

Appendix E.2

Avoidance, Minimization, and Compensatory Mitigation Measures for the Preferred Alternative

Some documents included in this are provided as they were originally produced and may not fully comply with Section 508 of the Rehabilitation Act. These materials include third-party reports, historical documents, maps, and technical drawings that cannot be readily converted into accessible formats.

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E.2 Avoidance, Minimization, and Compensatory Mitigation Measures for the Preferred Alternative

E.2.1 Temporary Access

Prior to construction, COID would contact adjacent landowners to discuss the Project. Landowners would be provided a construction schedule before construction begins. Where possible, work would be confined to existing and new easements. In addition, construction limits would be clearly flagged to preserve existing vegetation and prevent trespassing on private property. Access to residences and farms would be maintained during construction. Construction would occur during the daytime and primarily in the nonirrigation season to minimize disturbance to landowners or other individuals in the construction area vicinity. Following project completion in an area, temporary construction access routes would be decommissioned, restored to original contours, and reseeded.

E.2.2 Staging, Storage, and Stockpiling

Mechanized equipment and vehicles would be selected, operated, and maintained in a manner that minimizes adverse effects on the environment. Construction staging areas would be selected and used to minimize effects on vegetation and avoid tree removal. The use of construction vehicles and equipment within 150 feet of streams would be minimized to the greatest extent practicable. Fueling and maintenance operations would be performed on flat surfaces, away from moving equipment, and at least 150 feet away from any water source.

E.2.3 Noise and Vibration

Mitigation of potential construction noise impacts would incorporate low-cost, easy-to-implement measures into project plans and specifications (for example, requiring equipment mufflers and prohibiting the use of air brakes).

Construction time constraints would be determined at the time of project construction. However, according to the local noise ordinances, construction work conducted between 10 p.m. and 7 a.m. would require special permits prior to conducting construction activities.

Blasting must comply with all applicable federal, state, and local regulations and be supervised by a licensed blaster. Activities should only be conducted when deemed necessary and under the direction of qualified personnel designated by the project engineer.

It is recommended that the Project provide a separate blasting plan for each cut that requires blasting, prepared by a person qualified and experienced in blasting. Blasting in the mass of rock to be excavated shall be designed to control flyrock, minimize ground vibration and air blast, and result in loosened and fragmented in-place rock of a size that can be removed, transported, or crushed.

The blasting plan should include recommendations and methods to accomplish the following:

- Lay out production blast holes in a consistent pattern that does not affect the perimeter-control blast holes.
- Use techniques that effectively limit and control flyrock.
- Clear the site of all boulders or other material prior to beginning blasting.
- Cover all blast areas that are within 200 feet of residences, facilities, or aboveground utilities using appropriate blast containment mats.

- Notify all owners and occupants of buildings, structures, and utilities that are within 1,250 feet of the blasting areas.
- Provide notification, in writing, once, at least 48 hours before blasting begins and again on the day the blasting operations occur.

E.2.4 Right-of-Way, Displacements, and Relocations

For properties that would experience permanent impacts, compensation and relocation assistance would mitigate the effects on affected property owners and tenants. Federal and state regulations require that property be purchased at fair market value.

Mitigation for temporary construction impacts may include BMPs to reduce noise and vibration, such as equipment mufflers and limiting construction times to certain hours. Affected portions of public and private properties would be returned to their original condition following construction. Additional mitigation for construction easements could include payment to property owners in exchange for use of their property during construction. Access to impacted properties would be maximized to the extent possible, and specific provisions, including signing indicating businesses are open, would be made available.

E.2.5 Roads and Traffic Control

Impacts to traffic due to construction cannot be avoided due to the nature of the Project. Measures would be taken to appropriately detour traffic and coordinate with other nearby projects. Maintenance of traffic plans would be developed as part of final design. This would include wayfinding signs for alternative vehicle and pedestrian routes around the construction zones. Additionally, nearby landowners and residents would be notified of planned construction activities affecting their access.

Standard construction safety procedures and traffic control measures would be employed to reduce the risk of collisions between construction vehicles and other vehicles while construction is ongoing. Lane closures on roadways would be avoided during peak travel periods to the greatest extent possible to reduce potential traffic delays from construction vehicles.

E.2.6 Erosion Control

Silt fencing, straw wattles, geotextile filters, straw bales, or other erosion control measures would be used to minimize soil erosion and prevent eroded soil from entering waterbodies during construction. Erosion control measures would be free of weeds and weed seeds. Drainage measures would be incorporated into the engineering design to minimize effects of piping ditches on local flooding. Construction would occur during the nonirrigation season so that there is no water within the canal.

E.2.7 Utilities

Construction-related impacts to the existing utilities within the alignments of the Project would not be avoidable. The following measures for water mains and service lines would be taken to minimize impacts to utility service during construction:

- If the connection to the existing system involves a temporary water system shutoff, provide written notices to the residents affected by the shutoff a minimum of 72 hours before the shutoff.

- Once work is started on a connection, proceed continuously without interruption and as rapidly as possible until completed.
- Schedule main shutoffs to ensure that mains do not remain shut off overnight, on Fridays, over weekends, or on holidays.
- Make service connections to water mains according to the recommendations of the pipe manufacturer and appropriate American Water Works Association standard for water service installation.
- Install water service connections as continuous without splices between the main and the meter unless otherwise approved by the agency with jurisdiction.
- Verify the locations of the existing service connections and meter assemblies in the field.
- Install water service assemblies to match finished lines and grades, and maintain proper clearances and cover for the entire service connection.
- Adjust the meter box to the finished grade after the surface has been acceptably restored. When meter boxes are to be installed in driveways or a vehicle-traveled way, use approved traffic-rated meter boxes.

The following measures to minimize impacts for sewer service interruptions would be taken:

- Bypass pump sanitary sewer and stormwater flows around the pipe section or manhole being repaired or replaced by plugging an existing upstream manhole and pumping the flow around the work area to a downstream manhole.
- Submit a bypass pumping plan at least 48 hours before beginning bypass pumping.
- Use a pump with adequate capacity to handle existing flows and additional flow due to rain.
- Pumps shall not exceed a noise level of 86 dB at a distance of 50 feet.
- Do not operate bypass pumps at night except in an emergency.
- Do not discharge raw sewage onto private property, city streets, or into storm drain systems.

The following measures to minimize impacts for natural gas service interruptions would be taken:

- If the connection to the existing system involves a temporary natural gas system shutoff, provide written notices to the residents affected by the shutoff a minimum of 72 hours before the shutoff.
- Each disconnected service line must be tested in the same manner as a new service line before being reinstated.
- Each service line temporarily disconnected from the main must be tested from the point of disconnection to the service line valve in the same manner as a new service line before reconnecting.
- If provisions are made to maintain continuous service, such as by installation of a bypass, any part of the original service line used to maintain continuous service need not be tested.

The following measures to minimize impacts for electrical service interruptions would be taken:

- If the connection to the existing system involves temporary electrical shutoff, provide written notices to the residents affected by the shutoff a minimum of 72 hours before the shutoff.
- Planned electrical power outage notification would indicate the approximate duration of the power outage and what hours the power outage is anticipated to occur between.

E.2.8 Soils and Geology

The engineer of record should coordinate with the project geologist to plan a targeted geologic investigation of subsurface variability, depth to bedrock, trench stability, erosion, seepage, and groundwater risks to support design-phase planning.

E.2.9 Piping Resiliency

The pipe and associated trench would be designed to allow for long-term stability of the pipe and minimize potential loss of irrigation water to leakage. Mitigation measures include the following:

- Place geomembrane securely to minimize potential for shifting over time (a geotextile liner would be installed in the trench, followed by pipe bedding and the pipe).
- Compact fill material adequately to support the weight of planned vehicle and railroad traffic.
- Provide additional reinforcement as recommended by project engineers.

E.2.10 Revegetation and Visual Restoration

During excavation, topsoil would be saved and replaced as the top layer after trenches are filled. Areas disturbed for access purposes or during construction would be regraded to their original contours. When necessary, compacted areas such as access roads, stream crossings, staging, and stockpile areas would be loosened to facilitate revegetation and improved infiltration. Disturbed areas would be planted with a native seed mix appropriate to the habitat. Revegetation practices would follow the NRCS *Oregon and Washington Guide for Conservation Seedings and Plantings* (NRCS 2000). Costs of revegetation are included in project installation cost estimates. Pruning and tree removal would occur entirely within the ditch easement and would not exceed what is required for equipment clearance.

Mitigation for long-term visual and aesthetic impacts may incorporate measures to create visual interest in the alignment where the canal was visible before piping. This may include measures such as seeding with native plants or installation of landscaping, depending on the setting. Recreation uses such as linear parks or trails may be created along the alignment. The alignment may be used for the installation of public art or other aesthetic features that provide visual interest.

E.2.11 Hazardous Materials

A project-wide construction health and safety plan would minimize the potential for exposure of construction workers to hazardous materials and the risk to human health and the environment. Health and safety plans are required by federal Occupational Safety and Health Act regulations and state regulations.

A site-specific contaminated media management plan would ensure proper characterization, management, storage, disposal, and reporting of contaminated materials encountered during

construction activities. The plan could outline the roles and responsibilities of personnel; health and safety requirements; methods and procedures for characterizing, managing, storing, and disposing of waste; and reporting requirements.

E.2.12 Spill Prevention, Control, and Countermeasures

Spill kits would be located at fuel storage areas, and construction crews would have adequate absorbent materials and containment booms on hand to enable rapid cleanup of spills. Immediately upon learning of any spills of fuel, oil, or hazardous material, or upon learning of conditions that could lead to an imminent spill, the person discovering the situation would initiate actions to contain the fluid or eliminate the source of the spill and notify the spill coordinator or crew foreman immediately. If it is determined that a spill is beyond the scope of on-site equipment and personnel, an environmental emergency response contractor would be contacted immediately to contain or clean up the spill. Any spill into a waterbody or along the adjacent streambed would be reported immediately to the Oregon Emergency Response Service at 1-800-452-0311 and the National Response Center at 1-800-424-8802. The spill coordinator would complete a spill report form for each release of a regulated substance, regardless of volume.

E.2.13 Invasive Species Control

The following measures would be taken to avoid the introduction of invasive plants and noxious weeds into project areas.

- Inspect gear and equipment to be used in or near water for aquatic invasive species.
- Limit ground disturbance to those areas necessary to safely implement the Preferred Alternative.
- Begin activities in areas not characterized by invasive plants or noxious weeds before operating in infested areas.
- Use areas that are free of invasive plants or noxious weeds for staging, parking, and cleaning equipment. Avoid or minimize all types of travel through infested areas and restrict travel to those periods when the spread of seed or plant reproductive parts is least likely.
- Schedule soil work in infested roadsides or ditches during periods when seeds or propagules are least likely to be viable and spread.
- Monitor disturbed areas for at least three growing seasons following completion of activities. Provide follow-up treatments based on inspection results.
- Inspect material sources at their site of origin to ensure that they are free of invasive plant material before transport and use to the extent practicable. If possible, treat contaminated material before any use.

E.2.14 Wildlife

Construction would occur outside of USFWS-approved buffer distances for migratory birds and bald and golden eagle nests. If construction within the recommended buffer distance is not possible, it would be scheduled take place outside of the nesting season.

Construction is anticipated to take place during October through April, outside of the primary nesting period for migratory birds of concern (April 15 through July 31). For occasions where project construction overlaps with the primary nesting period for raptors and eagles (February 15

through July 31), surveys would be conducted out to a radius of at least 2 miles of the construction site, per USFWS eagle nest survey protocol. Should an active nest be found, construction would not proceed prior to consultation with a local USFWS biologist to determine the next steps.

Blasting activities would adhere to management prescriptions in the USFWS National Bald Eagle Management Guidelines (USFWS 2007). These would include but may not be limited to avoiding blasting within a minimum of 0.5 miles of active nests, as well as avoiding blasting within 0.5 miles (or 1 mile in open areas) of communal roosts when eagles are congregating, without prior coordination with USFWS and ODFW. See Section E.2.3 for additional discussion of BMPs and mitigation measures for blasting noise.

In appropriate cases and under consultation with ODFW, ramps would be placed in open pipeline trenches during construction to avoid the potential for wildlife to become trapped overnight.

E.2.15 Cultural Resources Mitigation

E.2.15.1 Inadvertent Discovery

A cultural resource survey was conducted by a qualified archaeologist in areas where ground disturbance would occur, consistent with the NRCS and BLM cultural resource management policies. This survey included the identification and evaluation of cultural resources present within those areas and provides measures to avoid, minimize, or mitigate impacts to those resources.

If archaeological resources are inadvertently discovered during construction, an Inadvertent Discovery Plan would be followed. Construction would stop in the vicinity of the discovery, the area would be secured and protected, a professional archaeologist would assess the discovery, consultation with the Oregon SHPO and NRCS cultural resources staff would occur as appropriate, and the appropriate tribes would be notified. Construction would continue in accordance with applicable guidance and law.

E.2.15.2 Historic Resources

Draft Amendment 001 to Programmatic Agreement No. R19MA13745 for compliance with Section 106 of the NHPA for certain activities involving the Central Oregon Project System of canals, laterals, and associated irrigation features and facilities contains the following mitigation actions for the adverse effect to the Pilot Butte Canal: Downtown Redmond Segment Historic District, listed in the NRHP in 2017 under the Carey and Reclamation Acts Irrigation projects in Oregon 1091–1978 Multiple Property Document. The following excerpt from Programmatic Agreement No. R19MA13745 provides the mitigation items:

X. MITIGATION OF ADVERSE EFFECTS FOR PILOT BUTTE CANAL: DOWNTOWN REDMOND SEGMENT HISTORIC DISTRICT

- A. In coordination with the City of Redmond Parks District, COID will support the design and development of a pocket park or linear corridor within its right-of-way that highlights a section of the Pilot Butte Canal. The preferred location will be within the Pilot Butte Canal: Downtown Redmond Segment Historic District, subject to agreement from the City of Redmond. The park will include landscape amenities that help to document the scale and design of the Pilot Butte Canal, its history and significance, and will include no less than two (2) high-quality interpretive panels of minimum 24x36" size, constructed of high-quality durable material suitable for outdoor display. Panel content will be prepared by person(s) meeting the relevant Secretary of the Interior's Professional Qualification Standards (36 CFR Part 61, Appendix A) and include text*

and graphics on the construction, operation and significant impacts of the canal in the Bend/Redmond region. The panel will remain in a publicly accessible location for a minimum of ten (10) years from the date of installation.

- B. COID will retain salvaged elements from the Pilot Butte Canal Piping Project for use in the design of Stipulation A as possible. Such elements might include gate valves, chute structures, fish screens, or other built features that can be incorporated as interpretative or artistic elements within the park. If no salvageable materials are identified or considered appropriate for interpretative use, COID and NRCS will develop alternative mitigation of comparable scale in consultation with SHPO and other signatories.*
- C. COID will support the production of a video documentary on the history of the irrigation district, focused on the Pilot Butte Canal. This professionally scripted and produced work will include historic and current images, interviews with appropriate individuals as can be identified, and other pertinent materials to create a balanced and accessible history of the role and impact of irrigation in the history of Deschutes County, with emphasis on the Bend-Redmond area. The production will have a total runtime of not less than ten (10) minutes in length. The completed work will be made available to the public via multiple platforms, including COID's website (for a minimum of five (5) years), YouTube, and other platforms (OPB, local media, etc.) as can be identified.*
- D. COID will support the development of two entries that document the history of irrigation in Central Oregon and its impact on the development of that region for inclusion in the Oregon Encyclopedia (www.oregonencyclopedia.org). Entries will be professionally researched, written to OE standards, and be prepared by person(s) meeting the relevant Secretary of the Interior's Professional Qualification Standards (36 CFR Part 61, Appendix A). One entry will include a narrative to serve as an overview/cover entry for Carey Act projects in Central Oregon and the role of the Bureau of Reclamation in the agricultural development of the Bend-Redmond area. A second entry will focus specifically on COID's history and development, including the Pilot Butte Canal. This is envisioned as a framework for future entries on the COID system elements as well as for other irrigation districts in the region. Final entries, subject to OE approval, will be uploaded to the OE website and maintained for free public access. Should OE decline to publish entries as proposed, COID and NRCS will propose alternative mitigation measures of comparable scale.*
- E. COID will support the development of a professionally researched and designed publication on the history of irrigation efforts in the Central Oregon region. This illustrated work will be prepared by person(s) meeting the relevant Secretary of the Interior's Professional Qualification Standards (36 CFR Part 61, Appendix A) and will draw on COID's and Reclamation's photo and map archives, along with other materials, to document the history and implementation of the Carey Act in Deschutes and Jefferson counties with a focus on COID's own history and development over the past 125 years. The finished work, with an estimated length of 100-125 pages, will include a narrative history of the COID system, a timeline and details of its construction and operation as well narrative on the district's role in the development of Deschutes and Jefferson counties. The publication will be amply illustrated with the intent to provide a focused history of COID in an academically sound and accessible narrative geared toward an interested general public to inform future research and study.*

COID will distribute gratis copies of the completed work to area libraries, school districts and historic societies in Deschutes and Jefferson counties, with additional copies to the Oregon Historical Society, the University of Oregon and Oregon State University and other regional repositories to assure widespread public availability.

- F. COID and NRCS shall ensure that all work in completing the above measures are carried out by or occur under the supervision of individuals who meet the appropriate Secretary of the Interior's Professional Qualifications Standards (36 CFR §61).*
- G. COID and NRCS will assure that the Downtown Redmond Segment is formally delisted from the National Register of Historic Places following its demolition. COID will provide photography and other information to Oregon SHPO so that it may prepare the required documentation for submittal to the National Park Service.*

E.2.16 Water Resources Mitigation

Overall, the Modernization Alternative is expected to have no direct long-term effects on surface water resources in the Upper Deschutes Basin. The pass-through of saved COID water to NUID would help to support NUID's compliance with nonirrigation season flow augmentation directives per the DBHCP conservation measures. NUID would face these directives independently of the Modernization Alternative. As a result, no long-term mitigation measures are proposed. The Modernization Alternative would potentially result in a measurable but localized reduction in groundwater recharge from canal seepage. The amount would be small relative to the combined effects on groundwater levels from climate factors, groundwater pumping, and other irrigation modernization projects. Groundwater levels are expected to continue declining throughout the Upper Deschutes Basin due to climate change. Therefore, it is difficult to predict the specific potential impacts of the Modernization Alternative on local domestic and irrigation wells. No long-term mitigation measures are proposed as a result. Avoidance and minimization measures would be implemented during construction to ensure that adverse effects on surface water and groundwater are prevented to the greatest extent practicable. Post-construction mitigation and restoration actions would be implemented following construction to ensure that post-construction site conditions do not contribute to ongoing effects on water resources.

E.2.17 References

- NRCS (Natural Resources Conservation Service). 2000. Oregon and Washington Guide for Conservation Seedings and Plantings. Accessed April 17, 2025. https://efotg.sc.egov.usda.gov/references/public/OR/OR_WA_seeding_guide.pdf
- USFWS (U.S. Fish and Wildlife Service). 2007. National Bald Eagle Management Guidelines. Accessed April 17, 2025. <https://www.fws.gov/media/national-bald-eagle-management-guidelines>