Final Memorandum

To: John Urbanic, U.S. Army Corps of Engineers, Omaha District, Denver Regulatory Office  
From: Andrea Parker, Jody Glennon, Courtney Taylor and Caitlin Shaw, URS Corporation  
Date: May 15, 2017

Subject: Evaluation of the Final Quarry Location Report: Impact Minimization and Avoidance Measures, Moffat Collection System Project, prepared by Denver Water

Introduction

The City and County of Denver, acting by and through its Board of Water Commissioners (Denver Water) is in the process of obtaining a Clean Water Act (CWA) Section 404 Permit from the U.S. Army Corps of Engineers (Corps) for the proposed Moffat Collection System Project (Project) to place fill material in jurisdictional waters of the U.S. for the construction of a water storage facility associated with developing additional water supplies. In addition to 404 permitting requirements, the Corps determined that analysis of the natural and human environmental effects of the Applicant’s Preferred Alternative and a reasonable range of alternatives was necessary to provide full public disclosure and to aid in decision-making as documented in the Moffat Collection System Project Final Environmental Impact Statement (FEIS) (Corps 2014). The FEIS was prepared in accordance with the National Environmental Policy Act of 1969, as amended, (NEPA) and the Corps regulations for implementing NEPA (33 Code of Federal Regulations [CFR] 325, Appendix B).

The Applicant’s Preferred Alternative (also referred to as the Proposed Action and Project) consists of raising Gross Dam by 131 feet to 471 feet and increasing storage volume in Gross Reservoir from 41,811 acre-feet to approximately 119,000 acre-feet. As described in FEIS Section 2.3.2.1, it was assumed that 60 percent (%) of the material required to make the concrete for the dam raise would be produced onsite and 40% of the remaining material (sand aggregate, flyash, and cement) would be transported from an off-site source. As described in the Final Quarry Location Report: Impact Minimization and Avoidance Measures, Moffat Collection System Project (Report) (Denver Water 2016), Denver Water estimates that approximately 930,000 cubic yards of concrete consisting of approximately 90% sand and gravel aggregate and 10% cement and flyash materials would be needed to construct the dam raise and would come from a combination of an on-site quarry and off-site commercial sources.

No site-specific geotechnical evaluations were conducted by Denver Water while the FEIS was being developed. A preliminary geotechnical reconnaissance at the site, however, indicated an on-site granite quarry could produce sand and gravel aggregate material and that cement and flyash would need to be supplied from an off-site source (MWH Americas 2006). For purposes of analysis in the FEIS, it was therefore assumed that an on-site hard rock quarry (FEIS Quarry) would supply the needed gravel aggregate for the Project, shown as the benched/unbenched quarry site on FEIS Figure 2-3. The FEIS Quarry site would impact approximately 29 acres of lands owned by Denver Water and the National Forest System (NFS). Additionally, it was assumed that all of the sand aggregate would be imported to the site from an off-site supplier.
near Longmont, Colorado (FEIS Figure 2-5). In the FEIS, the Corps acknowledged that more advanced geotechnical analysis may require consideration of alternate on-site quarry locations.

Denver Water conducted preliminary engineering and geotechnical evaluations at Gross Reservoir from 2014-2016 to assess if the native granite underlying the FEIS Quarry could be used to produce aggregate for concrete and if other on-site quarry locations exist that would minimize impacts. In response to comments received by the Corps on the FEIS (Corps 2014), Denver Water proposes to modify the Applicant’s Preferred Alternative to minimize adverse impacts identified in the FEIS. The proposed modifications to the Applicant’s Preferred Alternative are related to changes to the FEIS Quarry site as described in the Report (Denver Water 2016).

The Report summarized the findings from the preliminary engineering evaluations completed by Denver Water for the purposes of reducing: 1) impacts to NFS lands, 2) number of surface acres requiring mitigation or reclamation, 3) visual impacts to the viewshed of residences and recreationists around Gross Reservoir, and 4) impacts associated with trucking in aggregates from off-site commercial sources. The findings of the preliminary engineering reports showed that all aggregate (sand and gravel) could be produced onsite and that the FEIS Quarry could be located entirely on Denver Water property within the new reservoir inundation pool. The relocated quarry site would occur along the existing access road (shown as Haul Road Recreation Area on FEIS Figure 3.15-1) to Osprey Point (Osprey Point Quarry).

**Comparison of Resource Impacts between the FEIS Quarry and Osprey Point Quarry Sites**

The Report provides a comparative analysis by Denver Water of the potential impacts associated with the FEIS Quarry site to the Osprey Point Quarry for the Applicant’s Preferred Alternative. All resources described and evaluated in Chapters 3, 4, and 5 of the FEIS were independently assessed by URS in relation to the proposed change in quarry location described in the Report. In general, the Corps/URS agree that the Osprey Point Quarry site and associated features (e.g., spoil area) would result in no impacts, have similar impacts to the FEIS Quarry, or have reduced impacts due to a reduction in land disturbance and off-site haul trips.

**Resources Not Applicable to Analysis**

**Channel Morphology** – FEIS Section 5.3 indicates that channel morphology would not be impacted by construction activities at Gross Reservoir. Rather, Project impacts to channel morphology are associated with flow changes and not construction and operation of the FEIS Quarry. The Corps/URS agree that no permanent or temporary impacts to channel morphology are anticipated from either the FEIS Quarry site or the Osprey Point Quarry site.

**Resources with no Permanent, Temporary, or Cumulative Impacts**

**Surface Water** – The Corps/URS agree that no permanent, temporary, or cumulative impacts to surface water would occur from the construction and operation of the Osprey Point Quarry site since the analysis for it is similar to the analysis conducted for the FEIS Quarry site in FEIS Sections 4.6.1 and 5.1 and Appendix H. The change in quarry location would not create impacts
to surface water hydrology (e.g., stream flows in South Boulder Creek and tributaries that feed into Gross Reservoir; the surface area, volume or level of Gross Reservoir; floodplain changes).

No cumulative effects to surface water were identified for the FEIS Quarry site; similarly, no cumulative effects to surface water would result from the construction and operation of the Osprey Point Quarry site.

**Water Quality** – The Corps/URS agree that no permanent, temporary, or cumulative impacts would occur to water quality from the construction and operation of the Osprey Point Quarry site and associated spoil area since the analysis for it is similar to the analysis conducted for the FEIS Quarry site in FEIS Sections 4.6.2 and 5.2. Both quarry sites are underlain by similar geology (FEIS Section 3.5.1.1; Figure 3.5-1), primarily Precambrian Boulder Creek granodiorite and quartz filled veins, which are unanticipated to create water quality issues if exposed during quarry activities. Additionally, the Colorado Department of Public Health and Environment (CDPHE), a Cooperating Agency on the Project, issued a CWA 401 Certification for the Project in June 2016. The 401 Certification did not cite concerns or conditions with any water quality issues related to quarry activities at Gross Reservoir. No cumulative effects to water quality were identified for the FEIS Quarry site; similarly, no cumulative effects to water quality would result from the construction and operation of the Osprey Point Quarry site.

**Groundwater** – The Corps/URS agree that no permanent, temporary, or cumulative impacts would occur to groundwater from the construction and operation of the Osprey Point Quarry site and associated spoil area since the analysis for it is similar to the analysis conducted for the FEIS Quarry site in FEIS Sections 4.6.4 and 5.4. It is not anticipated that the change in quarry location would impact groundwater. No cumulative effects to groundwater were identified for the FEIS Quarry site; similarly, no cumulative effects to groundwater would result from the construction and operation of the Osprey Point Quarry site.

**Aquatic Biological Resources** – The Corps/URS agree that no permanent, temporary, or cumulative impacts would occur to special status species from the construction and operation of the Osprey Point Quarry site and associated spoil area since the analysis for it is similar to the analysis conducted for the FEIS Quarry site in FEIS Sections 4.6.11 and 5.11. It is not anticipated that the change in quarry location would impact aquatic biological resources in and around Gross Reservoir. No cumulative effects to aquatic biological resources were identified for the FEIS Quarry site; similarly, no cumulative effects to aquatic biological resources would result from the construction and operation of the Osprey Point Quarry site.

**Cultural/Historical/Paleontological Resources** – The Corps/URS agree that no permanent, temporary, or cumulative impacts would occur to cultural/historical/paleontological resources from the construction and operation of the Osprey Point Quarry site and associated spoil area since the analysis for these resources is similar to the analysis conducted for the FEIS Quarry site in FEIS Sections 4.6.18 and 5.18 and Appendix L. It is not anticipated that the change in quarry location would impact cultural resources around Gross Reservoir since both sites are located within the Area of Potential Effects (APE) that was evaluated in the FEIS. Denver Water has entered into a Programmatic Agreement (PA) (FEIS Appendix L) with the Corps, Colorado State Historic Preservation Officer (SHPO), Advisory Council on Historic Preservation (ACHP) and the U.S. Forest Service (USFS) to account and mitigate for any unknown cultural/historical/
paleontological resources potentially encountered during construction, including quarry activities. No cumulative effects to cultural/historical/paleontological resources were identified for the FEIS Quarry site; similarly, no cumulative effects to cultural/historical/paleontological resources would result from the construction and operation of the Osprey Point Quarry site.

**Hazardous Materials** – The Corps/URS agree that no permanent, temporary, or cumulative impacts from hazardous materials are anticipated to occur from the construction and operation of the Osprey Point Quarry site and associated spoil area since the analysis for these materials is similar to the analysis conducted for the FEIS Quarry site in FEIS Sections 4.6.20 and 5.20. It is not anticipated that the change in quarry location would create impacts from hazardous materials in and around Gross Reservoir. No cumulative effects to hazardous materials were identified for the FEIS Quarry site; similarly, no cumulative effects to hazardous resources would result from the construction and operation of the Osprey Point Quarry site.

**Resources with the Same or Similar Permanent, Temporary, and Cumulative Impacts as the FEIS**

**Geology** – The Corps/URS agree that the permanent, temporary, and cumulative impacts to geologic resources from the construction and operation of the Osprey Point Quarry site would be similar those for the FEIS Quarry site as discussed in FEIS Sections 4.6.5 and 5.5. Both quarry sites are underlain by similar geology (FEIS Section 3.5.1.1; Figure 3.5-1), primarily Precambrian Boulder Creek granodiorite and quartz filled veins. The Osprey Point Quarry site would result in approximately 370,000 cubic yards more of unavoidable geologic losses than the FEIS Quarry site, but the disturbance area required to quarry the material would be almost half the surface size (i.e., the Osprey Point Quarry is 14-16 acres and the FEIS Quarry is 29 acres). FEIS Section 5.5 also generally presents an evaluation of potential geologic hazards related to seismicity and landslides. More recent geophysical seismic analysis conducted by Denver Water’s contractors concluded that the Roger’s Fault either does not exist in the Osprey Point Quarry site area or is not active and is unlikely to compromise dam safety at Gross Reservoir (Olson Engineering 2015). Additionally, Denver Water is required to comply with the Federal Energy Regulatory Commission (FERC) Division of Dam Safety and Inspection and would develop a dam safety plan prior to construction.

The FEIS Quarry and other construction activities associated with the Applicant’s Preferred Alternative and other reasonable foreseeable future actions (RFFAs) would contribute to the unavoidable loss of geological resources resulting in a minor cumulative effect. Cumulative effects to geologic resources from the Osprey Point Quarry site would result in the same or slightly less cumulative impacts than those for the FEIS Quarry site due to the smaller disturbance area.

**Riparian and Wetlands Areas** – The Corps/URS agree that the permanent, temporary, and cumulative impacts to riparian and wetland areas from the construction and operation of the Osprey Point Quarry site would be similar to the analysis conducted for the FEIS Quarry site in FEIS Sections 4.6.8 and 5.8. No wetland, riparian, or Other Waters of the U.S. were identified within the FEIS Quarry area (FEIS Figure 3.8-1). The proposed Osprey Point Quarry site spoil area, however, would impact approximately 0.02 acre of a Palustrine Scrub-Shrub (PSS) wetland...
located along the Gross Reservoir shoreline; inundation impacts associated with an enlarged Gross Reservoir to this same wetland was accounted for in the FEIS. Additionally, two woodland/shrubland riparian areas occur within the FEIS Quarry site compared to three woodland/shrubland riparian areas within the proposed Osprey Point Quarry site; impacts to these five woodland/shrubland riparian areas were accounted for in the FEIS due to inundation from the enlarged reservoir pool. Thus, impacts to wetlands, Other Waters of the U.S., and riparian areas would be the same regardless of the two quarry locations and would be fully mitigated in accordance with the Corps’ current mitigation policies and associated conditions of the Section 404 Permit.

The FEIS Quarry site and related construction activities associated with the Applicant’s Preferred Alternative would result in the permanent impacts of wetlands and riparian areas that would be fully mitigated. Similarly, the cumulative effects to wetlands and riparian areas from the construction of the Osprey Point Quarry site and related construction activities would be fully mitigated to ensure no net loss of these resources.

**Noise** – The Corps/URS agree that the permanent, temporary, and cumulative impacts to noise from the construction and operation of the Osprey Point Quarry site would be similar to the analysis conducted for the FEIS Quarry site in FEIS Sections 4.6.14 and 5.14. On-site construction related noise is unavoidable and was identified as a moderate temporary impact in the FEIS. It is anticipated that the change in location to the Osprey Point Quarry site would result in similar moderate temporary noise impacts since the processing activities used to produce sand and gravel aggregate is similar to what was assumed for the impact analysis in the FEIS. Similarly, the blasting frequency would increase from every three to four days (FEIS 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 what was described in the FEIS. Off-site noise impacts associated with haul trucks would be reduced by 72% (truck trip calculations are provided on the revised Traffic Trips table on page 5 of Denver Water’s Report) compared to what was presented in FEIS Sections 2.8.5 and 5.12. Overall, it is not anticipated that State of Colorado noise standards (Colorado Revised Statutes [C.R.S.] Title 25-12-103) or Boulder County noise ordinances (Boulder County 1992)would be exceeded onsite at either quarry location with the exception of the periodic exceedance of the U.S. Environmental Protection Agency (USEPA) noise threshold level of 70 A-weighted decibels (dBA); the Corps acknowledges that off-site noise impacts would be reduced due to associated decreases in haul truck trips.

Construction activity associated with the FEIS Quarry site would result in minor to moderate cumulative effects to on-site noise and construction traffic. The cumulative noise effects associated with Osprey Point Quarry site would be the same or less than those for the FEIS Quarry site due to the reduction in off-site haul truck traffic.

**Recreation** – The Corps/URS agree that the permanent, temporary, and cumulative impacts to recreation resources from the construction and operation of the Osprey Point Quarry site would be similar to the analysis conducted for the FEIS Quarry site in FEIS Sections 4.6.15 and 5.15. The FEIS identified temporary impacts to recreational activities at Gross Reservoir due to the
periodic closure of the Haul Road Recreation Area (Osprey Point) shown on FEIS Figure 5.15-2; similar temporary closures of recreational areas would be required for construction activities at the Osprey Point Quarry site. Both quarry areas would re-open to recreation upon completion of construction activities for the relocated Haul Road Recreation Area and scenic trails, but the Osprey Point Quarry site would be less visible to recreationists since it would be submerged under the new high water line.

Construction activity for the FEIS Quarry site and other RFFAs would likely result in minor, if any, cumulative effects to recreational activities at Gross Reservoir. Cumulative effects to recreation associated with the Osprey Point Quarry site are anticipated to be the same as the cumulative effects for the FEIS Quarry since the same existing recreational facilities (e.g., Haul Road Recreation Area) would need to be relocated.

**Socioeconomics** – The Corps/URS agree that the permanent, temporary, and cumulative impacts to socioeconomic resources from the construction and operation of the Osprey Point Quarry site would be similar to those for the FEIS Quarry site as described in FEIS Sections 4.6.19 and 5.19. The FEIS analysis concluded that temporary, minor, beneficial socioeconomic improvements would result for the Project area due to the addition of new construction jobs and revenue from the purchase of materials and supplies. The FEIS also identified that short-term minor to moderate construction-related impacts would occur to residents living within the Gross Reservoir Primary Impact Area (PIA). In general, the construction activities at the Osprey Point Quarry site would be similar to those at the FEIS Quarry site and would produce similar short-term economic benefits. The Osprey Point Quarry site, however, would likely result in fewer impacts to the residents in the PIA due to the 72% reduction of haul trucks on local roads and the improved post-construction scenic viewshed at the new quarry location.

No cumulative effects to socioeconomics from the FEIS Quarry site and other construction-related activities for the Project are anticipated since Gross Reservoir is primarily surrounded by NFS lands, residential lands, and other similar lands where significant future development is unlikely. Similarly, no cumulative effects are anticipated from construction activities at the Osprey Point Quarry site since the quarry activities would be similar to those at the FEIS Quarry site.

**Special Status Species** – The Corps/URS agree that the permanent, temporary or cumulative impacts to federal or state listed special status species and Forest Service Region 2 (Rocky Mountain Region) sensitive species from the construction and operation of the Osprey Point Quarry site and associated spoil area would be similar to those presented for the FEIS Quarry site in FEIS Sections 4.6.10 and 5.10.

Slightly greater impacts, however, than those described in the FEIS from the FEIS Quarry site would occur from the Osprey Point Quarry site to Arapaho & Roosevelt National Forests plant species of local concern that were identified during field surveys conducted at Gross Reservoir in 2010 (as described in the document titled Report Responding to USFS Comments [FEIS Appendix G-3]). More specifically, a small population of Maryland sanicle (Sanicula marilandica) was identified in one of the drainages on the south side of Gross Reservoir, on the south side of the Osprey Point Quarry site and is located entirely on Denver Water land. This species occurred in areas of moderate shade along the edges of the creek. All of this population is
located on Denver Water or private land, and not on NFS lands. Based on the 2010 survey, an additional 11 Maryland sanicle individuals would be affected at the Osprey Point Quarry site (FEIS Appendix G-3, Map 8). The USFS (Popovich 2011) recommended the following mitigations for impacts to Maryland sanicle at Gross Reservoir: 1) collect seed from affected plants and spread seed in suitable nearby unaffected habitat, and 2) conduct surveys to document additional individuals that would not be affected upstream of the known location on private land not owned by Denver Water.

No cumulative effects to federal or state special status species, Forest Service Region 2 sensitive species or Arapaho & Roosevelt National Forests species of local concern are anticipated from the FEIS Quarry site and other construction-related Project activities. Likewise, no cumulative effects would likely result from the Osprey Point Quarry site since the sensitive species and associated habitat are the primarily the same as those evaluated for the FEIS Quarry site. Although greater impacts to Maryland sanicle may occur from the construction and operation of the Osprey Point Quarry site, it is not anticipated that overall health of the local population would be cumulatively impacted if the recommended mitigation is implemented.

**Resources with Reduced Permanent, Temporary, or Cumulative Impacts than the FEIS**

**Soils** – The Corps/URS agree that less permanent, temporary, or cumulative impacts would occur to soils from the construction and operation of the Osprey Point Quarry site and associated spoil area than the FEIS Quarry site. Soil impacts for the FEIS Quarry site are described in FEIS Sections 4.6.6 and 5.6. The same soil units were evaluated as part of the affected environment for both quarry locations (FEIS Appendix F) and have very similar characteristics. Overall, unavoidable soil losses are likely to occur at both quarry locations from inundation of the enlarged reservoir pool and erosion from exposed soils after vegetation removal and wave action along the shoreline. Reduced erosion is likely to occur to at the Osprey Point Quarry site; however, since the slopes are less steep than those at the FEIS Quarry site and about half the land would be disturbed (i.e., the Osprey Point Quarry is 14-16 acres and the FEIS Quarry is 29 acres).

Minimal cumulative effects are anticipated from the soil losses associated with the proposed construction of Project facilities, including the FEIS Quarry site, since soil impacts can be minimized with the implementation of appropriate Best Management Practices (BMPs). Cumulative effects to soils at the Osprey Point Quarry site would be even less since the area of surface disturbance is about half the size as the FEIS Quarry site.

**Vegetation** – The Corps/URS agree that less permanent, temporary, or cumulative impacts would occur to vegetation from the construction and operation of the Osprey Point Quarry site and associated spoil area than the FEIS Quarry site. FEIS Quarry site vegetation impacts are described in FEIS Sections 4.6.7 and 5.7. Both of the quarry sites consist of coniferous forest land comprised of Ponderosa pine (*Pinus ponderosa*) and Douglas fir (*Pseudotsuga menziesii*) evergreen communities that would be unavoidably lost during construction activities. Reduced impacts would occur at the Osprey Point Quarry site when compared to the FEIS Quarry site, however, since it is about half the size of the FEIS Quarry site (i.e., the Osprey Point Quarry is 14-16 acres and the FEIS Quarry is 29 acres). Additionally, the Osprey Point Quarry site is
located entirely on land owned by Denver Water, thus vegetation on NFS lands would not be lost from quarry activities.

No cumulative impacts to vegetation are anticipated at the FEIS Quarry site. Likewise, no cumulative impacts to vegetation are anticipated at the Osprey Point Quarry site since construction activities would be similar those evaluated for the FEIS Quarry site and about half the area would be disturbed.

Wildlife – The Corps/URS agree that less permanent, temporary, or cumulative impacts would occur to wildlife from the construction and operation of the Osprey Point Quarry site and associated spoil area than the FEIS Quarry site. FEIS Quarry site wildlife impacts are described in FEIS Sections 4.6.9 and 5.7. Permanent direct impacts are associated with the loss or degradation of habitat from vegetation clearing and reservoir inundation as well as the potential mortality from construction activities and truck traffic. Reduced impacts to wildlife and their associated habitat would occur at the Osprey Point Quarry site than the FEIS Quarry site because less area (i.e., approximately half) would be disturbed (i.e., the Osprey Point Quarry is 14-16 acres and the FEIS Quarry is 29 acres). Regardless of quarry location, temporary impacts to wildlife would include displacement from construction noise, particularly during blasting activities.

No cumulative impacts to wildlife and associated habitat are anticipated at the FEIS Quarry site and spoil area. Similarly, no cumulative effects to wildlife would occur from the Osprey Point Quarry site since the habitat and the construction activities would be the same as those for the FEIS Quarry site.

Transportation – The Corps/URS agree that less permanent, temporary, or cumulative impacts would occur to traffic volume and roads from the construction and operation of the Osprey Point Quarry site and associated spoil area than the FEIS Quarry site. Transportation-related impacts are described in FEIS Sections 4.6.12 and 5.12. Based on recent engineering and geotechnical evaluations, Denver Water determined that all sand and gravel aggregate could be produced onsite at either quarry location (ASI 2015) leading to a 72% reduction in haul truck trips. The travel trips associated with the construction workforce, construction equipment, and tree removal and disposal as described in FEIS Section 5.12.1 would remain the same for both quarry locations. Additionally, Denver Water also determined that the temporary haul road needed to transport the aggregate materials onsite between the stockpile areas and the dam could be 10 feet less wide (40 feet) than presented in the FEIS, thus further reducing transportation impacts. Based on the reduced off-site truck trips and reduced footprint of the on-site haul road as previously described, the Corps/URS confirmed that transportation impacts would be reduced compared to those described in the FEIS.

Minimal cumulative effects to transportation are anticipated from Project-related construction activities, including the FEIS Quarry site, and were identified in FEIS Section 4.6.12. Production of all sand and gravel aggregate material onsite would further minimize cumulative transportation impacts from both the FEIS Quarry site and Osprey Point Quarry site due to the reduction of construction truck trips.
Land Use – The Corps/URS agree that less permanent, temporary, or cumulative land use impacts would occur from the construction and operation of the Osprey Point Quarry site and associated spoil area than the FEIS Quarry site. Land use impacts are described in FEIS Sections 4.6.16 and 5.16. As shown on FEIS Figure 2-3, the FEIS Quarry is located on existing Denver Water land (5 acres) and NFS lands (24 acres); the Osprey Point Quarry site is located entirely on lands owned by Denver Water and is approximately half the size of the FEIS Quarry site. Regardless of quarry location, temporary impacts to adjacent lands (e.g., Lakeshore and Miramonte subdivisions) from construction noise are likely to occur. Negligible cumulative impacts to existing and future land uses at the FEIS Quarry site and spoil area are anticipated. Cumulative impacts to land uses at the Osprey Point Quarry site would be less than those for the FEIS Quarry since approximately half of the land would be disturbed.

Visual Resources – The Corps/URS agree that less permanent, temporary, or cumulative impacts would occur to visual resources from the construction and operation of the Osprey Point Quarry site and associated spoil area than the FEIS Quarry site. Visual resource impacts are described in FEIS Sections 4.6.17 and 5.17. Both quarry sites would be temporarily exposed during construction activities; however, the FEIS Quarry would remain exposed upon completion of construction and permanently impact the scenic quality of Gross Reservoir (FEIS Figure 5.17-1 and Report Figure 1). The Osprey Point Quarry would be almost or entirely submerged below the new high water line once the reservoir is enlarged (Report Figure 2). Minor to moderate cumulative effects to the visual quality at Gross Reservoir would occur from the Applicant’s Preferred Alternative due to the exposure of the FEIS Quarry site above the high water line and the development of the auxiliary spillway. The Osprey Point Quarry site would result in reduced cumulative impacts to visual resources since the quarry would be almost entirely or entirely submerged under the new high water line.

Air Quality – The air quality analysis described in the Report accurately represents the anticipated changes to air quality effects due the relocation of the quarry site. Attachment 2 of the Report presents how the FEIS emissions calculations would be affected by the change in the quarry location. The primary changes are the number of supply truck trips and estimated volume of rock crushed. With the exception of particulate matter less than 2.5 microns in diameter (PM$_{2.5}$), the Applicant’s Preferred Alternative emissions from all criteria pollutants, hazardous pollutants (HAPs), and greenhouse gases (GHGs) would be reduced by a small amount if the quarry location is moved from the FEIS Quarry site to the Osprey Point Quarry site. While both particulate matter less than 10 microns in diameter (PM$_{10}$) and PM$_{2.5}$ are anticipated to increase from the FEIS Quarry site to the Osprey Point Quarry site due to the increased volume of rock crushed, the net total Applicant’s Preferred Alternative PM$_{10}$ emissions are estimated to decrease because the decreased truck trips would more than compensate for the increased emissions from rock crushing. However, the net total Applicant’s Preferred Alternative PM$_{2.5}$ emissions are estimated to increase slightly because the emission increases from rock crushing would be larger than the emission decreases from truck trips. To more clearly show the expected change in the air emissions associated with the new quarry location, FEIS Quarry Applicant’s Preferred Alternative emissions are shown in Table 1 and compared to the estimated emissions for the Osprey Point Quarry site.
Table 1. Comparison of the FEIS Quarry Emissions Estimates to the Osprey Point Quarry Site Emission Estimates

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<tr>
<th>Criteria Pollutants</th>
<th>Hazardous Air Pollutants</th>
<th>GHGs</th>
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<tr>
<td>CO</td>
<td>NO&lt;sub&gt;x&lt;/sub&gt;</td>
<td>PM&lt;sub&gt;10&lt;/sub&gt;</td>
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<tr>
<td>Osprey Point Quarry Site: Total Project Emissions (tons)</td>
<td>474.59</td>
<td>402.65</td>
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<td>FEIS Quarry Site: Total Project Emissions (tons)</td>
<td>494.36</td>
<td>423.44</td>
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<tr>
<td>Difference Between Osprey Point Quarry and FEIS Quarry Total (tons)</td>
<td>-19.77</td>
<td>-20.79</td>
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<tr>
<td>Osprey Point Quarry: Average Annual Emissions (tons/year)</td>
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<td>98.21</td>
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<tr>
<td>FEIS Quarry: Average Annual Emissions (tons/year)</td>
<td>120.58</td>
<td>103.28</td>
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<tr>
<td>Difference Between Osprey Point Quarry and FEIS Quarry Total (tons/year)</td>
<td>-4.83</td>
<td>-5.07</td>
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Notes:
- CO = carbon monoxide
- Co<sub>2</sub>e = carbon dioxide equivalent
- GHG = greenhouse gas
- HAP = hazardous air pollutant
- NO<sub>x</sub> = oxides of nitrogen
- PM<sub>1.0</sub> = particulate matter less than 2.5 microns in diameter
- PM<sub>10</sub> = particulate matter less than 10 microns in diameter
- SO<sub>2</sub> = sulfur dioxide
- VOC = volatile organic compounds
Overall, the Corps/URS agrees that the quarry site relocation would not change the air quality impacts from the Applicant’s Preferred Alternative or cumulative effects as described in the FEIS. In addition, the Report appropriately states that regardless of the quarry location, the Applicant’s Preferred Alternative would result in temporary, direct impacts, primarily due to construction activities. Furthermore, the Corps/URS agrees that the cumulative air quality impacts from the Applicant’s Preferred Alternative, regardless of the quarry location, would be negligible as the direct impacts are temporary and are expected to be minor.

**Clean Air Act General Conformity**

The Clean Air Act’s General Conformity (40 CFR Part 93, Subpart B) provisions require Federal agencies to ensure that planned Federal actions located in an area designated “non-attainment” or “maintenance” for air quality criteria pollutants do not impair State and local efforts to improve or maintain air quality. The Federal agency responsible for approving an action is required to determine if the action conforms to the applicable non-attainment or maintenance area State Implementation Plan (SIP). For the Moffat Project, the Corps is responsible for determining if the Applicant’s Preferred Alternative conforms to the SIP.

The General Conformity process is broken down into two steps that must be completed prior to commencement of a Federal action. As part of Step 1, a conformity review is completed to determine if de-Minimis or regional significance thresholds are exceeded. The conformity review consists of two parts:

1) an applicability analysis to determine whether an action meets a regulatory exemption, and

2) if the action is not exempt, to determine if either:
   a) the de-Minimis thresholds are exceeded, or
   b) the project is 10% or more of the area’s total emissions inventory.

If the project is not exempt and either exceeds the de-Minimis thresholds or 10% of the area’s emissions inventory, General Conformity regulations apply to the action and Step 2, a conformity determination, must be performed.

The Applicant’s Preferred Alternative is located within an ozone non-attainment area and a carbon monoxide (CO) and PM$_{10}$ maintenance area. Therefore, a conformity review is required for oxides of nitrogen (NO$_x$) and volatile organic compounds (VOC), ozone precursors, as well as, CO and PM$_{10}$. A conformity review was conducted for the Applicant’s Preferred Alternative after incorporating the proposed quarry location changes described in the Report. No emissions sources or activities planned as part of the Applicant’s Preferred Alternative meet regulatory exceptions to General Conformity requirements; therefore, the emissions inventory was reviewed and compared with applicable thresholds.

The Emissions Inventory for the Applicant’s Preferred Alternative was modified for the purposes of the conformity review. Specifically, care was taken to evaluate the potential peak emissions in order to characterize the maximum annual emissions instead of annual average emissions. Also,
emission factors for construction equipment were updated based on input from Denver Water to be consistent with newer, lower emission, equipment planned to be used during Project construction.\(^1\)

As part of the conformity review, the maximum Project year emissions were calculated by source, as shown in Table 2. In order to characterize the maximum annual emissions, each source type was calculated separately since the duration of the planned activities varies by source type. The yearly emissions by source are summed to determine the total maximum Project year emissions. The maximum yearly emissions by source type, total maximum Project year emissions, and de-Minimis level for NO\(_x\) and VOC, CO, and PM\(_{10}\) are shown in Table 2. The Project emissions are below the de-Minimis levels for all pollutants required to be analyzed for the conformity review.

<table>
<thead>
<tr>
<th>Source</th>
<th>Yearly Emissions (tons/year)</th>
<th>CO</th>
<th>NO(_x)</th>
<th>PM(_{10})</th>
<th>VOC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Construction Equipment Exhaust</td>
<td></td>
<td>29.85</td>
<td>55.13</td>
<td>1.75</td>
<td>11.31</td>
</tr>
<tr>
<td>Portable Diesel Engine Exhaust</td>
<td></td>
<td>5.16</td>
<td>23.96</td>
<td>1.70</td>
<td>1.91</td>
</tr>
<tr>
<td>On-road Exhaust</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Worker Commuting</td>
<td></td>
<td>14.50</td>
<td>1.07</td>
<td>0.03</td>
<td>1.11</td>
</tr>
<tr>
<td>Delivery Trucks</td>
<td></td>
<td>2.51</td>
<td>0.03</td>
<td>0.02</td>
<td>0.25</td>
</tr>
<tr>
<td>Fugitive Dust</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wind Erosion</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Blasting</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Paved Roads</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unpaved Roads</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rock Crushing/Screening</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Concrete Batching</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Applicant’s Preferred Alternative Maximum Project Year Emissions</td>
<td>52.02</td>
<td>80.19</td>
<td>86.00</td>
<td>14.58</td>
<td></td>
</tr>
</tbody>
</table>

| De-Minimis Level                      | 100  | 100  | 100  | 100  |
| Are the Applicant’s Preferred Alternative Maximum Emissions Below De-Minimis Level? | Yes  | Yes  | Yes  | Yes  |

The Applicant’s Preferred Alternative maximum annual emissions are compared to the Denver Metro and North Front Range Nonattainment Area (NAA) in Table 2. The 2011 and 2017 Denver Metro and NAA emissions are provided from the Technical Support Documents for the Moderate Area 2008 8-Hour Ozone Standard State Implementation Plan\(^2\). The emissions presented in Table 3 account for all emissions sources within the NAA. The Applicant’s Preferred Alternative maximum annual emissions are less than 10% of the 2011 and 2017 NAA emissions.

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1 Construction equipment is expected to be manufactured after 2002 which is compliant with Tier 2 non-road engine New Source Performance Standards.
2 Ramboll and Alpine 2016. Available at: [https://raqc.egnyte.com/dl/mm7FkWlbFy/TSD_AQTSD.pdf](https://raqc.egnyte.com/dl/mm7FkWlbFy/TSD_AQTSD.pdf)
for CO, NOₓ and VOC. NAA PM₁₀ emissions were not provided; however, it is not anticipated that the PM₁₀ emissions for the Applicant’s Preferred Alternative will exceed 10% of the PM₁₀ NAA emissions.

Since the Project emissions are both below the de-Minimis levels and below 10% of the area’s emissions inventory for the conformity review, a conformity determination is not required and the Project has been found to conform.

**Table 3. Applicant’s Preferred Alternative Emissions Compared to Nonattainment Area Total Emissions**

<table>
<thead>
<tr>
<th>Source</th>
<th>Yearly Emissions (tons/year)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>CO</td>
</tr>
<tr>
<td>Applicant’s Preferred Alternative Maximum Project Year Emissions</td>
<td>52.02</td>
</tr>
<tr>
<td>2011 NAA Total¹</td>
<td>622,690.00</td>
</tr>
<tr>
<td>10% of 2011 NAA Emissions</td>
<td>62,269.00</td>
</tr>
<tr>
<td>Are the Applicant’s Preferred Alternative Maximum Emissions Below 10% NAA Emissions?</td>
<td>Yes</td>
</tr>
<tr>
<td>2017 NAA Total¹</td>
<td>513,993.00</td>
</tr>
<tr>
<td>10% of 2017 NAA Emissions</td>
<td>51,399.30</td>
</tr>
<tr>
<td>Are the Applicant’s Preferred Alternative Maximum Emissions Below 10% NAA Emissions?</td>
<td>Yes</td>
</tr>
</tbody>
</table>

Notes:
1 Data from Table 2-2 (Ramboll and Alpine 2016, [https://raqc.egnyte.com/dl/mm7FkWlbFy/TSD_AQTSD.pdf](https://raqc.egnyte.com/dl/mm7FkWlbFy/TSD_AQTSD.pdf))
2 ND-no data available for PM₁₀.

**Council on Environmental Quality Guidance on Consideration of Greenhouse Gas Emissions and the Effects of Climate Change in NEPA Reviews**

Since the publication of the FEIS in 2014, the Council on Environmental Quality (CEQ) released final guidance for federal agencies on the consideration of GHGs and effects on global climate change within the NEPA documents (CEQ 2016). The final guidance provides a framework for agencies to consider both the effects of a project on climate change, as indicated by its estimated GHG emissions, and the effects of climate on a project. Although the Report does not directly discuss the CEQ guidance, it does disclose the change in the Applicant’s Preferred Alternative GHG emissions due to the quarry site relocation. Therefore, the effects of the Project on climate change as suggested by CEQ guidance can be addressed. The release of GHGs would primarily occur during the construction phase of the Project when construction equipment, heavy duty vehicles, and passenger vehicles are in use. It is not anticipated that the relocation of the quarry site would lead to adverse climate effects, as it would reduce the number of supply truck trips and decrease the associated GHG emissions.

To address the second CEQ suggestion that the effects of climate on the Project should be assessed, climate change is assessed over a long time period and on large regional scales.
Although the impact of climate change on the Project area is highly uncertain, precipitation rates, amounts, and timing (i.e., precipitation falling in the form of snow or rain) has the potential to affect the operation of the Project.

As described in FEIS Section 4.6.13, cumulative air quality impacts from the FEIS Quarry site and other construction-related Project activities are anticipated to be negligible, particularly in comparison with other RFFAs that are producing regional emissions from ongoing development. Production of all sand and gravel aggregate material onsite would further minimize cumulative air quality impacts from both the FEIS Quarry site and Osprey Point Quarry site due to the reduction in construction truck trips.

Conclusion

The Corps/URS understand that recent engineering and geotechnical evaluations conducted by Denver Water confirmed that an on-site granite quarry could produce sand and gravel aggregate material and that only cement and flyash would need to be supplied from an off-site source (MWH Americas 2006). Additionally, it was determined that the location of the on-site quarry could be entirely encompassed on lands owned by Denver Water, thus eliminating quarry activities on NFS lands. Based on a review of the Report, the Corps/URS determined that the Osprey Point Quarry site would result in no impacts, have similar impacts as the FEIS Quarry site, or reduced impacts from the FEIS Quarry site due to a reduction in land disturbance and off-site haul trips. More specifically, it is anticipated that no impacts would occur to surface water, water quality, groundwater, aquatic biological resources, cultural/historic/paleontological resources, and hazardous material resources from the Osprey Point Quarry site. Additionally, it was determined that the following resources would have the same or similar impacts as those presented in the FEIS: geology, wetlands and riparian areas, noise, recreation, socioeconomics and special status species. Reduced impacts to several resources would occur due to the change in quarry location from the FEIS Quarry site to the Osprey Point Quarry site including soils, vegetation, wildlife, transportation, land use, visual, and air quality; this reduction in impacts is primarily associated with the Osprey Point Quarry site having a smaller surface area, the reduction in off-site haul truck trips, and improved post-construction scenic quality.

References


U.S. Environmental Protection Agency. 2016. AP-42: Compilation of Air Emission Factors, Section 11.9, Western Surface Coal Mining (for Blasting Calculation). October.