

Appendix E.4

Preferred Alternative Evaluation Memo

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E.4 Preferred Alternative Evaluation Memo

E.4.1 Introduction

The Natural Resources Conservation Service (NRCS) and the Central Oregon Irrigation District (COID) agree that the Infrastructure Modernization Alternative is the Preferred Alternative. NRCS has selected the Modernization Alternative based on its ability to meet the purpose and need for the Pilot Butte Canal Infrastructure Modernization Project (Project), best address the Federal Objective and Guiding Principles, and provide the most beneficial effects to environmental, social, and economic resources.

Implementation of the Preferred Alternative would improve water delivery reliability for COID patrons, save an estimated 136 cubic feet per second (43,544 acre-feet) from seepage loss during the irrigation season, pass an estimated 43,544 acre-feet of water to North Unit Irrigation District, reduce COID operation and maintenance costs, reduce electricity costs from pumping, and improve public safety.

Section 6 of the Draft Watershed Plan–Environmental Impact Statement (Plan-EIS) describes effects on resources in detail. NRCS staff concluded that most adverse environmental impacts associated with the Preferred Alternative would be temporary or short-term during construction. The Preferred Alternative would result in an adverse effect to historic properties, namely the historic canal sections in North Bend/Deschutes County and in Redmond. The adverse effects to these sections would be addressed via the pending revised Section 106 Programmatic Agreement and implementation of mitigation measures contained therein.

The Preferred Alternative, with the mitigation measures recommended in the Plan-EIS, would not result in further significant adverse impacts. This determination is based on a review of the information provided by COID and further developed from data requests; field investigations; scoping; literature research; alternatives analyses; and contacts with the federal, state, and local agencies, Native American tribes, and other stakeholders. To ensure impacts on the environment are avoided, reduced, and minimized to the extent practical, NRCS staff recommends that these mitigation measures be attached as conditions to any authorization issued by U.S. Congress and NRCS. These mitigation measures are identified in Appendix E.2 of the Draft Plan-EIS.

Steps in developing and selecting the Preferred Alternative included the following:

- Assemble the preliminary range of alternatives.
- Refine the range of alternatives to be evaluated.
- Develop evaluation criteria.
- Develop rating descriptions.
- Develop criteria weighting.
- Score the alternatives.

The community stakeholders in the immediate Project Area played a central role in the selection of the initial preferred alternative recommendation through the public scoping process. The following summarizes the process for each of the above steps or tasks including roles played by the project team, other project stakeholders, agencies, and the public.

E.4.2 Assemble the Preliminary Range of Alternatives

One of the early tasks of the project team was to identify a range of potential alternatives. A No Action Alternative, three potential system alternatives (canal lining, dryland farming, and market-based approaches including voluntary reduction), and a Partial Modernization Alternative (one that would wholly avoid construction within the individually listed historic sections in Deschutes County/North Bend and in Redmond) were identified for evaluation. In addition, a Modernization Alternative (canal piping) was also identified as a potential action for evaluation within the preliminary range of alternatives. The alternatives are discussed in further detail in Section 5 of the Draft Plan-EIS.

E.4.3 Refine the Range of Alternatives to be Evaluated

After introducing the range of alternatives and information that had been gathered through project scoping and agency coordination, the project team asked COID to consider making revisions to the preliminary range of alternatives as well as phasing the construction of projects.

Canal lining, dryland farming, market-based approaches including voluntary reduction, and the Partial Modernization Alternative met the formulation criteria, but after further consideration they were not analyzed in detail as viable alternatives. These alternatives did not address the purpose and need for action, did not achieve the Federal Objective¹ and Guiding Principles, or became unreasonable because of cost, logistics, existing technology, or environmental reasons; they were removed from further consideration (National Watershed Program Manual 501.37, PR&G 6.5b).

The project team then further refined both the No Action and Modernization Route Alternatives, which are described below.

E.4.3.1 No Action Alternative

Under the No Action Alternative, COID would continue to operate and maintain its existing canals, culverts, and pipelines in their current condition. This alternative assumes that modernization of the COID infrastructure would not be reasonably certain to occur, as funding at the scale necessary to modernize the COID remaining infrastructure is not anticipated from other sources. The No Action Alternative would be a continuation of COID standard operations and maintenance.

The No Action Alternative would not meet the purpose and need. Improvements to reduce water loss to seepage and evaporation in District infrastructure, improve water delivery and reliability for farmers, reduce long-term operation and maintenance costs, and improve public safety to meet the sponsors' objectives would not occur.

¹ The Federal Objective, as set forth in the Water Resources Development Act of 2007, specifies that Federal water resources investments shall reflect national priorities, encourage economic development, and protect the environment by:

- (1) seeking to maximize sustainable economic development;
- (2) seeking to avoid the unwise use of floodplains and flood-prone areas and minimizing adverse impacts and vulnerabilities in any case in which a floodplain or flood-prone area must be used; and
- (3) protecting and restoring the functions of natural systems and mitigating any unavoidable damage to natural systems

E.4.4 Modernization Route Alternatives

A Modernization Alternative would replace the existing open Pilot Butte Canal within the Project Area with a closed-conduit pipeline system. The Modernization Alternative was refined to have six alternative alignment options that are described in the sections below. Under the Modernization Alternative, federal funding through Public Law Number (Pub. L. No.) 83-566 would be available for project implementation. Depending on the alternative alignment options chosen, after completion up to approximately 21 miles of the Pilot Butte system from NE 17th Street in Redmond, Oregon, to the diversion point from the Deschutes River in Bend, Oregon, would be piped. The Modernization Alternative would extend from the piped section of the Pilot Butte Canal approved under the 2020 *Smith Rock-King Way Infrastructure Modernization Project Final Watershed Plan-Environmental Assessment*.

COID facilities within the city of Bend/Deschutes County and the city of Redmond have associated historic features that should be avoided with alternative alignment options, if possible.

E.4.4.1 Deschutes County/North Bend Alternative Alignment Options

The Modernization Alternative has three alternative alignment options for piping between Yeoman Road and Cooley Road in north Bend and Deschutes County (see Figure E.4-1). The three options are listed and described below:

- Pilot Butte Canal Alignment.
- NE 18th Street Alignment.
- Old Deschutes Road Alignment.

Central Oregon Irrigation District Pilot Butte Canal Infrastructure Modernization Project
Draft Watershed Plan–Environmental Impact Statement

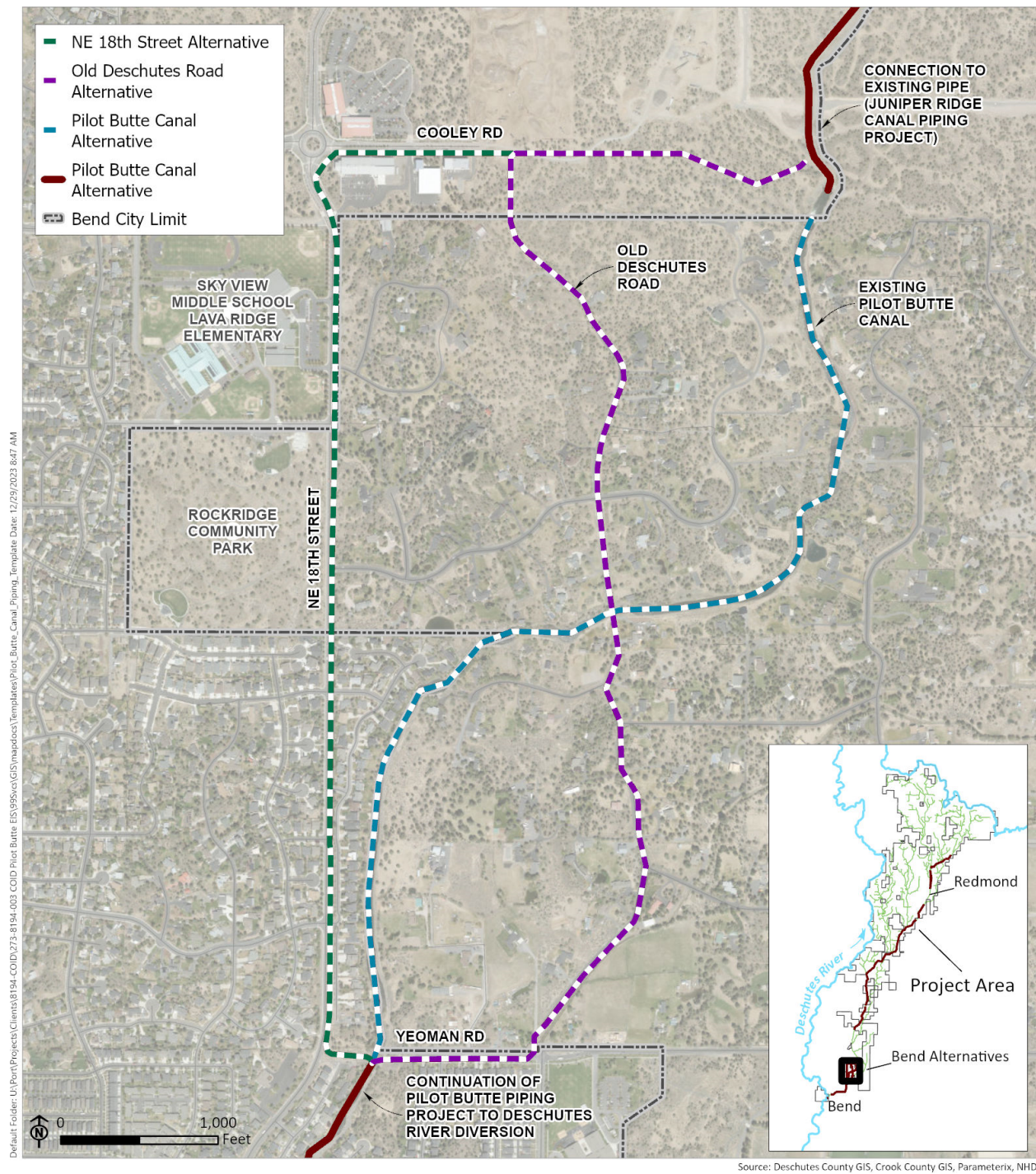


Figure E.4-1. Deschutes County/North Bend Alternative Alignment Options.

The Pilot Butte Canal Alternative Alignment would replace the open canal with pipe directly within the existing open canal alignment. This alternative alignment option would be built wholly within the section of canal that is listed in the NRHP and would be approximately 1.5 miles long. This option would not pipe the open canal section immediately south of the Juniper Ridge hydroelectric facility (approximately 170 feet). This alignment would avoid schools and parks, but it is adjacent to rural residences.

The NE 18th Street Alternative Alignment would place pipe in a new alignment beginning at the intersection of the existing alignment and Yeoman Road. It would travel west and then turn north to follow NE 18th Street. Following NE 18th Street, the alignment would travel generally north to the intersection of NE 18th Street and Cooley Road. At Cooley Road, the alignment would take an approximately 90-degree turn to follow an alignment that extends from near the eastern terminus of Cooley Road to the existing Pilot Butte Canal. Note that a portion of the alignment from Cooley Road would be identical to that of the Old Deschutes Road alignment. The NE 18th Street Alternative Alignment would be approximately 1.7 miles long.

The NE 18th Street Alternative Alignment Option would avoid impacts to a portion of the Pilot Butte Canal that is listed in the NRHP. The historic section of canal would be left in place, but it would no longer receive irrigation water from the COID system. Schools in Bend along the NE 18th Street Alternative Alignment Option include Lava Ridge Elementary School and Sky View Middle School. Parks in Bend along this alignment include Rockridge Community Park. All three of these resources are immediately adjacent to this alignment and are noise- and vibration-sensitive. This alignment would require new easements and potentially new right-of-way.

The Old Deschutes Road Alternative Alignment Option would place pipe in a new alignment beginning at the intersection of the existing alignment and Yeoman Road. It would travel east along Yeoman Road and then turn northeast to follow Old Deschutes Road. Following Old Deschutes Road, the alignment would travel generally north, crossing the existing Pilot Butte Canal until the terminus of Old Deschutes Road. At the road's northern terminus, the alignment would then generally travel northeast across undeveloped land until making an approximately 90-degree turn to follow an alignment that extends from near the eastern terminus of Cooley Road to the existing Pilot Butte Canal. This alternative alignment option would be approximately 1.8 miles long.

As with the NE 18th Street Alignment option, the Old Deschutes Road Alternative Alignment Option would avoid impacts to a portion of the Pilot Butte Canal that is listed in the NRHP. The historic section of canal would be left in place, but it would no longer receive irrigation water from the COID system. Schools and parks in Bend would be 2,500 feet away from this alignment. This alignment would require new easements and new right-of-way.

E.4.4.2 City of Redmond Alternative Alignment Options

The Modernization Alternative has three route options for piping within Redmond between NW Dogwood Avenue and NW Quince Avenue (see Figure E.4-2). These three options are listed and described below:

- Pilot Butte Canal Alignment.
- Piping to the east in the Watermaster's Access Road.
- Piping to the west within Northwest Canal Boulevard.

Central Oregon Irrigation District Pilot Butte Canal Infrastructure Modernization Project
Draft Watershed Plan–Environmental Impact Statement

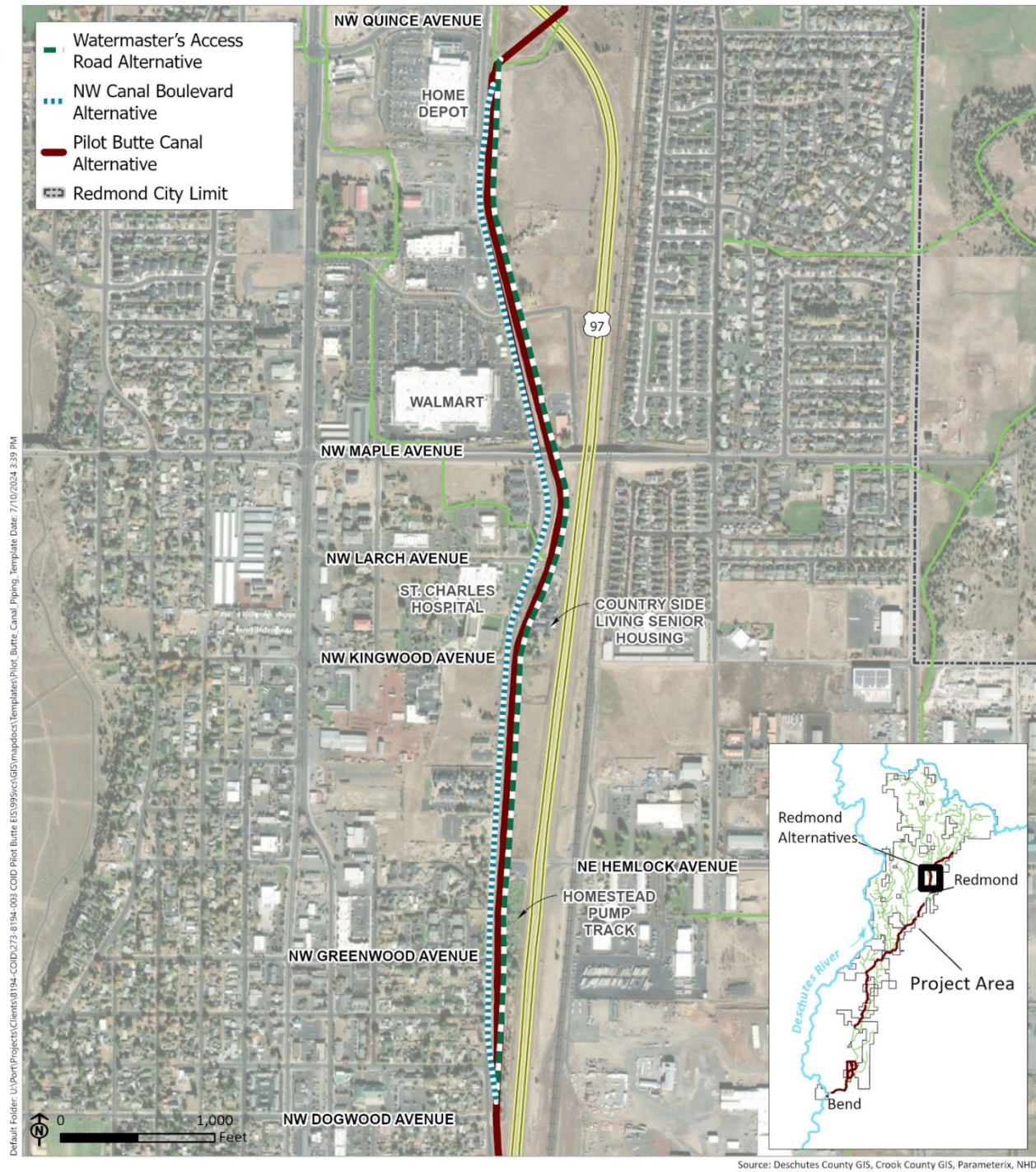


Figure E.4-2. Redmond Alternative Alignment Options.

The Pilot Butte Canal Alternative Alignment Option would replace the open canal with pipe directly within the existing open canal alignment. This alignment option would be built wholly within the section of canal that is listed in the NRHP and would be approximately 1.3 miles long. This option would not require major disruption to North Canal Boulevard, new utility easements, and potential relocation of utilities.

Piping to the east in the Watermaster’s Access Road would avoid impacts to a portion of the COID system that is listed in the NRHP. The historic section of canal would be left in place, but it would no longer receive irrigation water from the COID system. This option would not require a major disruption and potential relocation of utilities. The work area for this option is constrained by U.S. Highway 97 (U.S. 97) to the east and by a conflict with a bridge pier for the NE Maple Avenue overpass over the Pilot Butte Canal and U.S. 97.

Piping to the west in Northwest Canal Boulevard would avoid impacts to a portion of the COID system that is listed in the NRHP. The historic section of canal would be left in place, but it would no longer receive irrigation water from the COID system. This option would require a major disruption and potential relocation of utilities including overhead electrical power, water and fire hydrants, natural gas, and telecommunications. This option would also have the greatest traffic disruptions to Northwest Canal Boulevard, numerous side streets, and driveway access points, and it would require the complete reconstruction of Northwest Canal Boulevard. This alignment would require new utility easements and potentially new right-of-way.

The total length of the two historic sections is approximately 14,700 feet. This is 15 percent of the total of approximately 95,100 feet of proposed piping for the entire Project.

E.4.5 Develop Evaluation Criteria

The project team identified the criteria to be used to evaluate the project alternatives and help inform the recommendation of a preferred alternative. To draft the criteria, they first considered the communities’ interests, values, concerns and goals related to the Project. This feedback informed the initial draft criteria that the project team discussed and revised through several meetings. They also considered input from the participating agencies and the District’s patrons before finalizing the evaluation criteria. The criteria topics are listed and described in detail below:

- Irrigation Water and Delivery.
- Principles, Requirements, and Guidelines per Pub. L. No. 83-566.
- Natural Resources, Climate Change, and Sustainability.
- Historic Resources.
- Community Quality of Life (including socioeconomics, parks and recreational resources, and environmental justice).²
- Easements and Property Acquisition.
- Construction Impacts.

After the criteria were approved, the project team weighted the criteria. While the criteria express overall goals for specific issues (e.g., minimize temporary and permanent impacts to rural residential quality of life), weighting ensures that the criteria reflect their relative importance to the communities’ interests, values, concerns and goals related to the Project. See the section, Develop Criteria Weighting, for more information.

² Although “environmental justice” has been identified as part of community quality, the decision maker did not consider environmental justice analysis when signing the decision document per Executive Orders 14148 and 14173.

E.4.5.1 Irrigation Water and Delivery

Irrigation water and delivery includes the goals of the purpose and need for the Project as expressed in Section 3 of the Draft Plan-EIS. This criterion is one of the most important factors to the success of this Project, and it was given the highest weighting. The canal in its current configuration is structurally obsolete and will require ever-increasing maintenance costs to continue to operate.

E.4.5.2 Principles, Requirements, and Guidelines

This criterion embraces the Principles, Requirements, and Guidelines of the Watershed and Flood Prevention Act (Pub. L. No. 83-566) and includes the following four components: completeness, effectiveness, efficiency, and acceptability. Each of the components was weighted equally, and overall, this criterion was given equal weighting with irrigation water and delivery, as this criterion is fundamental to the success of projects that are receiving Pub. L. No. 83-566 funding.

E.4.5.3 Natural Resources, Climate Change, and Sustainability

This criterion was raised during scoping comments received from the U.S. Environmental Protection Agency. Included in this criterion is adaptability and resiliency. This is a forward-looking criterion that allows the agricultural community to continue to thrive into the next century. This criterion also provides a buffer for variances in water availability due to climate change through the efficient use of this important resource. This criterion also addresses the NRCS Special Environmental Concern (SEC) for Endangered and Threatened Species.

E.4.5.4 Historic Resources

This criterion stresses the importance of the historic listing of specific sections of the canal system and the responsibility of the U.S. Department of Agriculture to evaluate alternative alignment options that minimize adverse effects to resources protected under Section 106 of the 1966 National Historic Preservation Act of 1966. This criterion was also identified as being very important to the community as expressed through comments received during scoping. This criterion addresses the NRCS SEC for cultural resources.

E.4.5.5 Community Quality of Life

This criterion was identified as being very important to the community as expressed through comments received during scoping. In essence, the community enjoys the status quo with the canal offering features such as a visual amenity, a source of water for wildlife, and a connection to the agricultural community in central Oregon. This criterion was also used to evaluate socioeconomic impacts, impacts to parks and recreational resources, and potential environmental justice concerns.³ This criterion addresses multiple SECs including environmental justice and scenic beauty.

E.4.5.6 Easements and Right-of-Way Acquisition

This criterion was identified by the project team as being a differentiator for both cost and procedural difficulty. If the Modernization Alternative is moved outside of its established easement in the existing open canal alignment—either in a street or across undeveloped terrain—new easements and right-of-way would be required, both permanently and for construction. This would place an additional burden on the efficient use of federal and matching funds to support the

³ Although “environmental justice” has been identified as part of community quality, the decision maker did not consider environmental justice analysis when signing the decision document per Executive Orders 14148 and 14173.

Modernization Alternative. The additional burdens include cost of purchase, potential schedule delays, and the potential for litigation if the Project has to invoke condemnation under federal authority in order to acquire the necessary land. The costs of easements and right-of-way acquisitions are included in the Draft Plan-EIS, Appendix D.

E.4.5.7 Construction Impacts

This criterion was identified by the project team as being important due to the variations across the alternative alignment options discussed above. These impacts are all short-term in nature, but they could have substantial localized impacts related to the following components: disruption to the transportation network, disruption to utility services, and disruption of the ambient sound levels due to construction noise and vibration impacts including blasting in the underlying rock. This criterion also addresses the SEC for bald and golden eagles, migratory birds, and the Clean Water Act (construction stormwater runoff).

Due to the lack of project-related impacts to an SEC and/or the lack of presence of SECs within the affected environment of the Project Area, several SECs were not applicable to the evaluation criteria. These include Clean Air Act; Waters of the United States; Coastal Zone Management; Coral Reefs; Essential Fish Habitat; Floodplain Management; Invasive Species; Natural Areas; Prime and Unique Farmlands; Riparian Areas; Wetlands; and Wild and Scenic Rivers.

E.4.6 Develop Rating Descriptions

When applying the criteria for irrigation water and delivery and the Principles, Requirements, and Guidelines, the project team determined that these should be yes/no scores. If the alignment option meets the purpose and need for irrigation water and delivery or meets the Principles, Requirements, and Guidelines, the raw impact score was assigned a 1. If the alignment option does not meet the purpose and need or does not meet the Principles, Requirements, and Guidelines, the raw impact score was assigned a 0.

When applying the scoring for the remaining criteria, guidance was needed for determining what constituted a high, medium, or low score for each measure. The rating descriptions are the definitions of what constitutes a 5 (high), 3 (medium), or 1 (low) score. A score of 3 represented average performance, a 1 typically represented substantially worse than average performance, and a 5 typically represented notably better than average performance. For example, an alignment option that avoids piping the canal in a historic section would score a 5 for avoiding historic resources but would score a 1 for easements and property acquisition because the alignment option is outside of existing easements. An alignment option that would be constructed (piped) in a busy street with many utility conflicts would also score a 1 for construction impacts even though it could avoid a historic resource.

E.4.7 Develop Criteria Weighting

The project team weighted the evaluation criteria. The team deliberated on the relevant importance of each criterion to rank different interests and values related to the criteria. Table E.4-1 shows the results of the project team's weighting exercise. The team then determined how to divide the total weight per topic among the criteria that evaluated long-term impacts or performance, versus those that evaluated short-term impacts or performance.

Table E.4-1. Weighting of the Criteria

Group	Criterion	Weight
1	Irrigation Water and Delivery	50
2	Principles, Requirements, and Guidelines	50
3	Natural Resources, Climate Change, and Sustainability	20
4	Historic Resources	20
5	Community Quality of Life	20
6	Easements or Property Acquisition	25
7	Construction Impacts	15
	Total	200

E.4.8 Raw Impact and Weighted Scoring

The project team assigned raw impact scores for each criterion based on information and findings in the draft technical reports. These scores were numbered from 5 (least impact or most beneficial impact), 3, 1 or 0 (most impact or least beneficial impact). Scores were developed for each of the six pipeline alternative alignment options and the No Action Alternative (see Table E.4-2).

The criteria weightings were then applied to the raw scores for each criterion, and the weighted scores for each criterion were totaled for each alternative/option combination (see Table E.4-3). Weighted impact scores are the product of multiplying the weighting factor in Table E.4-1 by the raw impact score in Table E.4-2. These scores were provided to the project team for their deliberation.

Table E.4-2. Raw Impact Scoring of Alternative Alignment Options

Criteria Topics	Bend – Pilot Butte Canal	Bend – NE 18th Street	Bend – Old Deschutes Road	Redmond – Pilot Butte Canal	Redmond – Watermaster's Road		Redmond – Northwest Canal Boulevard
Irrigation Water and Delivery	1	1	1	1	1		1
Principles, Requirements, and Guidelines	1	1	1	1	1		1
Natural Resources, Climate Change, and Sustainability	5	5	5	5	5		5
Historic Resources	1	3	3	1	3		3
Community Quality of Life	3	1	3	3	3		1
Easements or Property Acquisition	5	1	1	5	1		1
Construction Impacts	3	1	3	3	3		1
Total	19	13	17	19	17		13

Table E.4-3. Weighted Impact Scoring of Alternative Alignment Options

Criteria Topics	Bend – Pilot Butte Canal	Bend – NE 18th Street	Bend – Old Deschutes Road	Redmond – Pilot Butte Canal	Redmond – Watermaster's Road	Redmond – Northwest Canal Boulevard
Irrigation Water and Delivery	50	50	50	50	50	50
Principles, Requirements, and Guidelines	50	50	50	50	50	50
Natural Resources, Climate Change, and Sustainability	100	100	100	100	100	100
Historic Resources	20	60	60	20	60	60
Community Quality of Life	60	20	60	60	60	20
Easements or Property Acquisition	125	25	25	125	25	25
Construction Impacts	45	15	45	45	45	15
Total	450	320	390	450	390	320

Note: Weighted impact scores are the product of multiplying the weighting factor in Table E.4-1 by the raw impact score in Table E.4-2.

E.4.9 Costs for All Alternative Alignment Options

When evaluating costs for the entire project and considering each of the alternative alignment options as a stand-alone alternative, the project developed 9 individual combinations that could be constructed as shown in Table E.4-4 through Table E.4-12. The least costly combination was the Preferred Alternative that pipes within the entire portion of the un-piped Pilot Butte Canal alignment. The most costly combination was modernization within both the Bend NE 18th Street alignment and the Northwest Canal Boulevard alignment. All other combinations of alternative alignment options fall within these “bookends” in terms of total project cost.

Table E.4-4. Old Deschutes Road in Rivers Edge Segment and Redmond NW Canal Blvd Segment

Work of Improvement	Pub. L. No. 83-566 Funds – Federal Land NRCS	Pub. L. No. 83-566 Funds – Non- Federal Land NRCS	Other Funds – Federal Lands	Other Funds – Non-Federal Lands	Total
Rivers Edge – Old Deschutes Road	\$0	\$80,015,000	\$0	\$25,351,000	\$105,366,000
Deschutes Market	\$3,998,000	\$52,026,000	\$1,277,000	\$16,611,000	\$73,912,000
Canal	\$3,357,000	\$31,085,000	\$1,072,000	\$9,925,000	\$45,439,000
Veterans Way	\$0	\$42,620,000	\$0	\$13,571,000	\$56,191,000
Redmond – NW Canal Blvd	\$0	\$50,920,000	\$0	\$16,130,000	\$67,050,000
King Way	\$0	\$25,866,000	\$0	\$8,379,000	\$34,245,000
Totals	\$7,355,000	\$282,532,000	\$2,349,000	\$89,967,000	\$382,203,000

Table E.4-5. Old Deschutes Road in Rivers Edge Segment and Redmond Watermaster Road Segment

Work of Improvement	Pub. L. No. 83-566 Funds – Federal Land NRCS	Pub. L. No. 83-566 Funds – Non- Federal Land NRCS	Other Funds – Federal Lands	Other Funds – Non-Federal Lands	Total
Rivers Edge – Old Deschutes Road	\$0	\$80,015,000	\$0	\$25,351,000	\$105,366,000
Deschutes Market	\$3,998,000	\$52,026,000	\$1,277,000	\$16,611,000	\$73,912,000
Canal	\$3,357,000	\$31,085,000	\$1,072,000	\$9,925,000	\$45,439,000
Veterans Way	\$0	\$42,620,000	\$0	\$13,571,000	\$56,191,000
Redmond – Watermaster Road	\$0	\$47,027,000	\$0	\$15,085,000	\$62,112,000
King Way	\$0	\$25,866,000	\$0	\$8,379,000	\$34,245,000
Totals	\$7,355,000	\$278,639,000	\$2,349,000	\$88,922,000	\$377,265,000

Table E.4-6. Old Deschutes Road in Rivers Edge Segment and Redmond Piping Pilot Butte Canal

Work of Improvement	Pub. L. No. 83-566 Funds – Federal Land NRCS	Pub. L. No. 83-566 Funds – Non- Federal Land NRCS	Other Funds – Federal Lands	Other Funds – Non-Federal Lands	Total
Rivers Edge – Old Deschutes Road	\$0	\$80,015,000	\$0	\$25,351,000	\$105,366,000
Deschutes Market	\$3,998,000	\$52,026,000	\$1,277,000	\$16,611,000	\$73,912,000
Canal	\$3,357,000	\$31,085,000	\$1,072,000	\$9,925,000	\$45,439,000
Veterans Way	\$0	\$42,620,000	\$0	\$13,571,000	\$56,191,000
Redmond – Pilot Butte Canal Piping	\$0	\$43,810,000	\$0	\$13,981,000	\$57,791,000
King Way	\$0	\$25,866,000	\$0	\$8,379,000	\$34,245,000
Totals	\$7,355,000	\$275,422,000	\$2,349,000	\$87,818,000	\$372,944,000

Table E.4-7. 18th Street in Rivers Edge Segment and Redmond NW Canal Blvd Segment (Most Expensive)

Work of Improvement	Pub. L. No. 83-566 Funds – Federal Land NRCS	Pub. L. No. 83-566 Funds – Non- Federal Land NRCS	Other Funds – Federal Lands	Other Funds – Non-Federal Lands	Total
Rivers Edge – 18th Street	\$0	\$82,206,000	\$0	\$26,185,000	\$108,391,000
Deschutes Market	\$3,998,000	\$52,026,000	\$1,277,000	\$16,611,000	\$73,912,000
Canal	\$3,357,000	\$31,085,000	\$1,072,000	\$9,925,000	\$45,439,000
Veterans Way	\$0	\$42,620,000	\$0	\$13,571,000	\$56,191,000
Redmond – NW Canal Blvd	\$0	\$50,920,000	\$0	\$16,130,000	\$67,050,000
King Way	\$0	\$25,866,000	\$0	\$8,379,000	\$34,245,000
Totals	\$7,355,000	\$284,723,000	\$2,349,000	\$90,801,000	\$385,228,000

Table E.4-8. 18th Street in Rivers Edge Segment and Redmond Watermaster Road Segment

Work of Improvement	Pub. L. No. 83-566 Funds – Federal Land NRCS	Pub. L. No. 83-566 Funds – Non- Federal Land NRCS	Other Funds – Federal Lands	Other Funds – Non-Federal Lands	Total
Rivers Edge – 18th Street	\$0	\$82,206,000	\$0	\$26,185,000	\$108,391,000
Deschutes Market	\$3,998,000	\$52,026,000	\$1,277,000	\$16,611,000	\$73,912,000
Canal	\$3,357,000	\$31,085,000	\$1,072,000	\$9,925,000	\$45,439,000
Veterans Way	\$0	\$42,620,000	\$0	\$13,571,000	\$56,191,000
Redmond – Watermaster Road	\$0	\$47,027,000	\$0	\$15,085,000	\$62,112,000
King Way	\$0	\$25,866,000	\$0	\$8,379,000	\$34,245,000
Totals	\$7,355,000	\$280,830,000	\$2,349,000	\$89,756,000	\$380,290,000

Table E.4-9. 18th Street in Rivers Edge Segment and Redmond Piping Pilot Butte Canal

Work of Improvement	Pub. L. No. 83-566 Funds – Federal Land NRCS	Pub. L. No. 83-566 Funds – Non- Federal Land NRCS	Other Funds – Federal Lands	Other Funds – Non-Federal Lands	Total
Rivers Edge – 18th Street	\$0	\$82,206,000	\$0	\$26,185,000	\$108,391,000
Deschutes Market	\$3,998,000	\$52,026,000	\$1,277,000	\$16,611,000	\$73,912,000
Canal	\$3,357,000	\$31,085,000	\$1,072,000	\$9,925,000	\$45,439,000
Veterans Way	\$0	\$42,620,000	\$0	\$13,571,000	\$56,191,000
Redmond – Pilot Butte Canal Piping	\$0	\$43,810,000	\$0	\$13,981,000	\$57,791,000
King Way	\$0	\$25,866,000	\$0	\$8,379,000	\$34,245,000
Totals	\$7,355,000	\$277,613,000	\$2,349,000	\$88,652,000	\$375,969,000

Table E.4-10. Pilot Butte Canal Piping in Rivers Edge Segment and Redmond NW Canal Blvd Segment

Work of Improvement	Pub. L. No. 83-566 Funds – Federal Land NRCS	Pub. L. No. 83-566 Funds – Non- Federal Land NRCS	Other Funds – Federal Lands	Other Funds – Non-Federal Lands	Total
Rivers Edge – Pilot Butte Canal Piping	\$0	\$67,453,000	\$0	\$21,560,000	\$89,013,000
Deschutes Market	\$3,998,000	\$52,026,000	\$1,277,000	\$16,611,000	\$73,912,000
Canal	\$3,357,000	\$31,085,000	\$1,072,000	\$9,925,000	\$45,439,000
Veterans Way	\$0	\$42,620,000	\$0	\$13,571,000	\$56,191,000
Redmond – NW Canal Blvd	\$0	\$50,920,000	\$0	\$16,130,000	\$67,050,000
King Way	\$0	\$25,866,000	\$0	\$8,379,000	\$34,245,000
Totals	\$7,355,000	\$269,970,000	\$2,349,000	\$86,176,000	\$365,850,000

Table E.4-11. Pilot Butte Canal Piping in Rivers Edge Segment and Redmond Watermaster Road Segment

Work of Improvement	Pub. L. No. 83-566 Funds – Federal Land NRCS	Pub. L. No. 83-566 Funds – Non- Federal Land NRCS	Other Funds – Federal Lands	Other Funds – Non-Federal Lands	Total
Rivers Edge – Pilot Butte Canal Piping	\$0	\$67,453,000	\$0	\$21,560,000	\$89,013,000
Deschutes Market	\$3,998,000	\$52,026,000	\$1,277,000	\$16,611,000	\$73,912,000
Canal	\$3,357,000	\$31,085,000	\$1,072,000	\$9,925,000	\$45,439,000
Veterans Way	\$0	\$42,620,000	\$0	\$13,571,000	\$56,191,000
Redmond – Watermaster Road	\$0	\$47,027,000	\$0	\$15,085,000	\$62,112,000
King Way	\$0	\$25,866,000	\$0	\$8,379,000	\$34,245,000
Totals	\$7,355,000	\$266,077,000	\$2,349,000	\$85,131,000	\$360,912,000

Table E.4-12. Pilot Butte Canal Piping in Rivers Edge Segment and Redmond Piping Pilot Butte Canal (Least Expensive)

Work of Improvement	Pub. L. No. 83-566 Funds – Federal Land NRCS	Pub. L. No. 83-566 Funds – Non- Federal Land NRCS	Other Funds – Federal Lands	Other Funds – Non-Federal Lands	Total
Rivers Edge – Pilot Butte Canal Piping	\$0	\$67,453,000	\$0	\$21,560,000	\$89,013,000
Deschutes Market	\$3,998,000	\$52,026,000	\$1,277,000	\$16,611,000	\$73,912,000
Canal	\$3,357,000	\$31,085,000	\$1,072,000	\$9,925,000	\$45,439,000
Veterans Way	\$0	\$42,620,000	\$0	\$13,571,000	\$56,191,000
Redmond – Pilot Butte Canal Piping	\$0	\$43,810,000	\$0	\$13,981,000	\$57,791,000
King Way	\$0	\$25,866,000	\$0	\$8,379,000	\$34,245,000
Totals	\$7,355,000	\$262,860,000	\$2,349,000	\$84,027,000	\$356,591,000

E.4.10 Recommendation

Based on scoring results, the project team made its recommendation on a Preferred Alternative in fall 2024. The recommendation was for the Modernization Alternative with the following alternative alignment options:

- Pilot Butte Canal Alternative Alignment Option in the city of Bend.
- Pilot Butte Canal Alternative Alignment Option in the city of Redmond.

Although the Pilot Butte Canal Alternative Alignment Options would have the greatest impact to historic resources (adverse effect) and would remove a visual resource that is important to the community and quality of life, these alternative alignment options would meet the purpose and need to maximize irrigation water delivery, satisfy the Principles, Requirements and Guidelines of the Water Resources Development Act of 2007 (Pub. L. No. 110-114), support the sustainable use of water resources that are becoming more scarce as a result of climate change, and avoid the need to obtain new easements and right-of-way. The temporary construction impacts would be minimized by not constructing in roadways, thereby avoiding the need for extensive utility relocations, transportation system disruptions, and impacts to sensitive community and social resources. The costs of the Preferred Alternative is presented in Table E.4-12 and the Preferred Alternative is the least expensive alternative.