land for any purpose, including permitting uses by third parties or members of the public, provided such use does not interfere with the rights and privileges authorized by the license.

**Condition No. 10 - Use of Roads on National Forest System Land (NEW CONDITION)**

Roads inside FERC Project Boundary

The Licensee shall develop a Road Maintenance Plan for use, maintenance, reconstruction and relocation of roads used for Project purposes on NFS land within the FERC Project Boundary. This plan shall be developed in consultation with the Forest Service and is subject to Forest Service approval. The Plan shall be filed by Licensee with the Commission within two years of the effective date of the amended license. The Plan shall address costs for maintenance, reconstruction and relocation of National Forest System Roads ("NFSRs"). Licensee shall be responsible for a proportional share of the costs of maintenance, reconstruction, and relocation of NFS roads within the FERC Project boundary commensurate with use of NFS roads for Project operations, Project-related public recreation and other Project-related activities as a percentage of the total use of NFSRs within the FERC project boundary. The Plan shall also address road maintenance for non-NFSRs that are used or maintained by the Licensee for Project purposes on NFS land within the FERC Project Boundary. The non-NFSR Plan shall specify road maintenance and management standards that provide for traffic safety, minimize erosion, and minimize damage to natural resources. It shall also

include Best Management Practices ("BMPs") as approved by the Forest Service. The Road Maintenance Plan filed with the Commission shall be updated as determined necessary by the Forest Service. All updates are subject to Forest Service review and approval. Suitable authorization for NFSRs needed for specific construction activities authorized under this license amendment will be provided under Conditions 24, 26 and 27.

In the event a road requires maintenance, restoration, or reconstruction to accommodate Licensee's needs and that work is not identified in the approved Road Maintenance Plan or cost share agreement, Licensee shall perform such work at its own expense after obtaining prior approval and/or authorization from the Forest Service.

The road maintenance plan shall also include the following:

- a. Current condition survey.
- b. Map(s) at a scale to allow identification of specific routes or segments.
- c. Forest Service assigned road numbers for NFSRs and Project road references for non-NFSRs used for reference on the maps, tables, and in the field.
- d. GIS compatible files of GPS alignments of all roads used for Project access to be provided to the Forest Service.
- e. Adequate signage, to be installed and maintained by Licensee at each road or route, identifying the NFSRs by Forest Service road number.

Licensee shall confine all vehicles being used for Project purposes on NFS land, including but not limited to administrative and transportation vehicles and construction and inspection equipment, to roads or specifically designed access routes, as identified in the Road Maintenance Plan described above. The Forest Service reserves the right to close any and all such routes on NFS land where resource damage is occurring or to require reconstruction/construction by Licensee to the extent needed to accommodate Licensee's use. The Forest Service understands the importance of access to the dam and agrees to provide advance notice of 30 days to Licensee prior to road closures, except in an emergency, in which case notice will be provided as soon as practicable.

Licensee shall maintain suitable crossings as required by the Forest Service for all roads and trails that intersect the right-of-way occupied by linear Project facilities (power line, penstock, ditch, and pipeline).

For roads on the west side of Gross Reservoir listed in Condition 30, a road maintenance plan shall only be required if the Licensee performs road maintenance in lieu of paying the Forest Service for Licensee's share of maintenance costs as required under Condition 30. Licensee shall continue to maintain the portions of Gross Dam Access Road and Miramonte Access Road that cross NFS land in Parcels 62 and 64 and provide access to the dam and Project-related facilities on the east side of Gross Reservoir,

which the Licensee currently performs under the current license. This maintenance shall be covered in the Road Maintenance Plan as described above.

#### Roads outside FERC Project Boundary

For use of NFSRs or non-NFSR project access roads used or maintained by the Licensee on NFS land outside the FERC Project Boundary, Licensee shall obtain suitable road use authorizations from the Forest Service. Such authorizations shall require cost sharing for road maintenance and reconstruction commensurate with Licensee's use and project-related use of NFSRs. It shall also address road maintenance for non-NFSR project access roads. The authorizations shall specify road maintenance and management standards acceptable to the Forest Service that provide for traffic safety, minimize erosion, and minimize damage to natural resources.

#### **Condition No. 11- Hazardous Substances Plan (REPLACES CONDITION NO. 109)**

Hazardous substances may not be stored on NFS land without prior approval of the Forest Service. Licensee shall submit a Spill Prevention and Cleanup Plan for prior review and approval by Forest Service as part of any request to store hazardous substances. The plan shall show evidence of consultation with Colorado Department of Public Health and Environment. The plan shall be filed with the Commission at least 90 days prior to storage of oil and hazardous substances on NFS land.

At a minimum, the plan must: (1) outline the Licensee's procedures for reporting and responding to releases of hazardous substances, including names and phone numbers of all emergency response personnel and their assigned responsibilities; (2) maintain within the FERC Project Boundary a cache of spill cleanup equipment suitable *to* contain any spill from the Project; (3) include a schedule to periodically inform the Forest Service of the location of the spill cleanup equipment on NFS land and of the location, type, and quantity of oil and hazardous substances stored in the FERC Project Boundary; and ( 4) include a requirement *to* inform the Forest Service immediately of the magnitude, nature, time, date, location, and action taken for any spill on NFS land. The plan shall include a monitoring plan that details corrective measures that will be taken if spills occur. The plan shall require a written report on a schedule approved by the Forest Service during construction documenting the results of the monitoring.

#### **Condition No. 12 - Pesticide-Use Restrictions on NFS Land (REPLACES CONDITION NO.108)**

Pesticides may not be used on NFS land or in areas affecting NFS land *to* control undesirable woody and herbaceous vegetation, aquatic plants, insects, rodents, non-native fish, etc. without the prior written approval of the Forest Service. Any request by Licensee *to* use pesticides shall be accompanied by the following:

- a. Explanation of the need for use of pesticides; A determination as to whether pesticide applications are essential for use on NFS land;
- b. Specific locations of use;
- c. Specific pesticides for proposed for use;
- d. Application rates;
- e. Dose and exposure rates; and
- f. Safety risk and timeframes for application.

Exceptions to this schedule may be allowed by the Forest Service only when unexpected outbreaks of pests require control measures that were not anticipated at the time the report was submitted by the Licensee. In such an instance, an emergency request and approval may be made by the Licensee.

On NFS land, Licensee shall only use those materials registered by the U.S. Environmental Protection Agency, and use must be consistent with Forest Service use for similar applications and approved by the Forest Service. Licensee must strictly follow label instructions in the preparation and application of pesticides and disposal of excess pesticides, materials, containers and other materials and equipment used in storage, transportation, or application. Licensee shall also submit Pesticide Use Proposal(s) with accompanying risk assessment and other Forest Service required documents to use pesticides on a regular basis. Submission of this plan will not relieve Licensee of the responsibility of annual notification and review.

### **Condition No. 13 - Consultation (REPLACES CONDITION NO. 103)**

Licensee shall annually consult with the Forest Service on Project-related activities on or directly affecting NFS land. The date of the consultation meeting will be mutually agreed to by Licensee and Forest Service but in general should be held by April 15. In its discretion, the Forest Service may invite other interested stakeholders and appropriate agencies, confirming the meeting location, time, and agenda with the Licensee. Licensee shall attempt to coordinate the meeting so interested agencies and other stakeholders may attend. Licensee shall make the following Project-related information available to Forest Service and other meeting participants at least 30 days prior to the meeting, unless otherwise agreed upon by the Forest Service:

- a. An operations plan for the year in which the meeting occurs, including planned outages.
- b. A description of planned maintenance projects for the year in which the meeting occurs.
- c. The hydrology record for the previous year, if available, including any variances.
- d. Results of any monitoring conducted the previous year.
- e. Safety reports, including geologic and seismic reports.

f. A document that tracks the status of the Section 4(e) conditions that require action in the year in which the meeting occurs.

Consultation shall include, but not be limited to the following, unless otherwise agreed upon by the Forest Service:

- a. A status report regarding implementation of license conditions.
- b. Results of Project monitoring studies performed over the previous year in formats agreed to by the Forest Service and Licensee during development of implementation plans.
- c. Review of any planned Project maintenance.
- d. Discussion of any foreseeable changes to Project facilities or features.
- e. Discussion of any necessary revisions or modifications to implementation plans approved as part of this license.
- f. Discussion of needed protection measures for sensitive areas, including but not limited to wetlands and other water bodies, riparian areas, areas with erosion concerns, and habitats for special status species.
- g. Discussion of: 1) additional protection measures for special status species potentially affected by the Project that may be needed for newly listed as threatened, endangered, Forest Service sensitive, Forest Service Species of Conservation Concern, Management Indicator Species, Focal Species, or species of local concern; 2) changes to existing management plans that may be needed due to the delisting of species; and 3) changes that may be needed to incorporate new knowledge about a species requiring protection on NFS land.
- h. Discussion of needed protection measures for newly discovered cultural resource sites.
- i. Discussion of elements of current year maintenance plans, *e.g.* road and trail maintenance.
- j. Discussion of any planned pesticide use.

A record of the meeting shall be kept by Licensee and shall include any recommendations made by the Forest Service for the protection of NFS land and resources. Licensee shall file the meeting record, with the Commission no later than 60 days following the meeting.

#### **Condition No. 14 - Approval of Changes (REPLACES CONDITION NO. 102)**

Notwithstanding any license authorization to make changes to the Project, when such changes directly affect NFS land, Licensee shall obtain written approval from the Forest Service prior to making any changes to any constructed Project features or facilities or use of Project lands and waters, or any departure from the requirements of any approved exhibits filed with the Commission. Following receipt of such approval from the Forest Service, and a minimum of 60 days prior to initiating any such changes, Licensee shall

file a report with the Commission describing the changes and the reasons for the changes and shall include any protection measures determined necessary by the Forest Service for such changes. Licensee shall file an exact copy of this report with the Forest Service at the same time it is filed with the Commission. This condition does not relieve Licensee from the amendment or other requirements of Article 2 or Article 3 of this license.

#### **Condition No. 15 - Surveys, Land Corners (NEW CONDITION)**

Licensee shall avoid disturbance to all public land survey monuments, private property corners, and forest boundary markers on NFS land. In the event that any such land markers or monuments on NFS land are destroyed by an act or omission of Licensee, in collection with the use and/or occupancy authorized by this license, depending on the type of monument destroyed, Licensee shall reestablish or reference same in accordance with (1) the procedures outlined in the "Manual of Instructions for the Survey of the Public Land of the United States," (2) the specifications of the County Surveyor, or (3) the specifications of Forest Service. Further, Licensee shall ensure that any such official survey records affected are amended as provided by law.

#### **Condition No. 16 - Signs (NEW CONDITION)**

Licensee shall consult with the Forest Service prior to erecting signs related to safety issues on NFS land. Prior to Licensee erecting any other signs or advertising devices on NFS land, Licensee must obtain the approval of the Forest Service as to location, design, size, color, and message. Licensee shall be responsible for maintaining all signs erected by the Licensee on NFS land to standards acceptable to the Forest Service.

### **PART II: STANDARD RESOURCE CONDITIONS**

#### **Condition No. 17 - Invasive Species Management (REPLACES CONDITION NO. 107)**

##### **Aquatic Invasive Species Management and Monitoring Plan**

Within one year of the effective date of the amended license and at least 90 days before ground-disturbing or construction activities authorized by license amendment, Licensee shall file with the Commission an Aquatic Invasive Species ("AIS") Plan developed in consultation with Forest Service, U.S. Fish and Wildlife Service, and Colorado Parks and Wildlife and subject to prior review and approval by the Forest Service. This plan shall meet applicable State and Federal laws, regulations, and guidance. The applicable State and Federal resource agencies shall be responsible for making the determination as to whether the AIS Plan complies with the State or Federal regulations of their



respective agencies. The AIS Plan shall only address Project-related waterbodies. Upon Commission approval, Licensee shall implement the Plan.

### Public Education Program

The AIS Plan shall include a public education program, including appropriate signage and information pamphlets at designated public boat accesses or up to five fishing access points. This program and these access points are subject to prior review and approval by the Forest Service. The following shall be addressed in the education program, unless otherwise agreed to with the Forest Service:

- a. A voiding the release of plants and animals into a waterbody unless they originally came from that waterbody.
- b. Cleaning and drying boats and fishing equipment using accepted protocols for the prevention of all AIS before entering any waterbody area.
- c. Removing visible plants, animals and mud from boat before leaving waterbody.
- d. Disposing of unwanted bait in trash, including earthworms.
- e. Draining water from boat, motor, bilge, live well, and bait containers before leaving a water access site.

AIS information shall be included on Project websites that provide public information on Project facilities. The public information website will also include information on the amphibian chytrid fungus.

### Best Management Practices (BMPs)

Licensee shall develop BMPs to prevent the spread of AIS for individual Project operations and maintenance activities performed by Licensee and/or its contractors and Project activities which have the potential to introduce AIS into Gross Reservoir. These BMPs shall be submitted to the Forest Service and Colorado Parks and Wildlife for their respective review and approval. The BMPs shall be submitted for review at the Annual Consultation Meeting required in the FERC license. Development of BMPs for Project activities shall include but not be limited to the following:

- a. List of AIS with potential to be introduced.
- b. Control or preventive measures for AIS.
- c. Identification of critical control points in the Project activity sequence at which to prevent the introduction of AIS.
- d. Any necessary implementation monitoring for potential AIS to ensure BMPs are followed.
- e. Actions that will be taken if an introduction of AIS is found.

If AIS are detected within any Project-related water body, Licensee shall consult with the Forest Service and appropriate agencies on an appropriate plan of action, and shall implement the appropriate action pursuant to Forest Service requirements after obtaining prior Forest Service approval.

### Monitoring and Reporting

The AIS Plan shall include a specific monitoring program that addresses all designated public fishing and boat launches on Gross Reservoir, South Boulder Creek upstream of Gross reservoir to the Moffat Tunnel, and areas identified as having boating or fishing access, and that follows State and/or Federal laws, regulations, and policies. Mapping and monitoring results shall be provided to the Forest Service and Colorado Parks and Wildlife.

### Plan Revisions

Licensee, in consultation with the Forest Service and Colorado Parks and Wildlife, shall review, update, and/or revise the AIS Plan, as determined necessary by the Forest Service and in consultation with Colorado Parks and Wildlife, subject to prior review and approval by the Forest Service, when substantial changes in the existing conditions occur. Changes or revisions to the plan would be expected if AIS conditions change as a result of: 1) unforeseen effects from new or existing Project-related activities, 2) the potential for new AIS to occur, 3) changed conditions as a result of natural events such as fire or flood, or 4) establishment of other regulatory or legal requirements for AIS. Additional monitoring may be required as part of any plan revisions. Licensee shall include all relevant documentation of coordination/consultation with the updated plan filed with the Commission.

### **Invasive Plant and Noxious Weed Species Management Plan (REPLACES CONDITION 108; Complements Article 406)**

Within one year of the effective date of the amended license and at least 90 days before ground-disturbing or construction activities authorized by license amendment, Licensee shall complete, in consultation with the Forest Service, and subject to prior review and approval of the Forest Service, an Invasive Plant and Noxious Weed Species Management Plan (Plan) for NFS land potentially affected by the Project. Invasive plant and noxious weed species will be those species defined by the Forest Service and Colorado Department of Agriculture's Noxious Weed List. Upon Commission approval, Licensee shall implement the Plan.

Notwithstanding weed management under Condition 30, the Plan shall address terrestrial invasive plant and noxious weed species management within the FERC Project Boundary. In areas where noxious weed populations that the Forest Service determines to be Project-related extend outside the FERC Project boundary, treatments

would extend up to 1/4 mile beyond the FERC Project Boundary. If noxious weed populations extend more than 1/4 mile from the FERC Project Boundary, and are determined to be Project-related, Licensee will consult with the Forest Service to determine if the populations should be treated and, if so, the appropriate treatment methods.

Minimum components of the Plan shall include, but may not be limited to:

- Invasive plant and noxious weed species management: frequency of surveys, guidelines for prevention, treatment, internal education, monitoring, reporting, guidelines for conducting weed risk assessment for new Project feature development, including an adaptive management element for invasive plant and noxious weed species management as necessary.
- Methods that ensure early detection and treatment of invasive plant and noxious weed species.
- Guidelines for conducting Licensee's inspections of construction-related or ground-disturbing equipment and vehicles for the presence of invasive plant and noxious weed species.
- List of target invasive plant and noxious weed species agreed to and approved by the Forest Service.
- Annual reporting guidelines for the Annual Meeting.

Licensee, in consultation with the Forest Service, shall review, update, and/or revise the Plans as determined necessary by the Forest Service, if changes in invasive plant and noxious weed species management occur on NFS land. Changes or revisions to the Plan would be expected if invasive plant and noxious weeds conditions change as a result of 1) unforeseen effects from new or existing Project-related activities, 2) the potential for new invasive plants and noxious weeds occurs or changes, 3) changed conditions due to natural events such as fire or flood, or 4) establishment of other regulatory or legal requirements. Changes to the Plan may be required if monitoring feedback indicates that resource objectives are not being met.

Any updates to the Plan shall be prepared in coordination and consultation with the Forest Service and require Forest Service review and approval. Licensee shall include all relevant documentation of coordination/consultation with the updated Plan filed with the Commission.

## **Condition No. 18 - Special Status Species and Sensitive Areas (NEW CONDITION)**

### **Biological Evaluations**

Licensee shall prepare and submit a biological evaluation (BE) to the Forest Service for review and approval when the Forest Service determines that proposed actions may

affect Forest Service special status species or their habitat on NFS land. Special status species include threatened, endangered, Forest Service sensitive, Forest Service Species of Conservation Concern, Management Indicator Species, Focal Species, or species of local concern. The BE shall evaluate the potential impact of the action on the species or its habitat. Licensee shall comply with mitigation measures required by the Forest Service for Forest Service special status species.

The BE shall:

- Include procedures to minimize or avoid adverse effects to special status species.
- Ensure Project-related activities meet restrictions included in site management plans for special status species.
- Develop implementation and effectiveness monitoring of measures taken or employed to reduce effects to special status species.
- As determined necessary by the Forest Service, include procedures to minimize or avoid adverse effects to sensitive areas and develop implementation and effectiveness monitoring of measures to reduce effects to sensitive areas, which include, but are not limited to wetlands and other water bodies, riparian areas, areas with erosion concerns and habitats for special status species.

A BE will not be required by the Forest Service for the construction and ground-disturbing activities for the Project authorized under the license amendment. Subsequent ground-disturbing activities and any additional new construction for the remainder term of the License shall be subject to this condition, as determined necessary by the Forest Service authorizing officer.

**Condition No. 19- Erosion Control and Reclamation (NEW CONDITION REPLACES No. 104; Complements Article 401)**

**Erosion Control and Reclamation Plan for Existing Project-Affected Areas**

Within two years of the effective date of the amended license and at least 90 days before ground-disturbing or construction activities authorized by license amendment, Licensee shall file with the Commission an Erosion Control and Reclamation Plan ("Plan") developed in consultation with Forest Service and other interested parties and subject to prior review and approval by Forest Service. The Plan shall provide direction for treating erosion, controlling sedimentation, and reclaiming disturbed sites upon Project-affected NFS land during the remaining term of license. Upon Commission approval, Licensee shall implement the Plan.

The Plan shall include, but not be limited to, the following minimum components, unless otherwise agreed to by the Forest Service during Plan finalization:

- Methods for initial and periodic inventory and monitoring of the Project-affected NFS land to identify erosion sites and sites needing reclamation caused by Project facilities and operations and assessment of site conditions for each such erosion site. Periodic monitoring and inventory will include recording effectiveness of erosion and reclamation treatment measures, including revegetation, and identification of new erosion and reclamation sites for the term of the license.
- Criteria for ranking and treating erosion and reclamation sites shall include a risk rating and hazard assessment for scheduling erosion treatment measures and monitoring at each site.
- Erosion control and reclamation measures shall incorporate current standards, follow Forest Service regulations and guidance (e.g. Forest Plan, Road Management Objectives, BMPs) and shall be customized to site-specific conditions.
- Development and implementation of a schedule for treatment (e.g. repair, mitigate, monitor) of erosion and reclamation sites, including a list of sites requiring immediate mitigation and a schedule for their immediate implementation.
- Effectiveness monitoring of completed erosion control and reclamation treatment measures after treatment in order to determine if further measures are needed. If erosion control or reclamation measures are not effective, Licensee shall implement additional measures subject to prior approval by Forest Service and continue monitoring until the site has stabilized and reclamation goals are achieved to the satisfaction of the Forest Service.
- Protocols for emergency erosion and sediment control and disturbed site reclamation.
- Process for documenting and reporting inventory and monitoring results including periodic plan review and revision. Documentation shall include Forest Service compatible GIS geodatabase or shapefiles for maps keyed to a narrative description of detailed, site-specific, erosion and reclamation treatment measures and sediment monitoring results.

### **Erosion Control and Reclamation Plan Measures for New Construction or Non-Routine Maintenance**

At least 90 days before ground disturbance commences, Licensee shall develop site-specific temporary erosion control measures and long-term reclamation measures for each new construction or non-routine maintenance project. These measures are subject

to prior review and approval by the Forest Service. The temporary measures shall be designed to prevent erosion, stream sedimentation, dust, and soil mass movement during the period of ground disturbance until replaced by permanent reclamation measures on NFS land.

For the construction and ground-disturbing activities for the Project authorized under the license amendment, all site-specific erosion control and reclamation measures shall be included as part of the appropriate plan(s) required under the license.

**Condition No. 20 - Fire Management and Response Plan (NEW  
CONDITION; Complements existing Article 407)**

Within two years of the effective date of the amended license and at least 90 days before ground-disturbing or construction activities authorized by license amendment, Licensee shall complete, in consultation with Forest Service, Colorado State Forest Service, and Colorado Department of Fire Prevention and Control, a Fire Management and Response Plan (FMRP). The FMRP is subject to prior review and approval by Forest Service. The FMRP shall set forth in detail Licensee's responsibility for the prevention (including fuels treatment), reporting, emergency response, and investigation of fires on NFS land related to Project operations. Upon Commission approval, Licensee shall implement the FMRP.

Minimum components of the FMRP shall include, but may not be limited to:

- Fuels Treatment/Vegetation Management: Identify fire hazard reduction measures and reoccurring maintenance measures necessary to prevent the escape of Project-induced fires.
- Fire Prevention and Patrol: Address fire danger and public safety associated with Project-induced recreation, including but not limited to fire danger associated with dispersed camping, existing and proposed developed recreation sites, trails, and vehicle access. Identify water drafting sites and other fire suppression resources.
- Emergency Response Preparedness: Analyze fire response needs including equipment and personnel availability.
- Reporting: A requirement that the Licensee report any Project-related fires as soon as practicable, but no later than 24 hours after ignition, to Forest Service.
- Fire Control/Extinguishing: Provide Forest Service a list of the locations of available fire suppression equipment and the location and availability of fire suppression personnel.

### **Part III. PROJECT-SPECIFIC CONDITIONS**

#### **Condition No. 21 - Raptor Protection Measures (REPLACES CONDITION 104)**

The Licensee shall implement the following Raptor Protection Measures:

*Osprey Nest Platform Relocation.* Licensee shall replace the two existing osprey nest platforms that are located in the inundation area of Gross Reservoir, either on top of suitable trees or on poles. After license amendment issuance, Licensee shall consult with the Forest Service and Colorado Parks and Wildlife on design, suitable locations, and timing for construction of the new platforms and shall obtain Forest Service approval for design, locations, and timing of construction at least 60 days prior to implementation. Osprey nest platform relocation shall be completed prior to reservoir inundation.

*Pre-construction Raptor Surveys.* Unless prior written approval is obtained from the Forest Service, any tree cutting or removal authorized by the Forest Service shall be conducted prior to March 1 or after July 31 to prevent raptors (and other birds) from nesting on site during tree clearing and *to* avoid destruction of or disturbance to active nests during the breeding season. Timing of tree cutting or removal may be altered from above with prior written Forest Service approval and subject to appropriate mitigation measures.

If tree cutting or removal begins between March 1 and July 31, Licensee shall conduct surveys on NFS land for raptor nests, including hawks, falcons, and owls, prior to the start of land disturbing activities or any tree removal in all areas which will be affected by construction activities, including access routes and other associated disturbance areas. Survey areas and timing shall be developed in consultation with the Forest Service and Colorado Parks and Wildlife, based on species biology and the nature and timing of disturbance, and is subject to Forest Service approval.

If active raptor nests are found, Licensee shall alter tree cutting or removal timing until chicks have fledged and shall consult with and obtain approval from the Forest Service regarding appropriate buffer zones around nest sites. Licensee shall implement appropriate buffer zones as determined necessary by Forest Service during project activities. Licensee shall monitor nest success and fledging dates of the active raptor nests during Project construction at a frequency specified or approved by the Forest Service, and shall report monitoring data to the Forest Service.

## **Condition No. 22 - Special Status Plants Relocation Plan (NEW CONDITION, Complements existing Article 410)**

Within two years of the effective date of the amended license and at least two years before tree removal for inundation authorized by the license amendment begins, Licensee shall file with the Commission, a Special Status Plants Relocation Plan (Plan) for addressing impacts to special status plants on NFS land. This Plan shall be developed in consultation with the Forest Service and is subject to Forest Service approval. Upon Commission approval, Licensee shall implement the Plan. Special status plants include threatened, endangered, Forest Service sensitive, Forest Service Species of Conservation Concern, Management Indicator Species, Focal Species, or plant species of local concern.

The Plan shall detail how Forest Service special status plant species found on NFS land within the new inundation area and new areas to be disturbed for the relocated recreation facilities will be collected and transplanted. This new Plan will supplement, and supersede where appropriate, the *Rare and Sensitive Species Plan* approved by the Commission on January 15, 2004 under Article 410. The Plan shall include but not be limited to: locations of all suitable sites for transplanting species, seed collection and transplant timing, quantities of seeds and transplants, and timing of voucher collecting. Locations of all suitable sites for transplanting species discussed below shall be developed in consultation with the Forest Service and shall be subject to Forest Service approval.

The Plan shall include the following components:

1. Prior to ground-disturbing operations, locations of Forest Service special status plants, based on the most recent listing provided by the Forest Service, plus additional surveys if determined necessary by the Forest Service, will be marked in the field with a buffer zone of at least 10 feet. Ground-disturbing activities will be minimized to the extent practicable within the marked populations or buffer zones.
2. Wild sarsaparilla (*Aralia nudicaulis*). Transplant 200 individuals from affected sites to suitable nearby sites that would not be affected by inundation or, if the Forest Service determines that seed is an effective translocation method, collect and distribute seed from affected sites
3. Dewey sedge (*Carex deweyana*). Transplant all affected individuals to suitable nearby sites.
4. Sprengel's sedge (*Carex sprengelii*). Transplant all affected individuals to suitable nearby sites.



5. Enchantress's nightshade (*Circaea alpina*). Collect and distribute seed to suitable nearby sites. Alternately, surveys may be used to document additional locations that would not be affected.
6. Tall blue lettuce (*Lactuca biennis*). Collect seed from affected plants for two years and spread seed in suitable nearby unaffected habitat.
7. Maryland sanicle (*Sanicula marilandica*). Collect seed from affected plants and spread seed in suitable nearby unaffected habitat. Alternately, surveys may be used to document additional individuals that would not be affected upstream of the known location.
8. False melic (*Schizachne purpurascens*). Collect seed from affected plants and spread seed in suitable nearby unaffected habitat.
9. All sensitive and local concern plant species: Collect herbarium<sup>1</sup> voucher specimens from affected populations, and provide them to Forest Service for distribution to herbaria. Ten specimen sheets should be collected for each species, to document their pre-disturbance occurrence.

**Condition No. 23 - Visual Resource Protection Plan (REPLACES CONDITION 105; complements Article 414)**

At least 90 days before ground-disturbing or construction activities on NFS land authorized by license amendment, Licensee shall file with the Commission an addendum to the current Visual Resource Protection Plan (Plan) (approved by FERC on May 22, 2003), developed in consultation with the Forest Service and subject to prior review and approval by the Forest Service. Upon Commission 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 NFS land, 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 NFS land.
- Schedule of ongoing facility maintenance and replacement that will incorporate the design considerations listed on pages 48 and 49 of the current Visual Resource Protection Plan on NFS land.

The Plan addendum shall adhere to applicable Forest Service scenery management guidance included in current Forest Plan direction and USDA Forest Service Agricultural Handbook Number 701, "Landscape Aesthetics: A Handbook for Scenery Management," December 1995.

**Condition No. 24-Recreation Management (REPLACES CONDITION 106; Complements existing Article 416)**

Licensee shall implement the Addendum to the existing Recreation Management Plan under Article 416, submitted with the Final License Amendment Application. The Licensee shall also implement the following recreation management measures:

*Human/Bear Interaction Management-Beginning* on the effective date of the amended license, Licensee shall manage activities to minimize the potential for bear/human interactions as needed within the FERC Project Boundary on NFS land. If unwanted bear/human interactions are reported, Licensee shall consult with the Forest Service and Colorado Parks and Wildlife and implement appropriate mitigation measures. These measures are subject to Forest Service approval. Potential measures could include, but are not limited to, activities such as trash management, signing to inform workers and visitors on bear activity, and proper behavior to reduce potential for attracting bears.

*Recreation Use Monitoring* - For the first three years after the expanded Gross Reservoir is full, Licensee shall annually submit recreation use monitoring data spreadsheets to the Forest Service by February 28. At the end of the first three years, the Licensee shall submit a recreation use monitoring report to the Forest Service using the data from the previous three years. Thereafter, the Licensee shall provide the recreation use monitoring report to the Forest Service every three years. On the sixth year the report will include the Form 80 report, which is also submitted to FERC. The recreation use monitoring report shall provide a summary of annual monitoring conducted by year, a summary of the annual data collected, and a tabulation and summary of the data and monitoring practices required in the approved Recreation Monitoring Plan (FERC Order issued June 8, 2004).

In addition to the above, for NFS land in the Winiger Ridge area within the FERC Project Boundary, the recreation use monitoring report shall include those items specified or required by the Forest Service, which include but are not limited to, Frissell condition class of dispersed campsites, documentation of any reported social use conflicts, and any environmental damage caused by dispersed recreation. This information will be used to determine patterns in dispersed recreation use after reservoir inundation and to evaluate the need for additional recreation mitigation measures.

The Forest Service monitoring requirements described above can be changed upon mutual agreement of the Forest Service and Licensee. If the Forest Service and Licensee

agree to change the monitoring requirements, the Licensee shall submit an update to the requirements with the Commission.

Costs for recreation use monitoring conducted by the Forest Service in the Winiger Ridge area outside the FERC Project Boundary is included in the Collection Agreement under Condition 30.

*Dispersed Recreation Management at Winiger Ridge-* Beginning on the effective date of the amended license, Licensee shall conduct a pre-construction inventory of all social trails and roads at Winiger Ridge within the FERC Project Boundary as specified or approved by the Forest Service. Within three years after the expanded Gross Reservoir is full, and, at minimum, every three years thereafter, the Licensee shall consult with the Forest Service and the Forest Service will determine if there is a need to implement additional recreation management measures to meet Forest Plan direction.

If the Forest Service determines there is a need for additional mitigation measures due to Project-related effects to meet Forest Plan direction, based on pre-construction inventory results, the new inundation level of the expanded Gross Reservoir, and the ongoing recreation monitoring, the Licensee shall develop a Recreation Adaptive Management Plan for Winiger Ridge. The Plan shall be developed in consultation with the Forest Service and is subject to prior Forest Service review and approval. The Licensee shall file the Recreation Adaptive Management Plan with the Commission. Upon Commission approval, the Licensee shall implement the Plan.

The Plan shall include, but not be limited to, unless otherwise agreed to by the Forest Service:

- Measures for addressing social, environmental, safety, and/or sanitation concerns that may arise from the proliferation and/or expansion of dispersed campsites at Winiger Ridge and surrounding area. These measures could include triggers for adding bathrooms, trash receptacles or other temporary or long-term mitigation measures as determined necessary by the Forest Service.
- Plans for converting obsolete roads to trails.
- Plans for formalizing social trails, including social trails for fishing.
- Measures for minimizing creation of new social trails.

*Fishing Line Recycling* Licensee shall provide fishing line recycling receptacles at five relocated fishing access points, as described in the Recreation Plan Addendum, for collecting used line to keep it out of the environment. Receptacles shall include labels explaining their purpose to encourage use. Licensee shall monitor and empty the receptacles as needed, and at a minimum on a monthly basis from May to November,

and one time from December to April. Licensee shall periodically send line for recycling to a fishing line recycling program.

**Condition No. 25 - Channel Instability and Bank Erosion (REPLACES CONDITION 110)**

At least one year prior to the initial fill of the enlarged reservoir authorized by license amendment, Licensee shall file with the Commission a revised South Boulder Creek Channel Stability and Monitoring Plan (Plan), developed in consultation with the Forest Service and Colorado Parks and Wildlife, and subject to prior Forest Service review and approval. Upon Commission approval, Licensee shall implement the Plan.

The revised Plan shall include two new monitoring reaches to be selected in consultation with the Forest Service and Colorado Parks and Wildlife, and subject to prior Forest Service review and approval. The monitoring reaches shall be established during the dam construction period. Participants may include a fisheries biologist, hydrologist, and geomorphologist, and Colorado Parks and Wildlife biologists.

Monitoring at the two new reaches shall follow a Control-Impact study design, with one control reach (including both response and transport reach segments) upstream of East Portal flows, and one potential impact reach (including both response and transport reach segments) downstream of East Portal flows. Monitoring elements shall include, but not be limited to:

- a. The longitudinal profile of each reach (impact versus control) shall be surveyed and monumented.
  - i. The length of the longitudinal profile will be determined in the field depending on site characteristics, but shall be a minimum of 20 bankfull widths to capture elevational differences from degradation or aggradation and to include equivalent portions of response and transport reach segments.
- b. Within each longitudinal profile, a minimum of four channel cross-sections will be established and monumented. Cross-sectional profiles shall be evenly spaced within the longitudinal profile
- c. The longitudinal profile shall be resurveyed in each monitoring year in order to detect bed elevation changes not captured in the cross-sections. The longitudinal profile shall include, at minimum, real coordinates for the top of the bank (right and left banks) and thalweg spatial locations and elevations. The recommended data acquisition method would be a total station or similar instrument that collects x, y, and z coordinates.

d. Within each reach, data collected shall include at minimum, but not be limited to:

- i. Data sufficient to perform the Rosgen Bank Erosion Hazard Index (BEHI) assessment of streambank stability
- ii. Physical measurement of length of eroded banks, number of slump blocks or detached banks, and/or frequency of tension cracks in the bank.
- iii. At least four channel cross-sections in each longitudinal profile, collect data for the following metrics: bankfull height, bankfull width, maximum channel depth at bankfull flow, bankfull hydraulic depth (cross-sectional area divided by bankfull depth), and bankfull hydraulic radius (cross-sectional area divided by wetted perimeter).
- iv. Installation of bank erosion pins to measure bank erosion directly.
- v. Field and photo documentation of bank vegetation and stability for 100 feet on both right and left bank through each channel cross-section within the longitudinal profile.

Licensee shall conduct monitoring as described above once during dam construction to establish baseline conditions. During the initial fill of the enlarged reservoir, the Licensee shall conduct monitoring once a year for three years.

Once the initial fill of the enlarged reservoir is complete, the Licensee shall conduct monitoring once every three years for three monitoring cycles, unless a high delivery year occurs. High delivery years shall be defined as years when the average monthly flow conveyed down South Boulder Creek through the Moffat Tunnel in May, June, and July is 55,000 acre-feet or greater. If a high delivery year occurs earlier than the scheduled monitoring once every three years, the Licensee shall complete monitoring once during the high delivery year.

After the initial fill of the enlarged reservoir is complete and after the first three monitoring cycles have been completed, the Licensee shall conduct monitoring once every five years for an additional three monitoring cycles. If the Forest Service determines there is no longer a risk of erosion and channel instability, then monitoring requirements under this condition will have been met. The monitoring requirements can be changed upon mutual agreement of the Forest Service and Licensee. If the Forest Service and Licensee agree to change the monitoring requirements, the Licensee shall submit an update to the South Boulder Creek Channel Stability and Monitoring Plan with the Commission.

The Licensee shall submit a report summarizing the most recent data collected and any changes since the last monitoring event 30 days prior to the annual consultation meeting.

If significant channel instability, erosion, or channel alteration occurs at any time, which will be based on the monitoring data collected and evaluated according to the four questions below, the Licensee shall meet with the Forest Service to discuss if restoration is needed.

Monitoring results will be evaluated based upon answers to the following questions:

1. Do the results of the BEHI analysis indicate an increase in bank erosion has occurred in control and impact reaches? Did the erosion risk categories change by more than one level?
2. Has the percentage of channel length with eroded banks increased in the control and impact reaches?
3. Is there evidence of substantial channel widening in the response segments or downcutting in the transport segments?
4. Is there a significant net cross-section change in any cross-sectional data (e.g., cross-sectional area, bankfull parameters, channel depth at bankfull flow, etc.) in the impact reach relative to the control reach?

If the Forest Service determines restoration is needed, the Licensee shall file with the Commission a restoration plan developed in consultation with Forest Service and subject to prior Forest Service review and approval. Upon Commission approval, Licensee shall implement the plan.

#### **Condition No. 26-Pit Development and Reclamation Plan (NEW CONDITION)**

At least 90 days before ground-disturbing or construction activities associated with pit development on NFS land authorized by license amendment and a mineral materials permit, Licensee shall file with the Commission a Pit Development and Reclamation Plan (Plan) developed in consultation with the Forest Service and Colorado Division of Reclamation, Mining and Safety, and subject to prior review and approval by the Forest Service. Upon Commission approval, Licensee shall implement the Plan.

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

- The development, construction, operation, reclamation and rehabilitation of the quarry on affected NFS land.

- The location, activity, amount of surface activity, reclamation measures, safety measures, and measures to protect and minimize impacts to natural resources
- Transportation management during construction, describing how construction traffic will be managed to minimize disruption on NFS roads and provide for visitor safety.

The Plan shall tier to other applicable plans and conditions, including but not limited to the Visual Resource Protection Plan, Hazardous Substances Plan, Invasive Species Management, Erosion Control and Reclamation Plan, Raptor Protection Measures Condition, and Reclamation and Revegetation Seed Mixes Condition.

Licensee shall obtain a mineral materials permit or authorization as governed by 36 CFR 228 Subpart C, as amended and revised, or federal law or regulations in effect at the time, from the Forest Service for use of the materials before ground-disturbing activities occur on NFS land. If the Licensee does not proceed with developing a quarry on NFS land, Licensee will not be required to submit a Pit Development and Reclamation Plan to the Forest Service for review and approval.

#### **Condition No. 27 -Tree Removal Plan (NEW CONDITION)**

At least 90 days prior to tree removal within the inundation area of the enlarged reservoir, Licensee shall file with the Commission a Tree Removal Plan (Plan) developed in consultation with the Forest Service and subject to prior review and approval by the Forest Service. Upon Commission approval, Licensee shall implement the Plan.

The Plan shall address the removal of trees around Gross Reservoir to maximize product utilization and minimize traffic and environmental effects. The schedule for tree removal shall be developed in consultation with the Forest Service, subject to final approval by the Forest Service, and will consider, among other items, key winter range timing for elk (December 1 through March 30) and raptor nesting season (varies depending on species).

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

- Roads to be improved, constructed and used for tree removal activities;
- Restoring Project roads to pre-Project conditions
- Travel management considerations such as prevention of public use of temporary roads created for tree removal.

- Transportation management during tree removal activities,
- How Project-related traffic will be managed to minimize disruption on Forest Service roads and provide for visitor safety.

The Plan shall tier to other applicable plans and conditions, including but not limited to the Hazardous Substances Plan, Invasive Species Management Plan, Erosion Control and Reclamation Plan, Raptor Protection Measures Condition, and Reclamation and Revegetation Seed Mixes Condition. Licensee shall perform a timber cruise with a Forest Service-qualified forester on NFS land as part of the Plan development. Licensee shall enter into a reimbursable Collection Agreement provided by the Forest Service to reimburse the Forest Service for its costs associated with the timber cruise. Licensee shall work closely with the Forest Service to ensure that forest clearing and revegetation on NFS land will be consistent with National Forest standards. Licensee shall pay for merchantable timber in accordance with FERC Standard Form L Article 21 of the license. The Plan shall also ensure compliance with the CDPHE-Air Quality Control Division and include BMPs for the tree removal activities.

Notwithstanding the Licensee's annual payments to the Forest Service for road maintenance described in Condition 30, during tree removal activities for the proposed Project, the Licensee shall perform additional improvements and maintenance of Forest Service roads used for tree removal activities. Once tree removal is completed, the Licensee shall restore such Forest Service roads to their existing Forest Service Maintenance Level 2 (roads open for use by high clearance vehicles) as directed by the Forest Service.

#### **Condition No. 28 -Reclamation and Revegetation Seed Mixes and Mulch Materials (NEW CONDITION)**

Licensee shall consult with the Forest Service on seed mixes and mulch materials used for all Project reclamation and revegetation activities on NFS land. Seed mixes and mulch materials used for revegetation and reclamation shall be subject to prior Forest Service review and approval.

Seed mixes shall comply with the Forest's revegetation policy and include, unless waived in writing by the Forest Service, pollinator-friendly host plants. If a species in the seed mix is not available, the Licensee shall provide written evidence from three seed vendors that the species is not available. With prior written Forest Service approval, the mix may be adjusted and a new species may be substituted.

Seed lot tags, seed, and noxious weed seed and purity exams for each species lot shall be available to the Forest Service at least 90 days prior to seeding, for review and testing that may be performed by the Forest Service. If seed cited on the weed, noxious weed, or crop analysis categories is present, or if seed of smooth brome, or cheatgrass or



its allies is present, the entire seed lot may be rejected and the Licensee shall be responsible for the replacement cost of seed.

When feasible, the Forest Service will provide government-furnished seed for areas requiring seeding. The Forest Service may provide seed at no cost to Licensee, or may require Licensee to purchase seed directly from a supplier or reimburse the Forest Service for its cost.

Only non-agricultural products (e.g., wood straw, wood shred, wildlife-friendly netting) shall be used for mulch activities/erosion control unless agricultural straw is approved in writing in advance by the Forest Service and is certified weed-free. The Forest Service may perform or require inspection of the mulch. Licensee shall notify the Forest Service at least 21 days prior to purchase to provide the Forest Service time to inspect the proposed agricultural mulch.

**Condition No. 29-Public Safety and Law Enforcement (NEW CONDITION; complements Article 418)**

After project components are implemented, as determined necessary by the Forest Service and subject to prior Forest Service review and approval, Licensee shall file with the Commission, an update to the Public Safety and Law Enforcement Plan. Upon Commission approval, the Licensee shall implement the updated Plan.

**Condition No. 30 - Cost Collection and Participating Agreements (NEW CONDITION)**

Within one year of the effective date of the amended license and for the remaining term of the license, the Licensee shall enter into a Collection Agreement provided by the Forest Service to pay the Forest Service for the Project-related Forest Service costs of road and recreation facility maintenance and monitoring on NFS land, as described below. Within one year of the effective date of the amended license, the Licensee shall enter into a Participating Agreement provided by the Forest Service for Licensee to perform weed management as described below.

The term of the Collection Agreement shall be five years. Initial payment will be based on fifty percent (50%) of reference costs developed from the previous five years of Forest Service road and recreation maintenance costs. The Licensee shall renew the Collection Agreement every five years through the term of the license, unless a different time period is agreed to by the Forest Service. Prior to renewal of the Collection Agreement, the Forest Service will re-calculate the reference costs below based on the previous five years of road and recreation maintenance costs, and any changes to the reference costs will be incorporated at the time of renewal of the Collection Agreement. The amount of money the Licensee shall pay annually after the first five years shall be

based on 50% of the reference costs incorporated into each subsequent Collection Agreement.

The term of the Participating Agreement shall be five years. The Licensee shall renew the Participating Agreement every five years through the term of the License, unless a different time period is agreed to by the Forest Service. The Participating Agreement will authorize the Licensee to perform weed management on NFS land as described below.

### Road Maintenance

The following roads on the West side of Gross Reservoir, including inside and outside of the FERC Project Boundary, will be covered by the Collection Agreement: 1) Forest Service 359.1 (Winiger Ridge Road)- approximately 2.5 miles; 2) Various spur roads off Forest Service 359.1 - approximately 1.5 miles; and 3) Forest Service 97.1 (Lazy Z Road)- approximately 2.5 miles.

For the first five years after the license amendment, the Licensee shall pay the Forest Service \$1,000 per year for road maintenance, based on estimated annual Forest Service road maintenance costs of \$2,000 per year. The Licensee shall pay the Forest Service for annual road maintenance in accordance with the subsequent Collection Agreements for the term of the license.

Notwithstanding its annual payments to the Forest Service for maintenance described above, during tree removal activities for the Project, the Licensee will perform improvements and maintenance of NFS roads used for tree removal activities as described in Condition 27.

### Recreation Maintenance

The following recreation facilities on Winiger Ridge on the west side of Gross Reservoir outside the FERC Project Boundary will be covered by the Collection Agreement: 1) Forsythe Canyon Trail - approximately 2/3-mile; 2) Forsythe Trail parking lot and toilet; and 3) Fourteen dispersed campsites.

For the first five years, the Licensee shall pay the Forest Service \$5,000 per year, based on estimated annual Forest Service recreation maintenance and monitoring costs of \$10,000 per year. The Licensee shall pay the Forest Service for annual recreation maintenance in accordance with the subsequent Collection Agreements for the term of the license.

### Weed Management

Licensee shall enter into a Participating Agreement provided by the Forest Service for Licensee to conduct weed management on the west side of Gross Reservoir outside the FERC Project Boundary within 100 feet of the roads and recreation facilities identified in Road and Recreation Collection Agreement discussion above.

## Appendix B

### Water Quality Certification Conditions for Enlargement of Moffat Collection System, including Enlargement of Gross Reservoir

#### Colorado Department of Public Health and Environment

Issued June 23, 2016

**Condition 1:** The Applicant will obtain temperature data from three real-time monitoring locations and two data logger sites in the Fraser basin, as described below. Monitoring at these sites will begin as soon as practicable, but no later than one year after the date of issuance for the 404 permit or the FERC license, whichever is later, and will continue for not less than five years after the project becomes fully operational. The data from each calendar year and a report documenting exceedances of the temperature standard will be submitted to the Division by April 1 following each calendar year of sampling. If the USGS ceases data collection at a real-time site, or GCWIN ceases collection at a data logger site, the Applicant will be responsible for establishing and maintaining data collection at the site. The condition for the Applicant to obtain the data at a site is satisfied at that site if the benefit from bypass flows is shown to be *de minimis*.

- Fraser River below Crooked Creek near Tabernash, CO (USGS gaging station 09033300). Real-time temperature data are currently available from the USGS. If the USGS ceases data collection at this site, the Applicant will be responsible for establishing and maintaining real-time data collection at the site.
- Ranch Creek near Fraser, CO (USGS gaging station 09032000). Real-time temperature data are currently available from the USGS. The Applicant will be responsible for establishing and maintaining real-time data collection at this site. The commitment also is captured in existing agreements.
- Ranch Creek below Meadow Creek (USGS gage 09033100). Real-time temperature data are currently available from the USGS. If the USGS ceases data collection at this site, the Applicant will be responsible for establishing and maintaining real-time data collection at the site.
- Fraser River at Rendezvous Bridge (GCWIN site FR-Rendezvous). Data logger site maintained by GCWIN.

- St. Louis Creek above Fraser River confluence (GCWIN site ST-LC). Data logger site maintained by GCWIN.

**Condition 2:** The fixed values for temperature action levels<sup>30</sup> that are specified in existing agreements may or may not continue to match applicable regulatory standards, which are subject to revision. The action levels are hereby modified to correspond to the lesser of the action level in the GCMECP or the applicable standard for Cold Stream Tier 1. The Division expects that lower thresholds may be developed for triggering bypass flows as more is learned about tailoring responses to avoid exceedances.

**Condition 3:** The Applicant will conduct a Voluntary Pilot Project<sup>31</sup> (VPP) in the Fraser basin using up to 1000 AF/y of environmental water in each summer in which water supply conditions allow, beginning no later than the date of issuance for the 404 permit or FERC license amendment, whichever is later. The VPPs will be executed in the 15 July to 31 August time period that will be the focus of the temperature mitigation response defined in the FWMP. This condition applies in the Interim Period, which ends when the project “becomes operational.”<sup>32</sup> Based on the amount of water expected to be available<sup>33</sup> for the VPP, the Applicant will prepare and submit a plan to the Division by 1 June each year outlining the objectives for the VPP and describing plan components such as the target stream (Fraser River or Ranch Creek), the source(s) for bypass flows, monitoring locations, and assessment metrics. (See Appendix B for further explanation of plan components and expectations for the VPPs in general.) The plan must be submitted by 1 June each year, and the Division will make comments and may recommend changes within 30 days. The Division recognizes that subsequent adjustments to the plan may be necessary during the summer in order to respond to actual stream flow conditions, or to accommodate operational or maintenance considerations.

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<sup>30</sup> As given in the GCMECP, the temperature action levels for the Fraser basin gages are 21.2°C for the daily maximum and 17.0°C for the weekly average temperature.

<sup>31</sup> GCMECP II.B.1.c.1

<sup>32</sup> As per the CRCA: “The capacity of Gross Reservoir has been enlarged, and water has been diverted and stored in the enlarged portion of Gross Reservoir.”

<sup>33</sup> Availability is determined by snowpack, system-wide reservoir storage, maintenance and operations schedules, and summer forecasts.

At the conclusion of each VPP, the Applicant will prepare a report characterizing the mitigation measures employed and evaluating the effectiveness of those measures in terms of the distance over which a benefit to temperature could be detected. Each report is due by 1 February so that the conclusions will inform development of a VPP for the next year in which bypass water is available.

**Condition 4:** The Final Report includes a provision that defines the Applicant's responsibilities<sup>34</sup> in the case where flow bypasses (released pursuant to Additional Actions for Elevated Stream Temperature) are shown to "have a *de minimis* effect in reducing stream temperature below the temperature response triggers at USGS gages 09032000, 09033300 or 09033100 when the Moffat Project is diverting...." This condition broadens the consideration of *de minimis* effect to include the GCWIN site at Rendezvous Bridge, and it requires a finding of *de minimis* effect at all four sites. Although determination of *de minimis* effect is made through the Learning by Doing process, the Division expects that results of VPPs will inform the process by casting the magnitude of effects in terms of distance from diversion points. The analysis of effects leading to a *de minimis* conclusion must be documented in a report submitted to the Division, and the Division must agree with the conclusion before the Applicant can discontinue these bypass flows.

**Condition 5:** If temperature monitoring indicates an impairment at any of the monitoring locations identified in Condition 1, the Applicant will perform investigations to determine what contribution operation of the project has made. The impairment investigation report and all supporting information will be submitted to the Division within 12 months after the impairment has been detected. If, after diligently working on the impairment investigation, the Applicant requires more time to finish the impairment investigation the Applicant may request an extension from the Division. The Applicant must request the extension at least two months prior to the one year deadline and must explain the reason and need for the extension. The Division will review the request and determine whether to grant the extension.

If the Division concludes that operation of the project is primarily responsible for the impairment, the Division will require that the Applicant actively explore preparation of a Category 4b Plan that will define the actions necessary to bring water quality back to attainment of the standard. In doing so, the Applicant will be encouraged to work with other significant contributors to the impairment, if applicable.

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<sup>34</sup> "Denver Water will contribute \$1 million dollars to LBD for the exclusive purpose of designing and constructing projects to address stream temperature issues in the Fraser River Basin."

A Category 4b Plan must ensure attainment with all applicable water quality standards through agreed upon pollution control mechanisms within a reasonable time period, must be consistent with CRS 25-8-104, and must be submitted to the Division no more than two years after the Division's determination that the plan is applicable. If it becomes apparent that a Category 4b Plan cannot ensure attainment with all applicable water quality standards through agreed upon pollution control mechanisms within a reasonable time period, or if such plan is not accepted by the Division or EPA, or is precluded by or inconsistent with the water rights provisions in section CRS 25-8-104, then the Division anticipates a 303(d) listing and, in cooperation with the Applicant, preparation of a TMDL. The Applicant, at its discretion, may agree to remedial actions to restore water quality that are inconsistent with the water rights provisions of CRS 25-8-104. If, after diligently working on the Category 4b Plan, the Applicant requires more time to finish the Category 4b Plan the Applicant may request an extension from the Division. The Applicant must request the extension at least two months prior to the two year deadline and must explain the reason and need for the extension. The Division will review the request and determine whether to grant the extension.

**Condition 6:** The Applicant will monitor continuous stream temperature at four locations in South Boulder Creek, listed below. Monitoring at these sites will begin as soon as practicable, but no later than one year after the date of issuance for the 404 permit or the FERC license, whichever is later, and will continue for not less than five years after the project becomes fully operational. The data from each calendar year will be submitted to the Division by April 1 following each calendar year of sampling.

- South Boulder Creek at Pinecliffe (DW Station WS-RL-001)
- Gross Reservoir Outlet (FERC monitoring location)
- South Boulder Creek at a location between the reservoir outlet and the diversion point (to match the corresponding site for sampling benthic macroinvertebrates). The Applicant will submit a proposed location to the Division for approval before sampling begins.
- South Boulder Creek at Diversion Structure (DW Station WS-TL-002)

**Condition 7:** The Applicant will undertake a study of alternatives for the Winter Park WSD to meet the Regulation 85 nutrient limits and develop conceptual level costs consistent with requirements for a Project Needs Assessment<sup>35</sup> (PNA). Developing a

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<sup>35</sup> A PNA is required for the sources of federal funding for which the Winter Park WSD might be eligible to upgrade the Wastewater Treatment Plant to meet the Regulation 85 nutrients limits.

PNA for early implementation of the Regulation 85 limits for nutrients at the Winter Park WSD wastewater treatment plant will set the stage for decreasing nutrient loads in the Fraser River upstream of the confluence with Vasquez Creek and will assist with Winter Park WSD's efforts to fund treatment plant upgrades as needed. The plan must be prepared and submitted to the Division's Engineering Review Unit for approval within one year of the date of issuance of the 404 permit or the FERC license, whichever is later.

**Condition 8:** The Applicant will monitor nutrient concentrations monthly (total phosphorus and total nitrogen) at the following sites:

- Fraser River below Buck Creek at Winter Park (USGS 09023750)
- Fraser River at Winter Park (USGS 09024000)
- Fraser River below Vasquez Creek at Winter Park (USGS 09025010)
- Vasquez Creek at Winter Park (USGS 09025000)

Monitoring at these sites will begin no later than the date of issuance for the 404 permit or the FERC license, whichever is later, and will continue for not less than five years after the project becomes fully operational. The data will be submitted annually to the Division along with a report documenting exceedances of the nutrient standards; the report is due by April 1 following each calendar year of sampling.

**Condition 9:** If monitoring of total phosphorus or total nitrogen concentrations in the Fraser River indicates a potential impairment,<sup>36</sup> the Applicant will perform investigations to determine what contribution operation of the project has made. The impairment investigation report and all supporting information will be submitted to the Division within 12 months after the impairment has been detected. If, after diligently working on the impairment investigation, the Applicant requires more time to finish the impairment investigation the Applicant may request an extension from the Division. The Applicant must request the extension at least two months prior to the one year deadline and must explain the reason and need for the extension. The Division will review the request and determine whether to grant the extension.

If the Division concludes that operation of the project is primarily responsible for the impairment, the Division will require that the Applicant actively explore preparation of

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<sup>36</sup> Data are to be assessed against the appropriate interim numeric values in the event that numeric standards have not yet been adopted for the relevant segment(s).



a Category 4b Plan that will define the actions necessary to bring water quality back to attainment of the standard. In doing so, the Applicant will be encouraged to work with other significant contributors to the impairment, if applicable.

A Category 4b Plan must ensure attainment with all applicable water quality standards through agreed upon pollution control mechanisms within a reasonable time period, must be consistent with CRS 25-8-104, and must be submitted to the Division no more than two years after the Division's determination that the plan is applicable. If it becomes apparent that a Category 4b Plan cannot ensure attainment with all applicable water quality standards through agreed upon pollution control mechanisms within a reasonable time period, or if such plan is not accepted by the Division or EPA, or is precluded by or inconsistent with the water rights provisions in section CRS 25-8-104, then the Division anticipates a 303(d) listing and, in cooperation with the Applicant, preparation of a TMDL. The Applicant, at its discretion, may agree to remedial actions to restore water quality that are inconsistent with the water rights provisions of CRS 25-8-104. If, after diligently working on the Category 4b Plan, the Applicant requires more time to finish the Category 4b Plan the Applicant may request an extension from the Division. The Applicant must request the extension at least two months prior to the two year deadline and must explain the reason and need for the extension. The Division will review the request and determine whether to grant the extension.

**Condition 10:** The Applicant will monitor the health of aquatic communities at four primary sites (see table below) chosen because of existing concerns due to low MMI scores. The health of the communities will be established by sampling benthic macroinvertebrates and calculating MMI scores. The macroinvertebrate sampling will be conducted using the Division's protocols,<sup>37</sup> which are described in Policy Statement 10-1 Aquatic Life Use Attainment Methodology to Determine Use Attainment for Rivers and Streams (Policy 10-1). The Applicant will develop a Sampling Analysis Plan for the collection and preservation of benthic macroinvertebrates that will be reviewed by the Division prior to the start of macroinvertebrate sampling.

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<sup>37</sup> The Division is insistent on the prescribed methodology. Even if a different methodology is selected through the LBD process (as suggested in the GCMECP), compliance with these conditions requires use of the Division's methodology.

GCWIN Site	Description	Latitude	Longitude
FR-abv WPSD	Fraser above Winter Park SD	39.89445	-105.76821
FR-Rendezvous	Fraser at Rendezvous Bridge	39.93412	-105.7896
FR-CR83	Fraser at Tabernash below bridge on CR83	39.99053	-105.8299
VC-WP	Vasquez at Winter Park	39.9203	-105.78498

Sampling at the primary sites will be conducted in the fall of each year beginning after the issuance of the 404 permit or the FERC license, whichever is later, and continue for five years after the project becomes fully operational. A report assessing the data (raw data and MMI scores) and documenting any impairment of aquatic life will be submitted to the Division by June 1 following each calendar year of sampling. If there are concerns about the representativeness of conditions in a particular year (e.g., if there has been a flood or other natural disaster), alterations to the sampling may be accommodated upon prior approval by the Division.

**Condition 11:** If monitoring of aquatic life indicates an impairment, the Applicant will use available indices to identify the stressor, if possible. Stressor identification work will be limited to indices that have been incorporated in the Listing Methodology applicable at the time the impairment is detected. The Applicant is not responsible for development of stressor identification tools. If a stressor is identified, the Applicant also will determine what contribution operation of the project has made to the identified stressor, or, if the project is not yet operating, the Applicant will predict the potential for the project to contribute to future impairment associated with the identified stressor. The impairment investigation report and all supporting information will be submitted to the Division within 12 months after the impairment has been discovered. If, after diligently working on the impairment investigation, the Applicant requires more time to finish the impairment investigation the Applicant may request an extension from the Division. The Applicant must request the extension at least two months prior to the one year deadline and must explain the reason and need for the extension. The Division will review the request and determine whether to grant the extension.

The Division, in consultation with the Applicant, will decide if the Applicant will be required to develop a Category 4b plan for the identified stressor. If such plan is required, it must be submitted to the Division within two years. If a Category 4b Plan is precluded by CRS 25-8-104, the Division anticipates a 303(d) listing and, in cooperation with the Applicant, preparation of a TMDL to bring water quality back to attainment of the standard. If, after diligently working on the Category 4b Plan, the Applicant requires more time to finish the Category 4b Plan the Applicant may request

an extension from the Division. The Applicant must request the extension at least two months prior to the two year deadline and must explain the reason and need for the extension. The Division will review the request and determine whether to grant the extension.

**Condition 12:** The Applicant will monitor the health of aquatic communities at three sites in South Boulder Creek below Gross Reservoir. The health of the communities will be established by sampling benthic macroinvertebrates and calculating MMI scores. The macroinvertebrate sampling will be conducted using the Division's protocols<sup>38</sup>, which are described in Policy Statement 10-1 Aquatic Life Use Attainment Methodology to Determine Use Attainment for Rivers and Streams (Policy 10-1). The Applicant will develop a Sampling Analysis Plan, including specifics of the proposed sampling locations, for the collection and preservation of benthic macroinvertebrates that will be reviewed by the Division prior to the start of macroinvertebrate sampling.

- South Boulder Creek immediately below Gross Reservoir
- South Boulder Creek at a location between the reservoir outlet and the diversion point (to match the corresponding site for temperature monitoring).
- South Boulder Creek upstream of the diversion point and the lentic zone it creates.

Sampling at the primary sites will be conducted in the fall of each year beginning after the issuance of the 404 permit or the FERC license, whichever is later, and continue for five years after the project becomes fully operational. A report assessing the data (raw data and MMI scores) and documenting any impairment of aquatic life will be submitted to the Division by June 1 following each calendar year of sampling. If there are concerns about the representativeness of conditions in a particular year (e.g., if there has been a flood or other natural disaster), alterations to the sampling may be accommodated upon prior approval by the Division.

If monitoring of aquatic life demonstrates that the project is responsible for degradation of aquatic life (as indicated with the MMI), the Applicant will be required to develop a Category 4b plan. The plan must be submitted to the Division within two years. If, after diligently working on the Category 4b Plan, the Applicant requires more time to finish the Category 4b Plan the Applicant may request an extension from the Division. The Applicant must request the extension at least two months prior to the two year deadline

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<sup>38</sup> The Division is insistent on the prescribed methodology. Even if a different methodology is selected through the LBD process (as suggested in the GCMECP), compliance with these conditions requires use of the Division's methodology.

and must explain the reason and need for the extension. The Division will review the request and determine whether to grant the extension.

**Condition 13:** The Applicant will work with the Division and CPW to support a biennial program to monitor mercury in fish tissue in Gross Reservoir. Field work to collect the fish will be performed consistent with CPW requirements, the EPA's Guidance for Assessing Chemical Contaminant Data for Use in Fish Advisories, and the goal will be to obtain adequate representation of the important species as per the Water Quality Control Commission's Section 303(d) Listing Methodology. The sampling effort for Gross Reservoir will begin in the first field season after the enlarged reservoir has filled and will continue for five more years. The Applicant will submit a brief report summarizing the sampling completed during each field season; the report is due by April 1 following each calendar year of sampling. If mercury levels fall below the level of concern for the last three years, the monitoring obligation will end. In the event that there is impairment for mercury at the end of the five-year period, the obligation for monitoring will be extended for an additional five years, at which time the monitoring obligation will end.

If fish tissue analyses show that a FCA is required, the Applicant will work with the Technical Advisory Team (TAC)<sup>39</sup> of the Colorado Fish Consumption Advisory Committee to provide public education including the posting of signs with associated consumption advisories. The TAC will determine the design of the signs and the information to be included. The Applicant will incur the costs of the signs and be responsible for proper posting of such signs.

**Condition 14:** The Applicant will monitor concentrations of total recoverable metals<sup>40</sup>, dissolved metals<sup>41</sup>, and hardness at the following locations selected on the basis of historical data record or proximity to important hydrologic features:

- Williams Fork above bridge at Sugarloaf Campground (Site WS-WF-004)
- Vasquez Creek above Vasquez Tunnel outfall (Site WS-WF-001)

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<sup>39</sup> Members include representative from CPW, the Division, and the Disease Control and Environmental Epidemiology Division of the Colorado Department of Public Health and Environment.

<sup>40</sup> Iron, arsenic, and chromium

<sup>41</sup> Arsenic, boron, cadmium, chromium, copper, iron, lead, manganese, nickel, selenium, silver, uranium, and zinc

- Vasquez Creek at Winter Park (USGS 09025000)
- Fraser River below Buck Creek at Winter Park (USGS 09023750)
- Fraser River at Winter Park (USGS 09024000)
- Fraser River below Vasquez Creek (USGS 09025010)
- Fraser River above Ranch Creek (USGS 09027100)
- South Boulder Creek above Moffat Tunnel outfall (WS-RL-018)
- South Boulder Creek at Pinecliff (WS-RL-001)
- South Boulder Creek at Diversion Structure (WS-RL-002)

Samples will be taken monthly except where winter conditions prevent access. Monitoring at these sites will begin no later than the date of issuance for the 404 permit or the FERC license, whichever is later, and will continue for five years after the project becomes fully operational. The data will be submitted annually to the Division along with a report documenting exceedances of the nutrient standards; the report is due by April 1 following each calendar year of sampling.

**Condition 15:** If monitoring indicates an impairment, the Applicant will perform investigations to determine what contribution operation of the project has made. The impairment investigation report and all supporting information will be submitted to the Division within 12 months after the impairment has been detected. If, after diligently working on the impairment investigation, the Applicant requires more time to finish the impairment investigation the Applicant may request an extension from the Division. The Applicant must request the extension at least two months prior to the one year deadline and must explain the reason and need for the extension. The Division will review the request and determine whether to grant the extension.

If the Division concludes that operation of the project is primarily responsible for the impairment, the Division will require that the Applicant actively explore preparation of a Category 4b Plan that will define the actions necessary to bring water quality back to attainment of the standard. In doing so, the Applicant will be encouraged to work with other significant contributors to impairment, if applicable.

A Category 4b Plan must ensure attainment with all applicable water quality standards through agreed upon pollution control mechanisms within a reasonable time period, must be consistent with CRS 25-8-104, and must be submitted to the Division no more than two years after the Division's determination that the plan is applicable. If it becomes apparent that a Category 4b Plan cannot ensure attainment with all applicable

water quality standards through agreed upon pollution control mechanisms within a reasonable time period, or if such plan is not accepted by the Division or EPA, or is precluded by or inconsistent with the water rights provisions in section CRS 25-8-104, then the Division anticipates a 303(d) listing and, in cooperation with the Applicant, preparation of a TMDL to bring water quality back to attainment of the standard. The Applicant, at its discretion, may agree to remedial actions to restore water quality that are inconsistent with the water rights provisions of CRS 25-8-104. If, after diligently working on the Category 4b Plan, the Applicant requires more time to finish the Category 4b Plan the Applicant may request an extension from the Division. The Applicant must request the extension at least two months prior to the two year deadline and must explain the reason and need for the extension. The Division will review the request and determine whether to grant the extension.

**Condition 16:** The Applicant will monitor water quality in Gross Reservoir. Monitoring will begin no later than the ice-free season following issuance of the 404 permit or the FERC license, whichever is later, and will continue for not less than five years after the project becomes fully operational. The data will be submitted annually to the Division along with a report documenting any water quality impairments. The report is due by April 1 following each calendar year of sampling.

Samples will be taken monthly during the ice-free season at a site in deep water near the dam. Analysis will include general field parameters<sup>42</sup>, nutrients and biological collections,<sup>43</sup> major ions<sup>44</sup> and metals.<sup>45</sup>

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<sup>42</sup> Vertical profiles of temperature, DO, conductance, pH, turbidity, and secchi depth

<sup>43</sup> Total Kjeldahl nitrogen, ammonia-nitrogen, nitrite+nitrate-nitrogen, orthophosphorus, total phosphorus, dissolved organic carbon, and chlorophyll-a.

<sup>44</sup> Calcium, magnesium, chloride, potassium, sodium, and sulfate

<sup>45</sup> Total recoverable form: iron, arsenic, and chromium; Dissolved form: arsenic, boron, cadmium, chromium, copper, iron, lead, manganese, nickel, selenium, silver, uranium, and zinc