APPENDIX 1 – TECHNICAL REPORT
WHITNEY RESERVOIR SITING STUDY
WHITE RIVER NATIONAL FOREST
EAGLE COUNTY, COLORADO

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Figure 6. Track-mounted drill rig.

Figure 7. Buggy-mounted drill rig.

Figure 8. Typical UTV proposed for boring access.

Figure 9. Typical track-mounted skid steer for boring access.
Background
The cities of Aurora and Colorado Springs (Cities); Climax Molybdenum Company (Climax) (previously Cyprus Climax Metals Corporation); the Colorado River Water Conservation District (River District); and the Vail Consortium (Eagle River Water and Sanitation District, Upper Eagle Regional Water Authority, and Vail Associates, Inc.) (collectively, the River District and the Vail Consortium comprise the Eagle Park Reservoir Company) are parties to the 1998 Eagle River Memorandum of Understanding (ERMOU) to develop a joint use water project in the Upper Eagle River basin.

The ERMOU parties entered into the ERMOU to develop a joint use water project to provide critical water supplies to both East and West Slope water users, and for environmental purposes. The ERMOU allows for the development of a project or projects with an annual yield of 30,000 acre-feet (AF), from which the Cities would receive an average annual supply of 20,000 AF, Climax would receive 3,000 AF of reservoir storage space, and the Reservoir Company would receive 10,000 AF of firm annual water yield to meet critical West Slope water supply needs and provide water to enhance streamflow for environmental and recreation uses.

The cities of Aurora and Colorado Springs (Cities) are conducting a fatal-flaw level reservoir siting study. The objective of this study is to evaluate opportunities to construct reservoir storage to develop a portion of the yield contemplated in the ERMOU. Specifically, the subsurface explorations described below would provide valuable information regarding the suitability of the area for reservoir development. The Cities are currently considering and evaluating multiple reservoir sizes with potential storage capacities between 6,850 and 20,000 acre-feet. It is contemplated that the Cities would forego development of Homestake II project infrastructure in the Holy Cross Wilderness in reliance on the joint use project; to that end, the Cities have relocated all Homestake II water rights that were in the wilderness to locations outside the wilderness.

The proposed siting study and subsurface exploration to evaluate feasibility of dam construction on lower Homestake Creek is planned for summer and fall 2020.
**Proposed Action**

The project area is along Homestake Creek about 6 miles southwest of Redcliff, Colorado. Access to the area is along existing Forest Road (FR) 703 (Homestake Road) about 5 miles south of the intersection with State Highway 24. The proposed action for the feasibility study is limited to geologic mapping, geophysical survey, and subsurface exploration as described below. Subsurface exploration activities would not occur within designated Wilderness or Roadless areas. Geophysical survey activities would not occur within designated Wilderness areas and may occur within designated Roadless areas. Geologic mapping activities may occur within designated Wilderness and Roadless. No materials would be removed from Wilderness areas.

**Geologic Mapping**

Geologic mapping is performed to improve our understanding of the geology and refine the locations of borings. This work is conducted by two individuals traversing the area on foot for about one to two weeks. Vehicles are not taken off designated public roads and parking areas. This work primarily consists of observing, describing, and mapping different bedrock and soil units; using a handheld compass to measure the orientations of bedrock fractures; and collecting soil and bedrock samples. A manual rock hammer is used to test surface rock hardness and weathering characteristics. Rock fragments, typically less than the size of a baseball, may be broken off boulders or bedrock outcrops in non-Wilderness areas.

Except in Wilderness areas, soil and bedrock samples are collected from the site. Approximately six samples each of soil and bedrock type are collected. The soil samples are obtained from the ground surface. Soil samples would be approximately 1/2 gallon. Bedrock samples are obtained from boulders and cobbles on the ground surface. The maximum size of sampled bedrock is about the size of a basketball. No materials are removed from Wilderness areas.

Geologic mapping was completed in Fall 2019, according to the methods described above. No materials were removed from Wilderness areas.

**Geophysical Survey**

The geophysical survey would be performed approximately along the exploratory dam alignments for alternatives B and C as shown on Figure 1. Each of the
geophysical survey lines would be about 2,500 feet long. This work is anticipated to take about one to two weeks in summer 2020, after completion of the geologic mapping. The survey would be conducted by four individuals on foot. There would be no use of off-road vehicles. The geophysical survey consists of a seismic survey using geophones to record a seismic response from a seismic source point. Geophones would be located at approximately 20-foot intervals along the survey alignments at lengths up to about 940 feet at a time. Figure 2 shows a typical geophone.
Figure 1. Project area. North (downstream) is towards the upper right and the yellow scale bar is 1000 feet long. Orange lines represent approximate alternative dam alignments.
Multiple seismic source points spaced along the survey lines would be used. Each seismic source point would consist of a small charge attached to a wooden stake about 1 to 2 feet above the ground surface, which minimizes the potential for ground disturbance. The seismic source point would generate an instantaneous sound burst of approximately 170 decibels, which would diminish to about 110 decibels at a 0.50-mile distance. Approximately 10 seismic source points per day would occur during the fieldwork. Herbaceous vegetation near the seismic source point may be temporarily matted down, but not permanently damaged. Homestake Road traffic would be monitored and may be momentarily detained on the roadway a safe distance from the seismic source point when seismic source points are performed near the road. Minimal short-term surface disturbance from foot traffic and seismic source points would occur with geophysical survey work.

Figure 2. Typical geophone.
Subsurface Exploration

The subsurface exploration would consist of drilling up to 10 borings along the four exploratory dam alignments shown on Figure 1. The approximate boring locations for each dam alternative are shown on Figures 3 through 5. Table 1 includes the approximate coordinates of the proposed boring locations. The borings are anticipated to extend up to about 150 feet below the ground surface. Subsurface exploration is anticipated to be performed in summer or fall 2020, after or concurrent with the geophysical survey. Up to five days would be required for each boring. It is possible that the work could be completed in multiple periods that are months apart. Work would be limited to daylight hours. Field personnel would generally consist of one or two engineers and two drillers.

Table 1. Approximate locations of proposed borings.

<table>
<thead>
<tr>
<th>Boring ID</th>
<th>Latitude (decimal degrees)</th>
<th>Longitude (decimal degrees)</th>
</tr>
</thead>
<tbody>
<tr>
<td>A1</td>
<td>39.435009</td>
<td>-106.401119</td>
</tr>
<tr>
<td>A2</td>
<td>39.435055</td>
<td>-106.400336</td>
</tr>
<tr>
<td>A3</td>
<td>39.434746</td>
<td>-106.399460</td>
</tr>
<tr>
<td>A4</td>
<td>39.433375</td>
<td>-106.402785</td>
</tr>
<tr>
<td>A5</td>
<td>39.433153</td>
<td>-106.403802</td>
</tr>
<tr>
<td>B1</td>
<td>39.429687</td>
<td>-106.408967</td>
</tr>
<tr>
<td>B2</td>
<td>39.429307</td>
<td>-106.408670</td>
</tr>
<tr>
<td>D1</td>
<td>39.444538</td>
<td>-106.397105</td>
</tr>
<tr>
<td>D2</td>
<td>39.444216</td>
<td>-106.395564</td>
</tr>
<tr>
<td>D3</td>
<td>39.443334</td>
<td>-106.396503</td>
</tr>
</tbody>
</table>

Notes:
- Horizontal datum is WGS 84.
- Final locations may be modified based on local access conditions, geologic mapping, or geophysical survey data.
Figure 3. Approximate proposed boring locations (white circles) and access routes (yellow lines) for Alternative A.
Figure 4. Approximate proposed boring locations (white circles) and access routes (yellow lines) for Alternative B.
Figure 5. Approximate proposed boring locations (white circles) and access routes (yellow lines) for Alternative D.
The equipment needed for this work includes a standard pickup truck, a heavy-duty pickup pulling a flatbed trailer, and a semi-tractor and trailer. These vehicles would remain on designated roads and parking areas. Equipment that would be taken off-road to access boring locations consist of a track-mounted drill rig (Figure 6) or a buggy-mounted drill rig (Figure 7), a utility vehicle (UTV) (Figure 8) pulling a small trailer, and a track-mounted skid steer (Figure 9). The drill rigs are up to about 8 feet wide, 22 feet long, and 8 feet high. The mast on the drill rigs extends about 30 feet above the ground surface when it is raised.

Figure 6. Track-mounted drill rig.
Figure 7. Buggy-mounted drill rig.

Figure 8. Typical UTV proposed for boring access.
Access Routes

To accommodate vehicle access, approximately 10-foot-wide temporary ungraded/unimproved access routes would be required from existing roads to the boring locations. The approximate alignments of temporary access routes for the proposed borings are shown on Figures 3, 4, and 5 for Alternatives A, B, and D, respectively. These are approximate and it is possible that localized site conditions may require modification to these alignments. Final locations and access route alignments would be coordinated with the U.S. Forest Service (USFS) to achieve USFS goals and provide the necessary equipment access.

Traffic on Homestake Road would be controlled for borings located near the road. Borings would not be located within the road footprint of Homestake Road. To provide a safe work area on all sides of the drill rig for borings located near the road, traffic cones or other marking equipment and traffic control consisting of caution signs would be placed several hundred feet from the work area to warn approaching traffic in both directions and placed on the road at the boring site to direct traffic into one lane around
the work area. The traffic control measures are expected to be necessary for up to five days for each boring located near the road.

Access routes would be selected to reduce surface disturbance and vegetation removal, and to avoid identified or potential unexploded ordnances (UXOs) discovered during field surveys; however, some vegetation clearing and some tree removal may be required. The objective is to reduce tree cutting to the least number possible and to preferentially cut dead trees where possible. Access roads and tree cutting locations would be identified in the field prior to cutting any trees. A joint site visit with the USFS prior to cutting any trees would be conducted, if desired by the USFS and if scheduling allows. Cut trees and vegetation would be cut into 3-foot lengths and left on-site. Shrubs and low-growing vegetation up to about 3 feet high would be driven over rather than removed where possible.

No formal road surfacing (e.g., gravel) would be used. Earthwork with a bulldozer or excavator is expected to be necessary adjacent to Homestake Road near Alternative A, where the road embankment grade is approximately 1 horizontal to 1 vertical (1H:1V). An earthen ramp with a grade of about 2H:1V would be constructed from the road grade to the adjacent ground surface about 6 feet below. Disturbed areas would be reclaimed to approximate the original topography and seeded as requested by the USFS. In access to areas other than Alternative A as described above, the access routes are not expected to require any grading. Some removal of obstacles such as trees and rocks may be required, but slope shaping or other ground disturbance is expected to be minimal or not required at all.

**Borings**

Boring sites would be located within the access routes, where possible, to reduce the area of disturbance. At each boring location, surface vegetation would need to be cut within an area of about 20 feet by 40 feet to provide space to park the drill rig, to place drill rods and tools, to enable operational and safe working conditions around the drill rig, and to provide overhead clearance of about 30 feet that is required for raising the drill rig mast. Vegetation would be cut/trimmed to a height of about 6 inches above the top of the ground along access roads and within the 20 by 40 foot work area. No grubbing and minimal ground disturbance would occur at the root zone. The extent and amount of
vegetation cutting/trimming would be minimized through coordination with the USFS and implementation of best management practices (BMPs; see BMP section).

The borings would be conducted using augers, ODEX, or rotary techniques. Drill rigs would operate continuously during the day and would emit noise at the source of drilling from about 80 to 100 decibels. If used, an auger or ODEX casing would create an 8-inch-diameter hole with soil brought to the ground surface around the boring. Rotary techniques would produce a boring that is less than about 4 inches in diameter. Rotary techniques involve pumping water down hollow drill rods that are used to advance the boring. The water flows around a drill bit at the end of the drill rods and out into the boring, returning to the ground surface in the annular space between the drill rods and boring wall. The circulating water carries the cuttings (soil and bedrock material) out of the boring. The circulating water and cuttings are collected in a mud tank (approximately 200-gallon steel tank) at the ground surface. The cuttings settle out of the water in the tank and the drill rig recirculates the water from the mud tank.

Packer testing would be performed within the bedrock portion of the borings. This involves inflating a rubber seal near the bottom of the boring to isolate the bottom section of the boring. Water is then injected into the isolated section of the boring under pressure and the rate of injection is used to calculate the permeability of the bedrock.

Water for rotary drilling techniques and Packer testing would be obtained from Homestake Creek or other nearby bodies of surface water. Water would be pumped from the source and conveyed to the boring location in hoses or in tanks. The amount of water would depend on the permeability of the bedrock but is anticipated to range from a few hundred gallons to a few thousand gallons per day. Most water would be recharged into the ground water via the bore hole. Minor (<100 gallons per bore) incidental water discharge would occur on the surface from spillage and drainage of the mud tank. Drill cuttings that accumulate at the ground surface or in the mud tank would be disposed of at each boring location by spreading them out on the adjacent ground surface (an area about 10 feet in diameter). No cuttings would be placed in wetlands. The anticipated quantity of cuttings is less than 10 cubic feet per boring. The bore hole would be filled from the
bottom to about 2 feet below the ground surface with cement-bentonite and the remaining 2 feet backfilled with native earth material from the boring.

**Best Management Practices**

BMPs would be implemented throughout planned geotechnical work to minimize impacts on environmental and cultural resources. The following paragraphs contain general and resource/activity specific BMP details.

**General Measures**

The work area limits would be clearly defined to keep ground disturbance and vegetation removal to a minimum. No disturbance would occur beyond these limits. Work would be limited to daylight hours.

**Unexploded Ordnance**

Unexploded ordnances (UXOs) may be present within the work area from previous military training activities performed at Camp Hale. UXO surveys would be performed by field personnel to ensure the safety of the field personnel.

During geologic mapping, field personnel performed a visual surface clearance for UXOs as they are traversing the work area. However, there is no intention to perform a comprehensive search for UXOs throughout the area identified on Figure 1. If UXOs are identified, their locations would be avoided during fieldwork. The UXO locations would be documented by flagging in the field and recording GPS coordinates, and the locations would be reported to the USFS or another appropriate agency. Field personnel would avoid activities that intrude beneath the ground surface during UXO surveys.

A geophysical magnetic survey would be performed along the proposed alignment of the geophysical seismic survey prior to placing any stakes or geophones to investigate for UXOs for the safety of field personnel. The magnetic survey would be performed using an all-metals detector, which proved successful during an earlier phase of investigation at differentiating between rocks that emit a magnetic response and anthropogenic metallic debris. Site information would be reviewed by geophysical specialists who have experience with UXO detection, and a Site-specific Health and Safety Plan would be developed with requirements for the extent of the
magnetic survey. At a minimum, it is anticipated that the magnetic survey would be performed at the location of each geophone and within a 50-foot radius of each geophysical seismic source point. If any magnetic anomalies are identified by the magnetic survey, their locations would be avoided during the seismic survey. The locations of the magnetic anomalies and any identified surface UXOs would be documented by flagging in the field and recording GPS coordinates. The locations of magnetic anomalies and identified surface UXOs would be reported to the USFS or another appropriate agency.

During the layout of temporary access routes and boring locations, field personnel would perform a visual surface clearance of UXOs as they traverse the work area. Before constructing the temporary access routes or drilling a boring, a metallic debris survey would be performed using an all-metals detector to identify potential subsurface UXOs. It is anticipated that the survey would encompass a 15- to 20-foot-wide swath along the temporary access routes and a 50-foot radius around each proposed boring location. Any metallic debris detected during the UXO survey would be flagged and the GPS coordinates recorded and reported to the USFS or another appropriate agency. The alignment of the access route and boring locations would be moved as necessary to avoid the UXO locations, in coordination with the USFS. No metallic debris would be unearthed or investigated further.

**Revegetation and Erosion Control**

Best management erosion-control and revegetation measures would be implemented during and following completion of boring. The track-mounted drill rig, UTV, and other equipment used off-road would be pressure washed and/or steamed cleaned before entering the national forest to prevent the introduction of nonnative plant species. BMPs and responsible environmental considerations such as using logs, wood mats or other non-erodible materials would be implemented to reduce ecological impacts. No work would be conducted when soils are excessively wet to reduce the potential to form deep ruts in the ground. A UTV and a track-mounted drill rig would be used to reduce the risk for compacting or rutting the ground, and to reduce impacts on vegetation cover. All equipment would be maintained in a clean and well-functioning state to avoid or reduce the risk of contamination from fluids or fuels. All
disturbed ground would be reclaimed using USFS-approved BMPs including reseeding with native plant species.

**Wildlife**

Trees would be removed outside of the breeding season (March 15 to August 1 or as defined by the USFS) if feasible, or nest surveys would be conducted prior to tree removal to avoid impacts on migratory birds. All proposed geotechnical activities would occur outside of the elk calving season (May and June).

**Wetlands**

Wetlands would be avoided during construction of temporary access routes to the extent possible and boring sites would be located outside of wetlands. Where avoidance of a wetland is not possible, wood mats made from trees, plywood, or other temporary structures may be used to protect wetlands during the short period of access travel. The drill rig, UTV, and skid steer would drive across Homestake Creek in areas where the streambank is gradual and water is low enough for safe travel. If a gradual streambank approach is not present, a temporary ramp would be constructed using logs, wood mats or other non-erodible materials. BMPs and responsible environmental considerations would be implemented to reduce ecological impacts. The timing of such work would be coordinated to provide a safe streambank approach and reduce the potential to erode the stream bank or introduce sediment into the stream. The temporary ramp or wood mats would be removed when the proposed work is complete. Where temporary wetland or waters disturbance is unavoidable, applicable 404 permitting would be secured from the U.S. Army Corps of Engineers (Corps). Crossing of Homestake Creek would occur in late summer or fall when stream flows are seasonally low. During boring activities, no drilling would occur in wetlands, and no cuttings or other material would be placed in wetlands, except in the temporary, protective manner described above (e.g., wood mats).

**Cultural Resources**

A Class III cultural resource field survey would be conducted in the area of potential effect (as identified in coordination with the USFS archaeologist) prior to disturbance for the temporary access route and borings, or a cultural resources monitor would be employed during site access as required by USFS. Survey or monitoring results would be used to modify the location of boring sites and the access route or to implement
appropriate mitigation measures, in coordination with the USFS. The results of the survey would be provided to the Colorado State Historic Preservation Office (SHPO) for concurrence. Should previously unknown cultural resources be encountered during proposed activities, work would be halted in the discovery area and the White River National Forest archaeologist would be consulted according to 36 CFR 800.13.

**Potential Resource Effects**

**Federally Listed Threatened or Endangered Species**

Several federally listed threatened or endangered species potentially occur in or downstream from the project area based on the U.S. Fish and Wildlife Service (USFWS) Information, Planning, and Conservation website (Table 2). Only Canada lynx has potential habitat in the vicinity of the project area. Colorado River endangered fish species are located downstream from the project area. There is no critical habitat for lynx or other federally listed species in the project area.

**Table 2. Federally listed, candidate, and proposed species potentially occurring in the proposed project area.**

<table>
<thead>
<tr>
<th>Common Name</th>
<th>Scientific Name</th>
<th>USFWS Status</th>
<th>State Status</th>
<th>Suitable Habitat and Potential to Occur in the Project Area?</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Mammals</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Canada lynx</td>
<td><em>Lynx canadensis</em></td>
<td>T</td>
<td>SE</td>
<td>Yes</td>
</tr>
<tr>
<td>North American wolverine</td>
<td><em>Gulo luscus</em></td>
<td>PT</td>
<td>SE</td>
<td>No</td>
</tr>
<tr>
<td><strong>Birds</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Greater sage-grouse</td>
<td><em>Centrocercus europhasianus</em></td>
<td>C</td>
<td>SC</td>
<td>No</td>
</tr>
<tr>
<td>Mexican spotted owl</td>
<td><em>Strix occidentalis lucida</em></td>
<td>T</td>
<td>ST</td>
<td>No</td>
</tr>
<tr>
<td>Yellow-billed cuckoo</td>
<td><em>Coccyzus americanus</em></td>
<td>C</td>
<td>SC</td>
<td>No</td>
</tr>
<tr>
<td><strong>Fish</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bonytail chub*</td>
<td><em>Gila elegans</em></td>
<td>E</td>
<td>SE</td>
<td>No</td>
</tr>
<tr>
<td>Colorado pikeminnow*</td>
<td><em>Ptychocheilus lucius</em></td>
<td>E</td>
<td>ST</td>
<td>No</td>
</tr>
<tr>
<td>Greenback cutthroat trout</td>
<td><em>Oncorhynchus clarki stomias</em></td>
<td>T</td>
<td>ST</td>
<td>No</td>
</tr>
<tr>
<td>Humpback chub*</td>
<td><em>Gila cypha</em></td>
<td>E</td>
<td>ST</td>
<td>No</td>
</tr>
<tr>
<td>Razorback sucker*</td>
<td><em>Xyrauchen texanus</em></td>
<td>E</td>
<td>SE</td>
<td>No</td>
</tr>
<tr>
<td><strong>Plants</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ute ladies'-tresses orchid</td>
<td><em>Spiranthes diluvialis</em></td>
<td>T</td>
<td>-</td>
<td>No</td>
</tr>
</tbody>
</table>

E = Federal Endangered; T = Federal Threatened; C = Federal Candidate; P = Federal Proposed; PE = Federal Proposed Endangered; PT = Federal Proposed Threatened; SE = State Endangered; ST = State Threatened; SC = State Special Concern.  
*These fish species may be affected by water depletions in the Colorado River Basin.  
Source: USFWS 2013; Colorado Natural Heritage Program (CNHP) 2012.
Canada Lynx. Work areas are located primarily in lynx summer foraging habitat and non-habitat. Surrounding lands provide areas of winter foraging, denning habitat and non-habitat. Human activity and noise during the summer associated with the reservoir siting study could temporarily deter lynx activity near the project area. Proposed boring operations and vegetation clearing for access would have minimal impacts on vegetation communities used by lynx prey species such as snowshoe hare. No impacts on lynx are anticipated from the proposed work because much of the activity would occur near Homestake Road, a well-traveled recreation access road. Work would be conducted over a short period (approximately five to six weeks), and impacts on potential habitat would be negligible.

Colorado River Endangered Fish. Bonytail chub, Colorado pikeminnow, humpback chub, razorback sucker, and their designated critical habitat are located downstream of the project area on the Colorado River. Proposed use of Homestake Creek water for boring operations would be recharged back into the watershed with no depletions to the Colorado River that would impact downstream Colorado River fish.

Forest Service Sensitive Species

Forest Service Sensitive Species potentially occurring in or near the project area are listed in Table 3. The project area and immediately surrounding area support vegetation communities and habitat characteristics that may be used by sensitive mammals, birds, and amphibians. Noise from boring operations could potentially affect bird foraging and nesting near the project area. Vegetation and tree clearing to provide access for boring could potentially affect nesting sites for birds. Boreal toads and northern leopard frogs potentially occur in small ponds, riparian areas, and streams.

Direct effects on bird habitat would be avoided by conducting nest surveys prior to vegetation removal or by removing trees outside of the breeding season, if feasible. Birds and mammals may avoid the project area as a result of human activity and noise. Reservoir siting activities may have short-term adverse effects on individuals, but the actions are not likely to cause a trend toward federal listing or a loss of species viability rangewide.

Direct effects on riparian habitat would be minimal. Crossings of Homestake Creek
would be transient (less than 2 minutes per crossing) and occur over a short period
(estimated to be less than 5 days for the completion of one boring). In total, it is expected
that equipment would take one trip to the bore site and one return trip back to Homestake
Road. No long-term effects on riparian habitat are anticipated from the proposed work
because the natural streambank would not be altered, and temporary environmental
protection measures would be removed after work is complete. While vegetation would
be trimmed, no grubbing involving disturbance of the root wads of shrubs or root zone of
herbaceous plant communities would occur.

**Table 3. Forest Service Sensitive Species potentially occurring in the project area.**

<table>
<thead>
<tr>
<th>Common Name</th>
<th>Scientific Name</th>
<th>Suitable Habitat and Potential to Occur in the Project Area?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Boreal owl</td>
<td><em>Aegolius funereus</em></td>
<td>Yes</td>
</tr>
<tr>
<td>Boreal toad</td>
<td><em>Bufo boreas</em></td>
<td>Yes</td>
</tr>
<tr>
<td>Brewer’s sparrow</td>
<td><em>Spizella breweri</em></td>
<td>Yes</td>
</tr>
<tr>
<td>Marten</td>
<td><em>Martes Americana</em></td>
<td>Yes</td>
</tr>
<tr>
<td>Northern goshawk</td>
<td><em>Accipiter gentilis</em></td>
<td>Yes</td>
</tr>
<tr>
<td>Northern leopard frog</td>
<td><em>Rana pipiens</em></td>
<td>Yes</td>
</tr>
<tr>
<td>Olive-sided flycatcher</td>
<td><em>Contopus borealis</em></td>
<td>Yes</td>
</tr>
<tr>
<td>Purple martin</td>
<td><em>Progne subis</em></td>
<td>Yes</td>
</tr>
<tr>
<td>Mountain sucker</td>
<td><em>Catostomus platyrynchus</em></td>
<td>Yes</td>
</tr>
<tr>
<td>Flammulated owl</td>
<td><em>Otus flammeolus</em></td>
<td>Yes</td>
</tr>
</tbody>
</table>

**Wildlife**

The project area contains suitable habitat for a variety of mountain-dwelling wildlife
species such as black bear, coyote, red fox, mountain lion, long-tailed weasel, porcupine,
yellow-bellied marmot, vole, squirrel, and deer mouse. Noise and disturbances
associated with the reservoir siting study may displace some wildlife from the project
area, but disturbances would be short-term, and no adverse impacts on habitat are
anticipated.

The project area is located within the Forest Management Area designation 5.41 for
deer and elk winter range. Forest and non-forest habitats are managed to provide forage,
cover, and solitude for deer, elk, and other species for winter. The proposed action would
not impact winter and early spring deer and elk use in the project area since all activities
would occur during the summer and early fall. Limited vegetation clearing for boring
access would not adversely impact foraging and cover habitat available for deer and elk.
All proposed activities would occur outside of the elk calving season.
The project area also contains habitat for Forest Service Management Indicator Species (MIS). Potential MIS species occurring in the project area include elk, trout, and macroinvertebrate communities present in Homestake Creek. Potential impacts on elk from the proposed action would be limited as described above. Small water withdrawals from Homestake Creek for boring would have negligible impacts on trout and macroinvertebrate species. Driving the drill rig, UTV, and skid steer across the creek would have transient (less than 2 minutes per crossing) and minimal disturbance on aquatic resources, and the natural streambanks would not be altered.

**Floodplains, Wetlands, Water Resources, and Municipal Watersheds**

The project area is located along Homestake Creek downstream from Homestake Reservoir. Homestake Creek is a perennial drainage with peak flows occurring during snowmelt runoff during the spring and early summer. Homestake Creek, which is tributary to the Eagle River, provides water for municipal, irrigation, and other downstream water uses. No Federal Emergency Management Act defined floodplains are in the project area, but portions of the proposed access route and boring locations span Homestake Creek and any associated floodplain. Wetland mapping conducted by ERO Resources Corporation in 2016 and USFWS National Wetland Inventory mapping indicate there are scattered scrub-shrub and herbaceous wetlands along the Homestake Creek Valley.

The proposed siting study would have no impact on floodplain functions. Temporary off-road vehicle access for borings would not result in changes to the topography or introduce new structures in the floodplain that would change or increase the risk of flooding.

Potential impacts on wetlands would be avoided during construction of temporary access routes to the extent possible and boring sites would be located outside of wetlands. If field conditions result in a situation where avoidance of a wetland is not possible, wood mats made from trees, plywood, or other temporary structures may be used to protect wetlands during the short period of travel. The drill rig, UTV, and skid steer would drive across Homestake Creek in areas where the streambank is gradual and water is low enough for safe travel. If a gradual streambank approach is not present, a temporary ramp would be constructed using logs, wood mats or other non-erodible materials. BMPs
and responsible environmental considerations would be implemented to reduce ecological impacts. The timing of such work would be coordinated to provide a safe streambank approach and reduce the potential to erode the stream bank or introduce sediment into the stream. In addition, if requested by USFS, an independent biological monitor would be hired to be onsite during creek crossings and riparian clearing, to ensure any adjustments to crossings do not materially affect waterways, riparian areas, or wetlands.

All equipment and temporary structures would be removed following completion of subsurface exploration, and disturbed areas would be reseeded and restored using native plant species. The appropriate 404 permit would be acquired from the Corps, and the USFS would be notified, prior to implementation of wetland protection measures or earthwork in wetlands or below the ordinary high water mark of Homestake Creek.

Water pumped from Homestake Creek for subsurface exploration would be recharged to ground water through the bore hole or incidental spillage on the ground surface. As a result, there would be negligible consumptive use of the water that would impact downstream water rights or water for municipal or other uses. Projected pumping from Homestake Creek during the drilling period of up to several thousand gallons per day would have negligible impacts on streamflow or aquatic habitat. Streamflow in Homestake Creek, as measured at the Red Cliff gage downstream from the project area, averages about 75 cubic feet per second (cfs) in July, 36 cfs in August, and 21 cfs in September during months when the water would be used. Water pumped from Homestake Creek during drilling would amount to less than 0.01 cfs, a small fraction of average flows.

Vegetation

The Homestake Creek drainage consists of stands of mature pine-spruce forest with intermixed meadows, granite outcrops, and wetlands. The forest canopy is dominated by lodgepole pine with occasional aspen. The understory is generally open and consists of mountain brome, plantain, serviceberry, needlegrass, elk sedge, and kinnikinnick, among other species. Cutting or trimming a route for drill rig access and surface boring would require limited tree removal, tree limb pruning, and vegetation cutting/trimming of larger shrubs. Trimming or cutting of vegetation at the boring
sites and along access routes to about 6 inches above the ground surface is necessary to access the sites and to provide space to park the drill rig, to place drill rods and tools, to enable operational and safe working conditions around the drill rig, and to provide overhead clearance of about 30 feet that is required for raising the drill rig mast. Grubbing or removal of root wads or impacts to the root zone is not anticipated. Impacts on vegetation would be avoided to the extent feasible when locating the access route and boring locations, in coordination with the USFS. Cut or trimmed vegetation would be left in place and any exposed soil would be revegetated upon completion of actions. Crushed or trampled vegetation is expected to recover quickly. No significant impacts on vegetation are anticipated because of the limited trimming/cutting, lack of impacts to the root zone, and planned revegetation/seeding efforts.

**Congressionally Designated Areas – Wilderness, Wilderness Study Areas, Roadless, or National Recreation Areas**

The project area is located southeast of the 113,841-acre designated Holy Cross Wilderness. No national recreation areas are in the vicinity of the project area.

Subsurface exploration activities would not occur within designated Wilderness or Roadless areas. Geophysical survey activities would not occur within designated Wilderness areas and may occur within designated Roadless areas. Geologic mapping activities may occur within designated Wilderness and Roadless areas. There would be no direct disturbance to Wilderness or Roadless areas. No materials would be removed from Wilderness areas. Noise from preparation of an access route and drilling operations would carry into the wilderness area for a short period. The effects on the Wilderness character would be minimized because drilling activity near the Wilderness would be conducted in a short amount of time. Noise from exploration-related activities would result in a short-term effect on Wilderness values, such as solitude. However, because no trails or defined Wilderness access points are near the project area, the effect on the quality of the Wilderness experience from proposed activities would only be slightly diminished.

**Research Natural Areas**

No Research Natural Areas are near the project area.
Archaeological Sites, Historic Properties, or American Indian Cultural Sites

Colorado SHPO cultural files indicate the presence of several cultural resource sites near the project area. [ERO Resources online SHPO file search available upon request]. A Class III cultural resource field survey would be conducted for the temporary access route and boring sites prior to disturbance, or a cultural resources monitor would be employed during site access as required by USFS. Survey or monitoring results would be used to modify the location of boring sites and the access route or implement appropriate mitigation measures, in coordination with the USFS. The results of a survey would be provided to the Forest Service and Colorado SHPO. Should previously unknown cultural resources be encountered during proposed activities, work would be halted in the discovery area and the White River National Forest archaeologist would be consulted according to 36 CFR 800.13.

Recreation

Homestake Creek Road (FS 703) provides access to popular recreational activities including the Gold Park Campground, trailheads into the Holy Cross Wilderness, and Homestake Reservoir. Popular summer recreation in the area includes camping, hiking, fishing, and boating on Homestake Reservoir; wildlife viewing; and other recreational activities. The recreational opportunity spectrum for the project area is semiprimitive nonmotorized or semiprimitive motorized in the summer/fall.

Proposed activities associated with the reservoir siting study would have limited impacts on recreational access and activities. Homestake Road would remain open, although closure of a single lane for two to three days may cause short-term travel delays. Work would be completed during the week, avoiding the busier weekend times.

Access route clearing and borings would introduce elevated noise levels for short periods that may have a slight impact on the quality of the visitor experience. No trails or designated recreation sites are in the immediate project area vicinity; however, fishing may occur anywhere along Homestake Creek. The closest trail is about 3 miles west of the project area. The Gold Park Campground is about 3.5 miles from the Alternative B alignment and about 2.3 miles from the Alternative D alignment. Noise from drilling operations would attenuate to less than 50 decibels at the Gold Park Campground and
would not be noticeable. It is anticipated that vegetation and terrain would attenuate noise to levels lower than estimated.

**Geology and Soils**

Clearing a path for drill rig access and boring would result in some surface disturbance to the soil from vegetation clearing and travel by a track-mounted drill rig, UTV, and skid steer. Earthwork requiring the use of a dozer would only occur where slopes greater than 2:1 are encountered. Borings would result in small areas of disturbance to subsurface geologic material from drilling. Bore holes would be filled from the bottom to within about 2 feet of the ground surface with cement-bentonite and the final 2 feet backfilled with native soil. Revegetation would be used to reclaim temporary soil disturbance from the proposed action. Minor removal of soil and geologic samples and continuous core samples of bedrock from subsurface borings would not adversely impact any important, scenic, or economic geologic features. No materials would be removed from Wilderness areas.

**Scenic Quality**

The scenery in the project area is managed to provide a range of scenic integrity objectives from low to moderate. The proposed action would result in selective vegetation clearing to allow access by the drill rig and conduct boring operations. Ground disturbance would be minimized to avoid exposing soils. All temporarily disturbed areas would be seeded with native species following operations. Vegetation clearing and disturbance, as well as equipment operations, may be observable near Homestake Road. No long-term impacts on scenic quality are anticipated upon completion of the proposed action and revegetation of any disturbed areas.

**Findings Required by Other Laws and Regulations**

The proposed action was developed to be consistent with the White River Forest Land Management Plan (Forest Plan). The project was designed in conformance with Standards and Guidelines for Management Area prescriptions. The project area is located in Management Area 5.41, with a prescription for deer and elk winter range. Vegetation composition and structure are managed to meet the needs of deer, elk, and other species on their winter range in this Management Area. The proposed action is
consistent with resource standards and guidelines for Management Area 5.41 and should not require any revisions to the Forest Plan.

**Clean Air Standards**

The project area is currently in attainment with National Ambient Air Quality Standards. The proposed action would be in compliance with air quality statutes in the Forest Plan.

**Clean Water Act**

The proposed action would be in compliance with the Clean Water Act. Impacts on wetlands and waters of the U.S. would be avoided by the use of temporary construction mats. No fill in wetlands or loss of waters of the U.S. would result from the proposed action.

**National Historic Preservation Act**

In accordance with the National Historic Preservation Act, a cultural resource survey would be conducted prior to disturbance to identify any historic properties. The results would be provided to the National Forest and SHPO.

**Endangered Species Act**

Based on an analysis of potential effects to species protected under the Endangered Species Act, the proposed action would have no effect on Canada lynx, Colorado River endangered fish, or other federally listed threatened or endangered species. The project would result in minor vegetation disturbance and activity in lynx summer foraging range but is not anticipated to impact lynx. There would be negligible, minor, immeasurable water depletions from Homestake Creek associated with drilling operations and, thus, no impacts are anticipated on bonytail chub, humpback chub, pikeminnow, and razorback sucker located downstream of the project area in the Colorado River.

**References**

