



Central Oregon Irrigation District Pilot Butte Canal EIS Draft Utilities Technical Report Deschutes County, Oregon

Prepared for

Central Oregon Irrigation District



May 2024

Prepared by

Parametrix

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Central Oregon Irrigation District Pilot Butte Canal EIS Draft Utilities Technical Report

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CITATION

Parametrix, 2024. Central Oregon Irrigation District Pilot Butte
Canal EIS Draft Utilities Technical Report. Prepared by
Parametrix, Bend, Oregon. May 2024.

CERTIFICATION

The technical material and data contained in this document were prepared under the supervision and direction of the undersigned, whose seal, as a professional engineer licensed to practice as such, is affixed below.

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Central Oregon Irrigation District
Pilot Butte Canal EIS
Draft Utilities Technical Report
Central Oregon Irrigation District

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ACRONYMS, INITIALISMS, AND ABBREVIATIONS

ac	acre
COID	Central Oregon Irrigation District
District	Central Oregon Irrigation District
EIS	environmental impact statement
GIS	geographic information system
NRCS	Natural Resources Conservation Service
NRHP	National Register of Historic Places
OAR	Oregon Administrative Rules
PBC	Pilot Butte Canal
Project	Pilot Butte Canal Piping Project
USC	United States Code

EXECUTIVE SUMMARY

The construction of the Pilot Butte Canal project would have a large impact on the existing utilities that run parallel to or cross the proposed canal piping alignment. For the construction of the canal piping, existing utilities would require adjustment or relocation to avoid conflicts. While services would either be rerouted or removed due to the Pilot Butte Canal piping project, some utility customers could lose access to the utility for a period of time. Detours would need to be set for traffic and pedestrian movement during construction. Creating bypasses for water, sewer, or gas utilities could be required to minimize service downtime. Franchise utility agreements would be reviewed to confirm relocation of conflicting franchise utilities. Most, if not all, of the work necessary to remedy the conflicts would be performed within the existing right-of-way or within the canal easement.

Construction of the Pilot Butte Canal project would temporarily impact the utility infrastructure in Central Oregon. There would only be short-term impacts during construction. No long-term impacts to utility facilities would be expected from the proposed project.

1. INTRODUCTION

As a part of the preparation of the Environmental Impact Statement (EIS) for the Pilot Butte Canal (PBC) Piping Project (Project), this technical report has been prepared to identify and evaluate the Project's impacts and effects on utilities within the project's Study Area.

1.1 Project Location

The Central Oregon Irrigation District (COID or District) is analyzing piping approximately 18 to 21 miles of the PBC from NE 17th Street in Redmond, Oregon, to the diversion point from the Deschutes River in Bend, Oregon (Figure 1). The piping would extend from the piped section of the PBC approved under the 2020 *Smith Rock-King Way Infrastructure Modernization Project Final Watershed Plan-Environmental Assessment* (NRCS, USDA 2020). Additional portions along the existing alignment that have been piped or converted to box culverts during previous construction projects include the following:

- Major freeway or roadway crossings of US 97, OR 20, and OR 126 in Bend and Redmond (0.2 miles)
- Within the city of Bend and Deschutes County for the Juniper Ridge hydroelectric plant (3.3 miles)
- Within Deschutes County north of the Juniper Ridge hydroelectric plant (0.1 miles)
- Within urbanized Redmond (1.5 miles)

The portions to be piped for this Project are shown in Figure 1.

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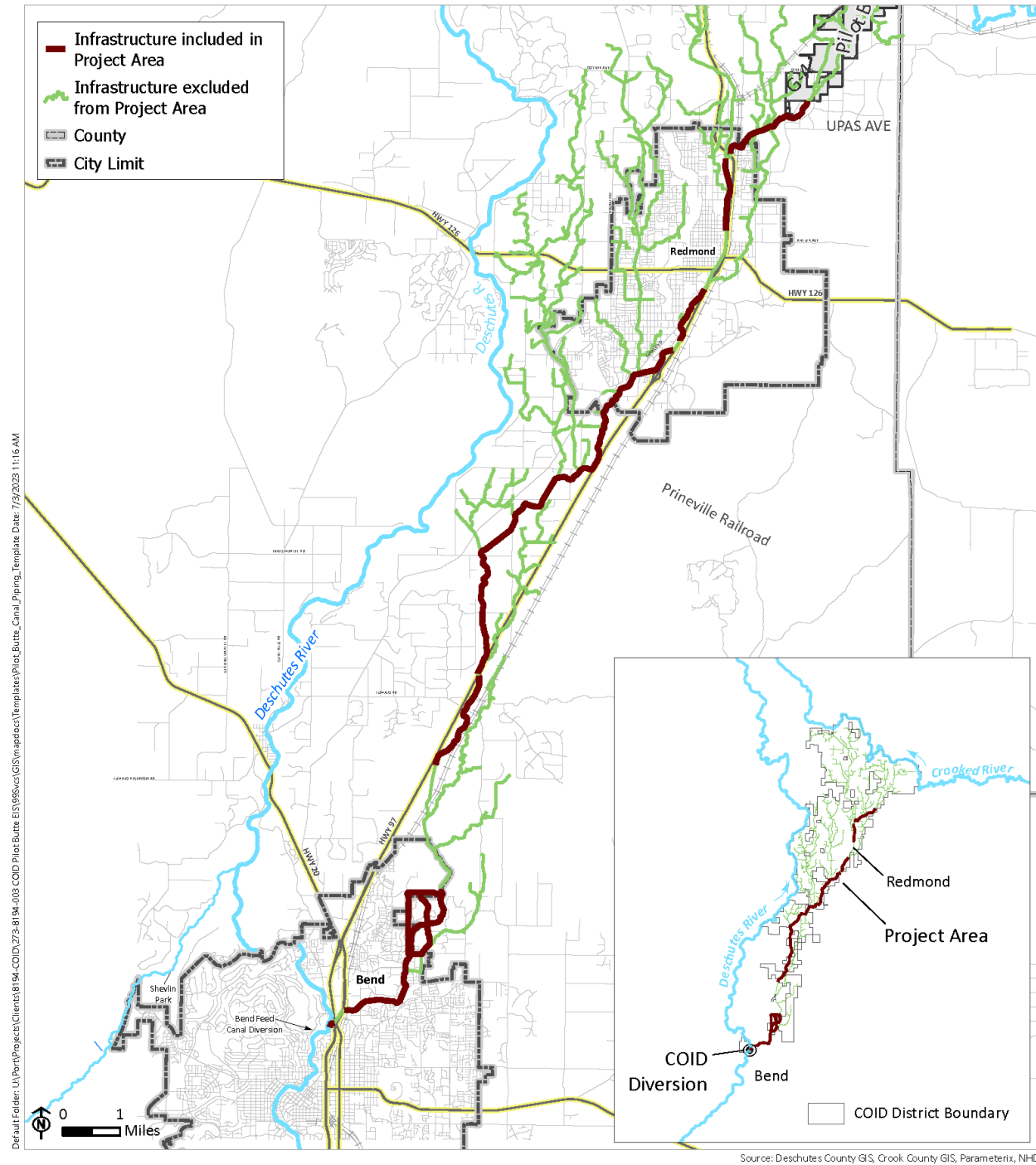


Figure 1. Project Area

1.2 Project Purpose and Need

The purpose of this project is agricultural water management through irrigation water conservation in District-owned infrastructure, improvement of water delivery reliability to District patrons, and reduction of long-term operation and maintenance costs on approximately 21 miles of the District-owned PBC. The Project is needed to address the following watershed problems and resource concerns: water loss in District conveyance systems and water delivery and operation and maintenance inefficiencies. Implementation of the proposed action would address the sponsors' objectives and goals to reduce seepage loss and provide better-managed water diversions for farm use; support agricultural land use; improve streamflow for fish, aquatic, and riparian habitat; and increase public safety.

2. PROJECT ALTERNATIVES

2.1 No Action (Future without Federal Investment)

Under the No Action Alternative, the District would continue to operate and maintain the existing delivery system within the Project Area in its current condition. This alternative assumes that modernization of the District's infrastructure would not be reasonably certain to occur, as funding at the scale necessary to modernize District infrastructure is not anticipated from other sources. The No Action Alternative would be a continuation of the District's current operations and maintenance.

The No Action Alternative would not meet the project purpose and need. Water would continue to be lost to seepage and evaporation in District infrastructure. Inefficiencies in water delivery reliability for farmers; streamflow and habitat conditions for fish and aquatic species; public safety; and sediment levels in irrigation water would not improve. The No Action Alternative would fail to achieve the goal of maximizing sustainable economic development, as identified in the Federal Objective to protect the environment. It would not resolve current water supply problems stemming from the loss of water from District infrastructure. Further, it would not foster the economic well-being of present and future generations through sustainable use and management of water resources to provide water supply and water quality for irrigated agriculture in the Deschutes basin.

2.2 Modernization Alternative (Future with Federal Investment)

The Modernization Alternative would focus on a single priority infrastructure modernization project: the District would replace the existing open PBC within the Project Area with a pressurized, closed conduit pipeline system (see Figure 2). When completed, the pipe would extend over approximately 18 to 21 miles of the COID system from the diversion point from the Deschutes River in Bend, Oregon, to NE 17th Street in Redmond, Oregon. Pipeline construction would begin in the northern portion of the Project Area at the piped section of the PBC that was approved under the 2020 Smith Rock-King Way Infrastructure Modernization Project Final Watershed Plan-Environmental Assessment (USDA, NRCS 2020), and progress south to the North Canal Dam. Construction of the Modernization Alternative would occur over the course of 3 years; two project groups would be constructed each construction season. The six project groups are described in Table 1.

Table 1. Project Group and Construction Sequence

Project Groups	Project Group Length (feet)	Construction Year	Construction Start	Construction End
1 – King Way	11,000	0	October 2026	April 2027
2 – Redmond				
Pilot Butte Canal Alignment Option	13,500	1	October 2027	April 2028
Watermaster Road Alignment Option	13,500	1	October 2027	April 2028
NW Canal Boulevard Alignment Option	13,500	1	October 2027	April 2028
3 – Veterans Way	16,700	2	October 2028	April 2029
4 – Canal	13,900	2	October 2028	April 2029
5 – Deschutes Market	22,000	1	October 2027	April 2028
6 – Rivers Edge				
Pilot Butte Canal Alignment Option	18,100	0	October 2026	April 2027
18th Street Alignment Option	19,300	0	October 2026	April 2027
Old Deschutes Road Alignment Option	19,800	0	October 2026	April 2027

Construction would occur during the non-irrigation season (October to April), with Project Group 1 (King Way) and Project Group 6 (Rivers Edge) construction beginning as early as the 2026–2027 non-irrigation season. The construction sequencing may be changed to provide flexibility for the construction contractor. Construction of each project group is anticipated to require one non-irrigation season to complete, and all six project groups would be completed over the course of three construction seasons. Two project groups—Redmond and Rivers Edge—each contain a segment with multiple alignment options. The alignment options are discussed below. Under the Modernization Alternative, federal funding through Public Law 83-566 would be available and would be expected to cover approximately 75% of total costs. The District would cover the remaining 25% of total costs.

A section of the PBC in Deschutes County just south of the Juniper Ridge hydroelectric facility, in the Rivers Edge project group, and another section in the downtown area of Redmond, in the Redmond project group, include historic features listed in the National Register of Historic Places (NRHP). In 2019, a Section 106 programmatic agreement was signed by COID, the Oregon State Historic Preservation Office, and the Bureau of Reclamation. The Natural Resources Conservation Service (NRCS) was added as a signatory in 2023. The programmatic agreement identified that COID will maintain the downtown Redmond reach “such that the historic integrity of and identification of the historic property as representative of an irrigation conveyance system will not be adversely affected.” The alignment options for the Deschutes County/North Bend (in the Rivers Edge project group) and the City of Redmond (in the Redmond project group) NRHP-listed historic sections of the Project Area are described in Section 2.2.1 and Section 2.2.2, respectively.

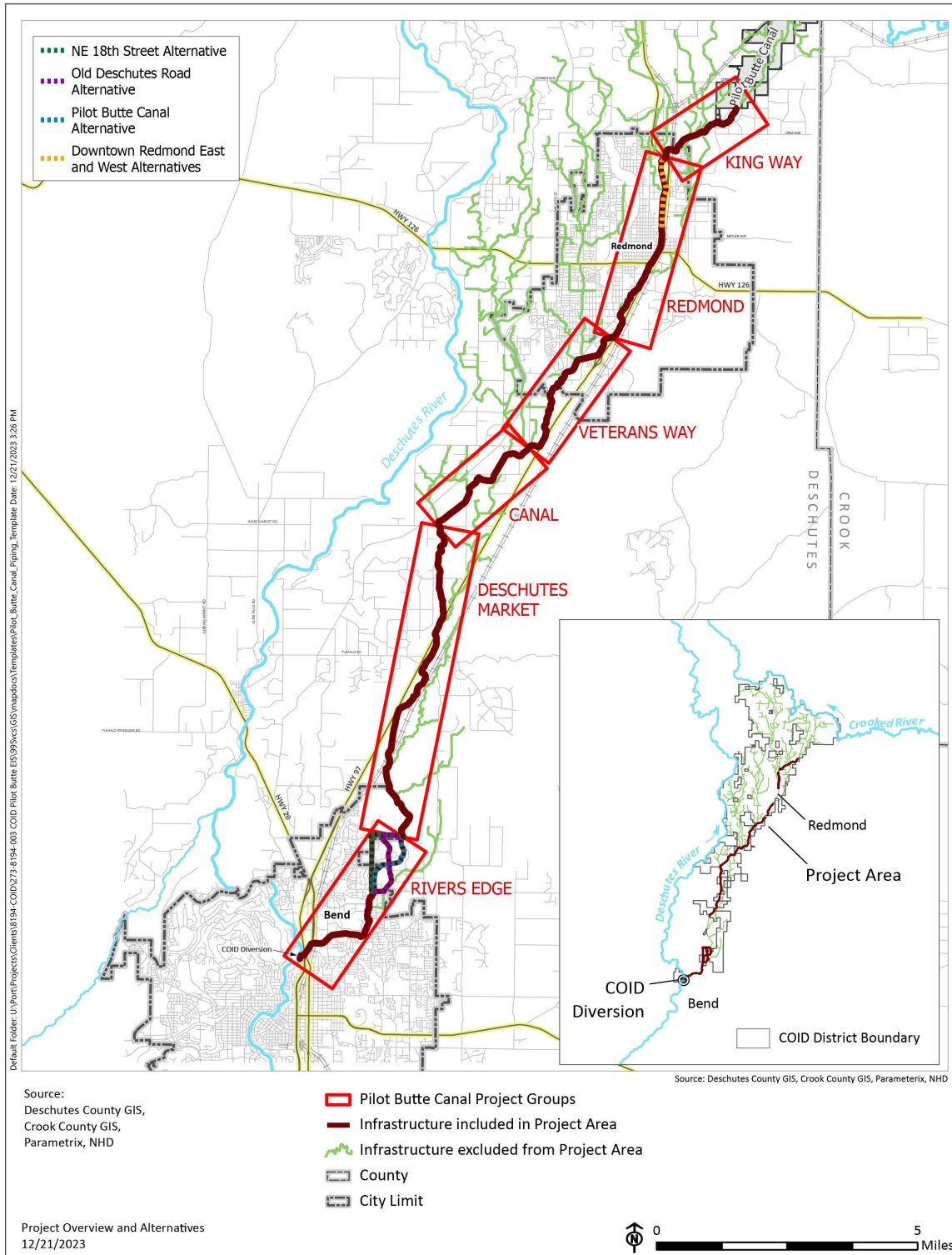


Figure 2. Project Groups

2.2.1 Deschutes County/North Bend Alignment Options

The Modernization Alternative has four options for piping between Yeoman Road and Cooley Road in Deschutes County and north Bend (see Figure 3).

- No Modernization within this Segment (no piping)
- Pilot Butte Canal Alignment (existing canal alignment)
- NE 18th Street Alignment
- Old Deschutes Road Alignment

2.2.1.1 No Modernization within this Segment (No Piping)

This alignment option would keep the 7,800-foot NRHP-listed stretch of the PBC between Yeoman and Cooley Roads in its current configuration and functionality as an open canal. This option would require a pressure reducing station south of Yeoman Road to slow the flow velocity as it exits the pressurized pipe so that the existing open canal can function as currently designed.

2.2.1.2 Pilot Butte Canal Alignment (Existing Canal Route)

This alignment option would replace the open channel with pipe directly within the existing open channel alignment. This alignment option would be built wholly within the section of canal that is listed in the NRHP. This option would not pipe the open channel section immediately south of the Juniper Ridge hydroelectric facility (approximately 170 feet), and it would require installing a pressure reducing station prior to where flow enters the hydroelectric facility.

2.2.1.3 NE 18th Street Alignment

This option would pipe the PBC within a new alignment beginning at the intersection of the existing alignment and Yeoman Road. It would travel west and then north to follow NE 18th Street to its intersection with Cooley Road. At Cooley Road, the alignment option would make an approximately 90-degree turn to follow an alignment extending from near the eastern terminus of Cooley Road to the existing PBC. This option would avoid impacts to a portion of the PBC 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.

2.2.1.4 Old Deschutes Road Alignment

The Old Deschutes Road Alignment option would place pipe in a new alignment beginning at Yeoman Road. It would travel east along Yeoman Road and then northeast to follow Old Deschutes Road. The alignment would travel generally north, cross the existing PBC, then continue north to Cooley Road. The alignment would make an approximately 90-degree turn to follow Cooley Road to the existing the PBC. This option would avoid impacts to the NRHP-listed portion of PBC. The historic section of canal would be left in place, but it would no longer receive irrigation water from the COID system.

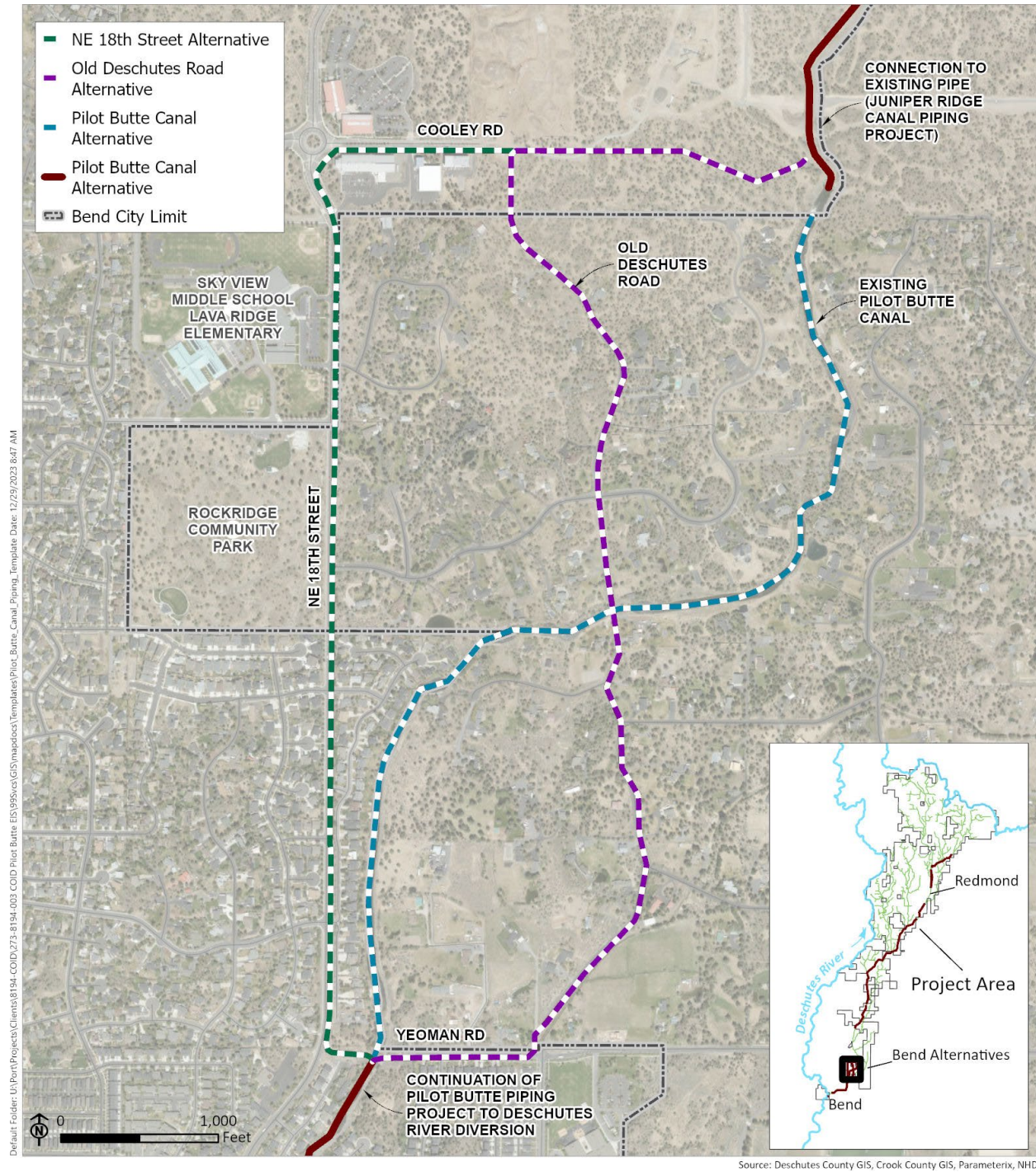


Figure 3. Deschutes County/North Bend Alignment Options

2.2.2 City of Redmond Alignment Options

The Modernization Alternative has four options for piping within the NRHP-listed historic Downtown Redmond section between NW Dogwood Avenue and NW Quince Avenue (see Figure 4).

- No Modernization within this Segment (no piping)
- Pilot Butte Canal Alignment (existing canal alignment)
- Piping to the east in the Watermaster's Access Road
- Piping to the west within Northwest Canal Boulevard

2.2.2.1 No Modernization within this Segment (No Piping)

This alignment option would keep the 6,800-foot NRHP-listed stretch of the PBC in Redmond in its current configuration and functionality as an open canal. This option would require installing a pressure reducing station near the intersection of SW Veteran's Way and US 97 to slow the flow velocity as it exits the pressurized pipe so that the existing open canal can function as currently designed.

2.2.2.2 Pilot Butte Canal Alignment (Existing Canal Route)

This alignment option would replace the open channel with pipe directly within the existing open channel alignment. This alignment option would be built wholly within the section of canal that is listed in the NRHP.

2.2.2.3 Piping to the East in the Watermaster's Access Road

This alignment option would install pipe to the east of the existing PBC and avoid impacts to the section of 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.

2.2.2.4 Piping to the West within Northwest Canal Boulevard

This alignment option would pipe to the west of the existing PBC, primarily within NW Canal Boulevard, and avoid impacts to the section of 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.

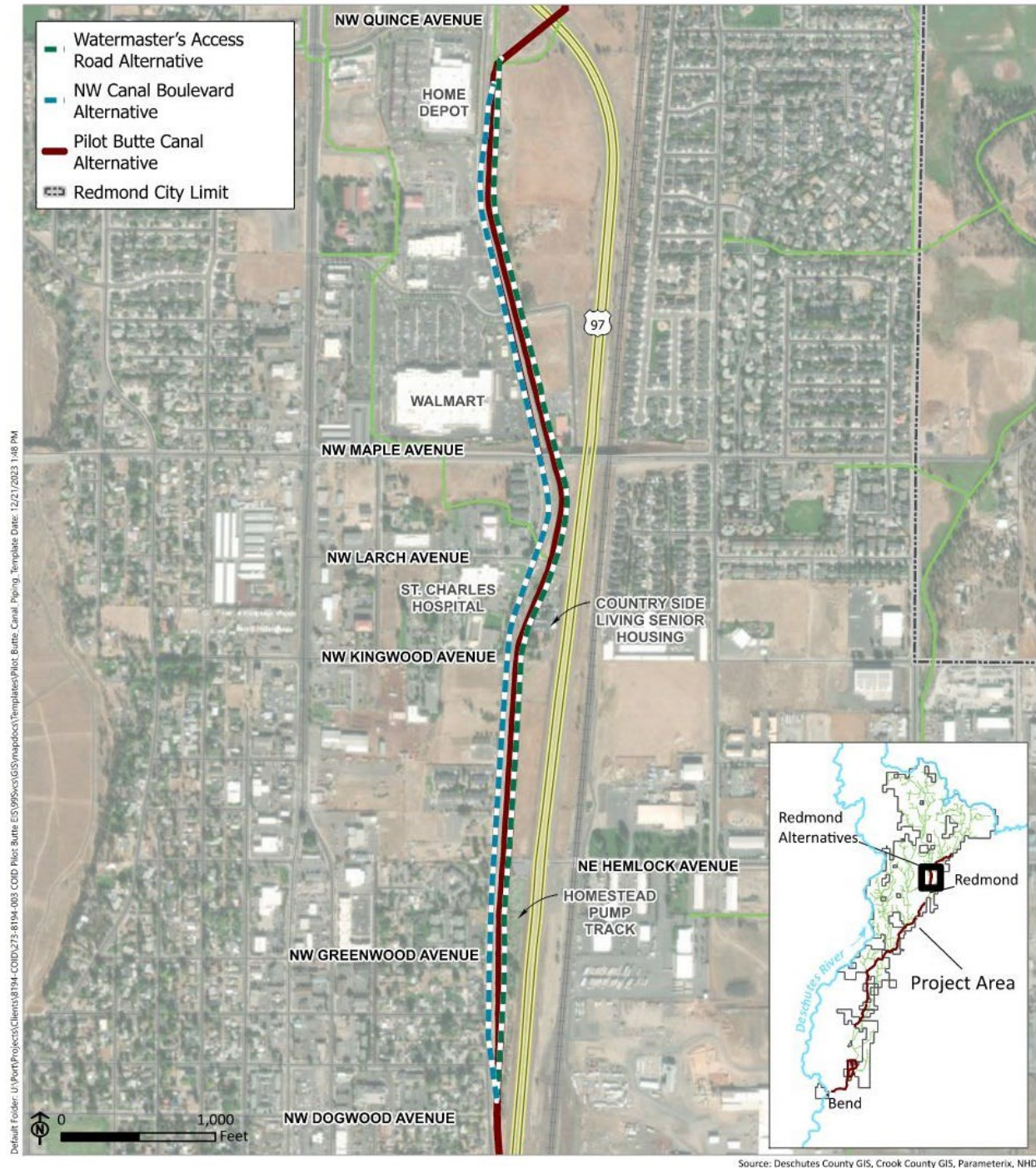


Figure 4. Redmond Alignment Options

3. DEFINITIONS

The following terminology is used when discussing geographic areas in this Technical Report

Project Area. The area within which improvements associated with the project alignment options would occur and the area needed to construct these improvements. The Project Area includes the area needed to construct all permanent infrastructure, including adjacent parcels where modifications would be required for associated work such as utility realignments or upgrades. The Project Area includes a 70-foot construction footprint alongside either side of the existing PBC alignment and alignment options to account for the anticipated area of disturbance during the construction process.

Study Area. This is the geographic area within which physical impacts to the environment could occur with the project alternatives. The Study Area is resource-specific and differs depending on the environmental topic being addressed. For all topics, the Study Area encompasses the Project Area, and for some topics (such as for utilities), the geographic extent of the Study Area is the same as that for the Project Area. For other topics (such as for transportation), the Study Area is substantially larger to account for impacts that could occur outside of the Project Area. The Study Area for the utilities analysis is defined in Section 5.1.

Project vicinity. The environs surrounding the Project Area. The project vicinity does not have a distinct geographic boundary but is used in general discussion to denote the larger area.

4. LEGAL REGULATIONS AND STANDARDS

4.1 Laws, Plans, Policies, and Regulations

4.1.1 Federal

16 USC Ch. 46, Public Utility Regulatory Policies for Electric Utilities, encourages the conservation of energy supplied by electric utilities, the optimization of the efficiency of use of facilities and resources by electric utilities, and equitable rates to electric consumers.

4.1.2 State

4.1.2.1 Statewide Land Use Planning Goals

OAR 660-015 establishes 19 statewide planning goals that express the State's policies on land use planning, which are enacted on a local level by comprehensive planning. The following goals are especially relevant to the PBC piping project:

- Goal 11: Public Facilities and Services. Goal 11 plans for and develops the provision of public facilities and services in both urban and rural areas at a level of service appropriate for current and projected population densities and land uses.

4.1.3 County

4.1.3.1 Deschutes County Code Title 13

Deschutes County Code Title 13 establishes regulations for public services in the county, including water supply systems, on-site sewage disposal and septic tanks, recycling, solid waste, and cable franchises.

4.1.4 Cities

4.1.4.1 Bend City Code Title 11

Bend City Code Title 11 provides regulations for utilities, specifically solid waste management.

4.1.4.2 Bend City Code Title 14

Bend City Code Title 14 provides regulations for the City water system, including restrictions on use, connections to the City water system, and standards and specifications.

4.1.4.3 Bend City Code Title 15

Bend City Code Title 14 provides regulations for the City wastewater system.

4.2 Design Standards

Design standards for public services and utilities are determined by relevant jurisdictions and service providers. Further guidance regarding development in or alongside COID canal alignments, along with standards for canal piping and crossings, is available in the *Central Oregon Irrigation District Development Handbook* (COID 2008).

The following were consulted as they pertained to utility construction requirements within these municipal districts:

- City of Bend Standards and Specifications, January 2022 (City of Bend 2022)
- City of Redmond Public Works 2010 Standards and Specifications (City of Redmond 2010)

5. AFFECTED ENVIRONMENT

5.1 Study Area

The Study Area for public services and utilities includes the Project Area and potential detour routes that may be created during construction. The Project Area includes a 70-foot construction footprint alongside either side of the PBC alignment and alignment options to account for the anticipated area of disturbance during the construction process.

The proposed pipe route stretches across Deschutes County, from the north side of the City of Redmond to the center of the City of Bend. Construction along the evaluated alignment options would require

coordination with several agencies, including Deschutes County, the City of Redmond, the City of Bend, the Oregon Department of Transportation, and BNSF Railway.

5.2 Resource Identification and Evaluation Methods

5.2.1 Published Sources and Databases

Sources used to conduct this land use analysis include the following:

- Deschutes County GIS
- City of Bend GIS
 - Utility maps
- City of Redmond GIS
 - Water distribution system, wastewater collection system, natural gas, COID laterals
- Oregon Department of Energy “Find Your Utility” map

5.2.2 Field Visits and Surveys

No field visits or surveys were performed as part of this environmental evaluation. This evaluation relied on engineering drawings prepared by KPFF as part of preliminary project design.

5.3 Existing Conditions

5.3.1 Existing Utilities

There is a wide range of public services and utilities in the project vicinity, provided by several public and private entities. Rural areas in unincorporated Deschutes County are generally served by fewer utilities and public services than the urban areas of Bend and Redmond.

Table 2 lists utility providers that serve customers within the project vicinity.

Table 2. Project Area Utility Providers

Utility	Provider	Contact	Telephone Number	Email Address
Electric	Pacific Power	Ryan Coburn	541-388-7129	Ryan.Coburn@pacificorp.com
	Central Electric Cooperative	Cody Smith	541-312-7752	cssmith@cec.coop
Natural Gas	Cascade Natural Gas	Donna Herman	541-706-2682	Donna.Herman@cngc.com
	Cascade Natural Gas	Stephen George	541-610-3088	Stephen.George@cngc.com

Utility	Provider	Contact	Telephone Number	Email Address
Sewer/ Wastewater	City of Bend Public Works Utility Department	N/A	541-317-3000 ext. 2	N/A
	City of Redmond Public Works Utility Department		541-504-2000	N/A
Water	Avion Water	Tanner Lemmon	541-408-1687	Tel@avionwater.com
	City of Bend Public Works Utility Department	N/A	541-317-3000 ext. 2	N/A
	City of Redmond Public Works Utility Department	N/A	541-504-2000	N/A
Irrigation	Central Oregon Irrigation District	Kelley Hamby	541-504-7585	khamby@coid.org
Cable/Telecom	TDS	Sosanna McHugh	541-693-5981	Sosanna.McHugh@tdstelecom.com
Solid Waste and Recycling	Bend, Cascade Disposal	N/A	541-382-6660	N/A
	Redmond, Republic Services	N/A	541-548-4984	N/A

Additional telecom providers service central Oregon. While these providers are not known to necessarily be within the project construction limits, a list of those providers and their contact information is provided in Table 3.

Table 3. Telecom Providers Outside Construction Limits

Provider	Contact	Telephone Number	Email Address
Fatbeam	Bruce Hathaway	509-344-1008	operations@fatbeam.com
Lumen	John Denes	541-410-0893	john.denes@centurylink.com
Lumen	Stephen Coker	541-385-0220	Stephen.coker@Centurylink.com
Level3	Robb Robison	503-242-6376	robert.robison@centurylink.com
Zayo	Joseph Kleinasser	720-549-2293	Joseph.kleinasser@zoyo.com

COID not only provides irrigation services but also generates hydropower through the existing Juniper Ridge Project, which is connected to 3.3 miles of piped PBC just north of Bend. The hydroelectric plant generates enough electricity to power 3,300 homes in Central Oregon.

Utility systems are located within the Study Area in several areas through the existing PBC alignment and proposed alignment options, and the systems could potentially be impacted by the piping project. The following tables show all the utility crossings that are known within the prospective alignments. These tables are intended to show the overall existing conditions of the proposed project. Each section is broken down to the crossings that would be impacted by the proposed projects within each prospective alignment option. See Table 4 for the utilities that would be impacted along the length of the proposed project.

Vertical conflicts between the PBC alignment and existing utilities are utility crossings that are either underground or overhead and are mounted on bridge crossings or utility poles. Horizontal conflicts between the PBC alignment and existing utilities are parallel or longitudinal utility alignments where proposed piping would be in the same space and orientation as the utility.

Stationing refers to locations along the alignment as marked on the 30% design plans prepared by KPFF engineers. The stationing begins at the point of diversion on the Deschutes River and continues northward in 100-foot increments toward Redmond.

Table 4. Existing Utility Crossings – Pilot Butte Canal Alignment

Crossing No.	Crossing Location/Station	Utility Type	Utility Owner	Conflict Type	Utility Size
City of Bend					
1	30+62.72	Water	City of Bend	None	12 inches
2	31+94.74	Power	Pacific Corp (Pacific Power)	Vertical	10 inches
3	Boyd Acres Rd. 44+80.97	Power	Pacific Corp (Pacific Power)	Vertical	Duct bank
4	Boyd Acres Rd. 44+83.64	Water	City of Bend	Vertical	16 inches
5	Boyd Acres Rd. 44+83.64	Water	City of Bend	Vertical	16 inches
6	Boyd Acres Rd. 45+34.44	Natural Gas	Cascade Natural Gas	None	4 inches
7	Boyd Acres Rd. 45+35.05	Natural Gas	Cascade Natural Gas	None	8 inches
8	Boyd Acres Rd. 45+38.47	Power	Pacific Corp (Pacific Power)	None	N/A
9	N.E. Brinson Blvd. 84+95.94	Water	City of Bend	None	12 inches

Crossing No.	Crossing Location/Station	Utility Type	Utility Owner	Conflict Type	Utility Size
10	N.E. Brinson Blvd. 85+43.11	Natural Gas	Cascade Natural Gas	None	2 inches
11	Empire Ave. 117+19.24	Water	City of Bend	None	16 inches
12	Empire Ave. 117+19.24	Sanitary Sewer	City of Bend	None	21 inches
13	Empire Ave. 117+51.73	Sanitary Sewer	City of Bend	None	21 inches
City of Redmond					
1	Xero Ln. – 161+07.36	Sanitary Sewer	City of Redmond	Vertical	8 inches
2	171+70.01	Sanitary Sewer	City of Redmond	Vertical	8 inches
3	S.W. Odem Medo Rd. 24+83.49	Sanitary Sewer	City of Redmond	Vertical	8 inches
4	31+95.52	Sanitary Sewer	City of Redmond	Vertical	8 inches
5	52+14.92	Sanitary Sewer	City of Redmond	Vertical	8 inches
6	S.W. Obsidian Ave. 68+50.08	Sanitary Sewer	City of Redmond	Vertical	8 inches
7	S.W. Veterans Way 72+27.98	Water	City of Redmond	Vertical	12 inches
8	N.W. Fir Ave. 144+85.48	Water	City of Redmond	Vertical	Unknown
9	N.W. Hemlock Ave. 154+77.69	Sanitary Sewer (Abandoned)	City of Redmond	Vertical	8 inches
10	N.W. Hemlock Ave. 155+24.06	Water	City of Redmond	Vertical	10 inches
11	N.W. Kingwood Ave. 167+95.93	Water	City of Redmond	Vertical	unknown
12	N.W. Kingwood Ave. 168+02.36	Sewer	City of Redmond	Vertical	8 inches
13	N.E. Negus Way 182+37.30	Sewer	City of Redmond	Vertical	12 inches

Crossing No.	Crossing Location/Station	Utility Type	Utility Owner	Conflict Type	Utility Size
14	N.E. Negus Way 182+52.65	Water	City of Redmond	Vertical	18 inches
15	N.E. 5th St. Approx. 26+25	Sewer - Pressurized	City of Redmond	Vertical	4 inches, pressurized
16	N.E. 5th St. Approx 26+28	Sewer	City of Redmond	unknown	8 inches
17	N.E. 5th St. Approx 26+35	Water	City of Redmond	Vertical	8 inches

5.3.2 Deschutes County/North Bend Alignment Options

5.3.2.1 Pilot Butte Canal Alignment (Existing Canal Alignment)

Within the PBC alignment, there are four occurrences of utilities that could be in conflict with the proposed pipe improvements. These conflicts are related to water and power and could be resolved with minimal impacts. Vertical utility impacts would need to either be rerouted, raised, or lowered.

Table 5 is a summary of the facilities that would be impacted by the proposed existing canal pipeline alignment.

Table 5. Utility Crossings for the 18th Street Optional Alignment in Bend

Crossing No. ^a	Crossing Location/Station	Utility type	Utility Owner	Conflict Type	Utility size
14	132+01.70	Water	City of Bend	None	18 inches
15	132+36.58	Natural Gas	Cascade Natural Gas	Vertical	2 inches
16	134+89.48	Water	Avion Water	Vertical	12 inches
17	137+00 – 158+00	Water	Avion Water	Horizontal	12 inches
18	Morning Star Dr./N.E. Brightwater Dr. 143+08.71	Water	Avion Water	None	10 inches
19	148+56.51	Sanitary Sewer	City of Bend	Vertical	8 inches
20	149+17.00	Storm Drain	City of Bend	None	8 inches
21	153+76.35	Storm Drain	City of Bend	None	12 inches
22	At Canal View Dr. 157+50.64	Natural Gas	Cascade Natural Gas	None	Unknown
23	At Canal View Dr. 157+55.45	Power	Pacific Corp (Pacific Power)	None	Unknown
24	At Canal View Dr. 157+79.27	Water	Avion Water	None	12 inches

Crossing No. ^a	Crossing Location/Station	Utility type	Utility Owner	Conflict Type	Utility size
25	At Canal View Dr. 158+03.23	Sanitary Sewer	City of Bend	None	6 inches
26	At Canal View Dr. – 158+50 – 165+60 Scottsdale Dr.	Fiber Optic	TDS Telecom	Horizontal	Unknown
27	At Scottsdale Dr. 165+62.38	Natural Gas	Cascade Natural Gas	None	Unknown
28	At Scottsdale Dr. 166+10 – 178+00	Fiber Optic	TDS Telecom	Horizontal	Unknown
29	171+35 – 174+24.12	Storm Drain	City of Bend	Horizontal	Unknown
30	174+47.08	Water	Avion Water	Vertical	16 inches
31	174+78.63	Natural Gas	Cascade Natural Gas	None	2 inches
32	175+09.76	Water	Avion Water	Vertical	12 inches
33	175+31.14	Comm	TDS Telecom	None	Unknown
34	174+25 – 178+00	Fiber Optic	TDS Telecom	Horizontal	Unknown
35	175+35 – 178+60	Gas	Cascade Natural Gas	Horizontal	Unknown
36	177+88.60	Gas	Cascade Natural Gas	None	2 inches
37	178+10.14	Storm Drain	City of Bend	Vertical	Unknown
38	178+50.03	Water	Avion Water	Vertical	12 inches
39	179+00 – 191+00	Water	Avion Water	Horizontal	(2) 16 inches
40	186+07.54	Natural Gas	Cascade Natural Gas	Vertical	2 inches
41	187+54.00	Water	Avion Water	None	12 inches
42	192+85.72	Power	Pacific Corp	Vertical	Unknown
43	192+98.66	Power	Pacific Corp (Pacific Power)	Vertical	Unknown
44	194+19.29	Sanitary Sewer	City of Bend	Vertical	8 inches
45	194+00.65	Water	Avion Water	Vertical	10 inches
46	194+99.65	Power	Pacific Corp (Pacific Power)	Vertical	Unknown
47	195+01.03	Natural Gas	Cascade Natural Gas	Vertical	Unknown
48	197+38.98	Storm Drain	City of Bend	Vertical	8 inches
49	197+76.22	Sanitary Sewer	City of Bend	Vertical	8 inches

^a Crossing number continues the list from Table 4 for the City of Bend.

5.3.2.2 NE 18th Street Alignment

Within the NE 18th Street alignment, there are 23 occurrences of utilities that could be in conflict within the corridor of the proposed pipeline alignment. These conflicts are a combination of crossings (vertical conflicts) along with utilities that would be impacted longitudinally (horizontal conflicts) along the proposed pipeline alignment. Detours would need to be set in place to allow for traffic and pedestrian movement during construction. Refer to the Traffic Technical Report for detour alternatives and obstacles. Vertical utility impacts would need to be rerouted, raised, or lowered.

Table 6 is a summary of the facilities that would be impacted by the proposed NE 18th Street pipeline alignment.

Table 6. Utilities Potentially Impacted by the NE 18th Street Alignment

Crossing Location/Station	Utility Type	Utility Owner	Conflict Type
132+36.58	Natural Gas	Cascade Natural Gas	Vertical
134+89.48	Water	Avion Water	Vertical
137+00 – 158+00	Water	Avion Water	Horizontal
148+56.51	Sanitary Sewer	City of Bend	Vertical
At Canal View Dr. – 158+50 – 165+60 Scottsdale Dr.	Fiber Optic	TDS Telecom	Horizontal
At Scottsdale Dr. 166+10 – 178+00	Fiber Optic	TDS Telecom	Horizontal
171+35 – 174+24.12	Storm Drain	City of Bend	Horizontal
174+47.08	Water	Avion Water	Vertical
175+09.76	Water	Avion Water	Vertical
174+25 – 178+00	Fiber Optic	TDS Telecom	Horizontal
175+35 – 178+60	Gas	Cascade Natural Gas	Horizontal
178+10.14	Storm Drain	City of Bend	Vertical
178+_50.03	Water	Avion Water	Vertical
179+00 – 191+00	Water	Avion Water	Horizontal
186+07.54	Natural Gas	Cascade Natural Gas	Vertical
192+85.72	Power	Pacific Corp (Pacific Power)	Vertical
192+98.66	Power	Pacific Corp (Pacific Power)	Vertical
194+19.29	Sanitary Sewer	City of Bend	Vertical
194+00.65	Water	Avion Water	Vertical

Crossing Location/Station	Utility Type	Utility Owner	Conflict Type
194+99.65	Power	Pacific Corp (Pacific Power)	Vertical
195+01.03	Natural Gas	Cascade Natural Gas	Vertical
197+38.98	Storm Drain	City of Bend	Vertical
197+76.22	Sanitary Sewer	City of Bend	Vertical

5.3.3 City of Redmond Options

5.3.3.1 Pilot Butte Canal Alignment (Existing Canal)

Within the PBC alignment, there are 14 occurrences of utilities that could be in conflict with the proposed pipe improvements. The conflicts that exist are vertical crossings. Vertical utility impacts would need to be rerouted, raised, or lowered.

Table 7 is a summary of the facilities that would be impacted by the proposed alignment.

Table 7. Utilities Potentially Impacted by the Existing Pilot Butte Canal Alignment

Crossing Location/Station	Utility Type	Utility Owner	Conflict Type
Xero Ln. – 161+07.36	Sanitary Sewer	City of Redmond	Vertical
171+70.01	Sanitary Sewer	City of Redmond	Vertical
S.W. Odem Medo Rd. 24+83.49	Sanitary Sewer	City of Redmond	Vertical
31+95.52	Sanitary Sewer	City of Redmond	Vertical
52+14.92	Sanitary Sewer	City of Redmond	Vertical
S.W. Obsidian Ave. 68+50.08	Sanitary Sewer	City of Redmond	Vertical
S.W. Veterans Way 72+27.98	Water	City of Redmond	Vertical
N.W. Fir Ave. 144+85.48	Water	City of Redmond	Vertical
N.W. Hemlock Ave. 154+77.69	Sanitary Sewer (Abandoned)	City of Redmond	Vertical
N.W. Hemlock Ave. 155+24.06	Water	City of Redmond	Vertical

Crossing Location/Station	Utility Type	Utility Owner	Conflict Type
N.W. Kingwood Ave. 167+95.93	Water	City of Redmond	Vertical
N.W. Kingwood Ave. 168+02.36	Sewer	City of Redmond	Vertical
N.E. Negus Way 182+37.30	Sewer	City of Redmond	Vertical
N.E. Negus Way 182+52.65	Water	City of Redmond	Vertical

5.3.3.2 Watermasters Access Road Alignment

The proposed Watermaster's Access Road alignment is adjacent to the existing PBC and runs along the east side of the current alignment. Within the Watermaster's Access Road alignment, there would be eight occurrences of utilities that could be in conflict with the proposed pipe improvements. All of the conflicts are vertical crossings. Vertical utility impacts would need to either be rerouted, raised, or lowered.

Table 8 is a summary of the facilities that would be impacted by the proposed alignment.

Table 8. Utilities Potentially Impacted by the Watermasters Access Road Alignment

Crossing Location/Station	Utility Type	Utility Owner	Conflict Type
S.W. Veterans Way 72+27.98	Water	City of Redmond	Vertical
N.W. Fir Ave. 144+85.48	Water	City of Redmond	Vertical
N.W. Hemlock Ave. 154+77.69	Sanitary Sewer (Abandoned)	City of Redmond	Vertical
N.W. Hemlock Ave. 155+24.06	Water	City of Redmond	Vertical
N.W. Kingwood Ave. 167+95.93	Water	City of Redmond	Vertical
N.W. Kingwood Ave. 168+02.36	Sewer	City of Redmond	Vertical
N.E. Negus Way 182+37.30	Sewer	City of Redmond	Vertical
N.E. Negus Way 182+52.65	Water	City of Redmond	Vertical

5.3.3.3 Northwest Canal Boulevard Option

Within the Northwest Canal Boulevard alignment, there would be 10 occurrences of utilities that could be in conflict with the proposed pipe improvements, both vertically and horizontally. Existing gas, water, and sewer lines would need to be relocated. Traffic and pedestrian movement would need to be detoured during construction. Refer to the Traffic Technical Report for detour alternatives and obstacles. Vertical utility impacts would need to either be rerouted, raised, or lowered.

Table 9 is a summary of facilities that would need to be relocated due to conflicts with the horizontal alignment.

Table 9. Utilities Potentially Impacted by the– Northwest Canal Boulevard Alignment

Location/Station	Utility Type	Utility Owner	Conflict Type
Canal Blvd. Station 143+50 thru 182+50	Sewer	City of Redmond	Horizontal
Canal Blvd. Station 168+00 thru 205+00	Gas	Cascade Natural Gas	Horizontal

Table 10 is a summary of facilities that would need to be relocated due to vertical conflicts with the alignment.

Table 10. Utilities Potentially Impacted by the– Northwest Canal Boulevard Alignment

Crossing Location/Station	Utility Type	Utility Owner	Conflict Type
S.W. Veterans Way 72+27.98	Water	City of Redmond	Vertical
N.W. Fir Ave. 144+85.48	Water	City of Redmond	Vertical
N.W. Hemlock Ave. 154+77.69	Sanitary Sewer (Abandoned)	City of Redmond	Vertical
N.W. Hemlock Ave. 155+24.06	Water	City of Redmond	Vertical
N.W. Kingwood Ave. 167+95.93	Water	City of Redmond	Vertical
N.W. Kingwood Ave. 168+02.36	Sewer	City of Redmond	Vertical
N.E. Negus Way 182+37.30	Sewer	City of Redmond	Vertical

Crossing Location/Station	Utility Type	Utility Owner	Conflict Type
N.E. Negus Way 182+52.65	Water	City of Redmond	Vertical

6. IMPACT ASSESSMENT METHODOLOGY AND DATA SOURCES

6.1 Long-Term Impact Assessment Methods

All the existing utilities within the Project Area were evaluated for potential long-term impacts. Project design and engineering and anticipated construction and operation and maintenance were evaluated alongside property boundary maps to determine potential physical impacts. Long-term impacts from the PBC piping project are expected to be limited. Utility infrastructure would be replaced or rerouted to match existing conditions or to improve on what currently exists.

6.2 Short-Term Impact Assessment Methods

Short-term impacts to utility infrastructure would be minimal. While services would either be rerouted or removed due to the PBC piping project, some utility customers could lose access to the utility for a period of time. During construction, roads could be temporarily closed, and detours set to avoid construction areas. This could also limit access by utility providers to enact repairs or install new service connections.

6.3 Indirect Impact Assessment Methods

Indirect impacts are changes to utility service levels based on how the project alternatives would affect existing and future utility connections in the Project Area. No indirect impacts are expected from the PBC piping project due to the lack of long-term direct impacts as described in Section 6.1.

6.4 Cumulative Impact Assessment Methods

The cumulative impacts analysis addressed the long-term and short-term cumulative impacts of the project alternatives. Other projects considered in the analysis included major transportation, development, utility infrastructure, and environmental enhancement projects recently constructed, under development, or scheduled for construction, as well as the planned projects that are reasonably likely to be constructed.

No cumulative impacts are expected from the PBC piping project. Once the piping project is completed, utility facilities are expected to be returned to preconstruction conditions or replaced to meet current design standards.

7. ENVIRONMENTAL CONSEQUENCES

7.1 Long-Term Impacts

7.1.1 No Action Alternative

Under the No Action Alternative, there would be no changes or impacts to the existing utility facilities or the environment surrounding the facilities.

7.1.2 Modernization Alternative (Full Piping)

Long-term impacts to utilities from the PBC piping project are expected to be limited. Existing utility lines could require adjustment or relocation to avoid conflicts with the proposed canal piping. Utility lines that could require adjustment include water mains, gravity and pressure sewer mains, storm mains, gas mains, underground power lines, and communication lines. Long term, costs for utility maintenance are not anticipated to increase after construction is complete.

7.1.2.1 Deschutes County/North Bend Options

No Modernization within this Segment (No Piping)

Under this option there would be no impacts to existing utility facilities. This option would have the least impact to adjacent utility customers for all of the Deschutes County/North Bend route options.

Pilot Butte Canal Alignment (Existing Canal Route)

Piping the PBC within the existing alignment would not have long-term environmental impacts to the existing utility facilities. There would be minimal utility impacts with the proposed pipe improvements. This would have the second-highest utility disruption impacts of the Deschutes County/North Bend route options. To accommodate the canal piping, crossing utilities could require elevation adjustments or relocation to achieve adequate cover and separation. Impacted utility crossings at Yeomen Road include a water main and pressure sewer main. Utility location services would verify utility locations and conflicts.

NE 18th Street Option

The NE 18th Street alignment would have significant impacts to the existing utilities both vertically and in parallel. This would have the highest utility disruption impacts of the Deschutes County/North Bend route options. The water, gas, and communications lines running along NE 18th Street and power lines running down Cooley Road would require relocation to accommodate canal piping. Other crossing utilities including water, sewer, and gas would require relocation or vertical adjustment when crossing the canal piping. No long-term environmental impacts to utility facilities are anticipated from this option.

Old Deschutes Road Option

Of the Deschutes County/North Bend route options, the Old Deschutes Road alignment would have the third-highest amount of disruption impacts to the existing utilities both vertically and in parallel. The water and sewer mains that run down Yeoman Road could require relocation to accommodate the canal

pipings; however, available utility information and maps do not indicate utility conflicts along Old Deschutes Road. Utility location services would verify the location of utilities along Old Deschutes Road to confirm impacts.

City of Redmond Options

No Modernization within this Segment (No Piping)

Under the No Action Alternative, there would be no changes or impacts to utility facilities. This option would have the least impact to adjacent utility customers for all of the City of Redmond route options.

Pilot Butte Canal Alignment (Existing Canal Route)

Piping the PBC within the existing alignment would not have long-term environmental impacts to the existing utility facilities. The PBC alignment would have the third-highest amount of utility disruption impacts of the City of Redmond route options. To accommodate the canal piping, crossing utilities could require elevation adjustments or relocation to achieve adequate cover and separation. Impacted utility crossings include water mains, sewer mains, and gas mains. No long-term environmental impacts to utility facilities are anticipated from this alternative. Utility location services would verify utility locations and conflicts.

Piping to the East in the Watermaster's Access Road

The Watermaster's Access Road alignment would impact the existing utilities both vertically and in parallel where existing utilities cross or run adjacent to the canal piping. The Watermaster's Access Road alignment would have the second-highest amount of utility disruption impacts of the City of Redmond route options. The water line running adjacent to the canal piping between NW Dogwood Avenue and NW Elm Avenue could require relocation to accommodate the canal piping. Impacted utility crossings including water mains, sewer mains, and gas mains could require vertical adjustment or relocation where they conflict with canal piping. Utility location services would verify the location of utilities along Watermaster's Access Road to confirm impacts. No long-term environmental impacts to utility facilities are anticipated from this option.

Piping to the West within Northwest Canal Boulevard

The NW Canal Boulevard alignment would have significant impacts to the existing utilities both vertically and in parallel. The NW Canal Boulevard alignment would have the highest amount of utility disruption impacts of the City of Redmond route options. Existing water and sewer lines running along NW Canal Boulevard could require relocation to avoid conflicts with the proposed canal piping. Other crossing utilities including water, sewer, gas, and underground power would likely require vertical adjustment when crossing the canal piping. Utility location services would verify utility locations and conflicts. No long-term environmental impacts to utility facilities are anticipated from this option.

7.2 Short Term (Construction) Impacts

7.2.1 Modernization Alternative (Full Piping)

The construction of the PBC pipe would be largely impactful to the existing utilities that run parallel to or cross the proposed canal piping alignment. Construction sequencing is presented in Section 2.

Construction at any given location would be completed during a single non-irrigation season during the winter months. For the construction of the canal piping, existing utilities would require adjustment or relocation to avoid conflicts. Detours would need to be set for traffic and pedestrian movement during construction. Refer to the Traffic Technical Report for detour alternatives for areas where existing utilities are parallel to the proposed alignment.

Creating bypasses for water, sewer, or gas utilities could be required to minimize service downtime. Franchise utility agreements would be reviewed to confirm relocation of conflicting franchise utilities. Most, if not all, of the work necessary to remedy the conflicts would be performed within the existing right-of-way or within the canal easement.

7.2.1.1 Deschutes County/North Bend Option

No Modernization within this Segment (No Piping)

Under the No Action Alternative, there would be no impacts to existing utility facilities.

Pilot Butte Canal Option

The existing PBC alignment would have minimal construction impacts to the surrounding area.

NE 18th Street Option

The NE 18th Street alignment would impact the existing utilities that run parallel to or cross the proposed canal alignment. These conflicts would be substantial along this alignment, and the construction impacts would affect the existing road in this section. Blasting the existing rock to facilitate excavation would not be advisable due to the proximity of the existing utilities. Detours would need to be set for traffic and pedestrian movement during construction. Refer to the Traffic Technical Report for detour alternatives.

Old Deschutes Road Option

The Old Deschutes Road alignment would have minimal construction impacts to the surrounding area. No utility conflicts have been identified within this section.

7.2.1.2 City of Redmond Option

No Modernization within this Segment (No Piping)

Under the No Action Alternative, there would be no impacts to existing utility facilities.

Pilot Butte Canal Alignment (Existing Canal Route)

Construction of the PBC within the existing alignment would have minimal construction impacts to the surrounding area with minimal impacts to the existing utility infrastructure surrounding it. Existing utility crossings would need to be relocated, raised, or lowered.

Piping to the East in the Watermaster's Access Road

Construction within the Watermaster's Access Road alignment would have minimal construction impacts to the surrounding area. Existing utility crossings would need to be relocated, raised, or lowered.

Piping to the West within Northwest Canal Boulevard

The NW Canal Boulevard alignment would impact existing utilities that run parallel to or cross the proposed piping alignment. These conflicts would be substantial along this alignment due to the number and location of conflicts, the utility customers adjacent to this alignment—including the St. Charles Redmond Hospital complex—and the length of the alignment in NW Canal Boulevard. The construction impacts would also affect the existing road in this section. Blasting the existing rock to facilitate excavation would not be advisable due to the proximity of the existing utilities. Detours would need to be set for traffic and pedestrian movement during construction. Refer to the Traffic Technical Report for detour alternatives.

7.2.2 Potential Off-Site Staging Areas

The construction contractor may use one or more off-site staging areas outside the Study Area to store or assemble materials that would then be transported by truck to the construction site. Off-site staging could occur with any of the alternatives. Whether, where, and how to use such sites would be the choice of the contractor; therefore, the actual site or sites cannot be known at this time. Given this uncertainty, detailed analysis of impacts is not possible at this time. It is assumed that because of regulatory and time constraints on the contractor, any site they choose would need to be already developed with road access. It is also assumed that the contractor would be responsible for relevant permitting or mitigation that could be required for use of a chosen site. The EIS identifies the types of impacts that could occur from off-site staging, based on the above assumptions. This analysis is not intended to “clear” any specific site, but rather to ensure disclosure of the general types of impacts.

Staging areas are not anticipated to have utility conflicts unless overhead vertical clearance is required for specialized construction equipment.

7.3 Cumulative Effects

No cumulative impacts are expected from the PBC piping project related to utility facilities. Utility infrastructure would be replaced to match existing conditions, or it would be improved to meet current design standards.

7.4 Compliance with Laws, Regulations, and Standards

Utility reconstruction would comply with City of Bend, City of Redmond, Deschutes County and/or Oregon Public Utility Commission utility standards as applicable, or the appropriate design deviations would be requested.

7.5 Conclusion

Construction of the PBC project would temporarily impact the utility infrastructure in Central Oregon. There would only be short-term impacts during construction. No long-term impacts to utility facilities would be expected from the proposed project.

8. MITIGATION MEASURES

8.1 Common to Piping

Construction-related impacts to the existing utilities within the alignments of the PBC 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.
- Adjusting 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 vehicular 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.

9. CONTACTS AND COORDINATION

No individuals or organizations were contacted as part of the preparation of this technical report.

10. PREPARERS

Name	Professional Affiliation	Education	Years of Experience
Dave Munsell	Parametrix	B.S. Civil Engineering	34
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