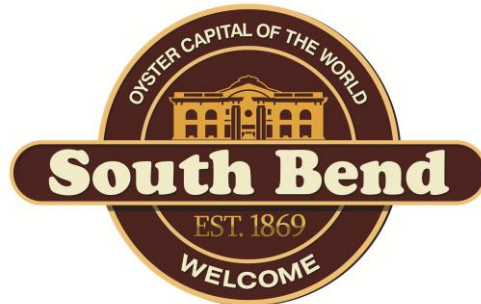


# CITY OF SOUTH BEND

PACIFIC COUNTY

WASHINGTON



## WATER SYSTEM PLAN

G&O #23245  
JANUARY 2026

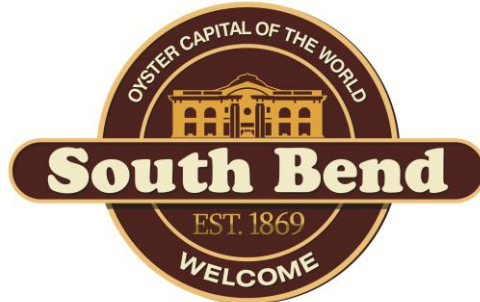


**Gray & Osborne, Inc.**  
CONSULTING ENGINEERS

# CITY OF SOUTH BEND

PACIFIC COUNTY

WASHINGTON



## WATER SYSTEM PLAN



G&O #23245  
JANUARY 2026



**Gray & Osborne, Inc.**  
CONSULTING ENGINEERS

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- Appendix A – WFI and Sanitary Survey
- Appendix B – Water Rights Documents
- Appendix C – Water System Standards and Policies
- Appendix D – Coliform and Stage 2 DBPR Monitoring Plan
- Appendix E – Water Quality Monitoring Schedule and CCR
- Appendix F – Hydraulic Modeling Results
- Appendix G – Water Loss Control Action Plan
- Appendix H – DOH Bacterial Detection Guidance
- Appendix I – Cross-Connection Control Policy
- Appendix J – SEPA Checklist
- Appendix K – Local Government Consistence Statements

# CHAPTER 1

## WATER SYSTEM DESCRIPTION

### OBJECTIVE

#### SCOPE OF WORK

This Water System Plan (Plan) is an update of previous water system plans prepared for and adopted by the City of South Bend (City) in accordance with requirements set forth in Chapter 246-290 WAC (Water Regulations). Previous water system plans include a 1994 and 2013 plan by Gray & Osborne, Inc. and the 2004 Water System Plan by Gibbs & Olson, Inc. This Plan meets all requirements of Part 246-290-100 WAC, as further detailed in the Washington State Department of Health (DOH) Water System Design Manual, as well as the needs and concerns of South Bend. This Plan must be reviewed by and address any comments of neighboring utilities, Pacific County Planning Department, DOH, and Washington State Department of Ecology (Ecology). Pursuant to Water Regulations, this Plan must receive approval of DOH and be adopted by South Bend. Gray & Osborne’s scope of work on this Plan was authorized by contract dated September 2023.

This Plan covers the following topics:

- Current and Projected Water System Capacities and Demands
- Water Use Efficiency (Conservation)
- Water Source Protection Requirements
- Water System Operations Program Requirements
- Water System Design Standards
- Capital and Non-Capital Improvement Plan
- Financing Plan

#### CHAPTER OBJECTIVE

The objective of this chapter is to present background information for South Bend’s Plan. Subjects covered include the following:

- Ownership and Management
- System Background
- Inventory of Existing System
- Related Planning Documents
- Service Area Characteristics
- Water System Policies

## OWNERSHIP AND MANAGEMENT

### SYSTEM NAME AND DOH ID NUMBER

The name of the water system on the DOH data system is “*SOUTH BEND WATER DEPARTMENT.*” The DOH public water system ID number is **81500Y**.

### TYPE OF OWNERSHIP

The City of South Bend operates a Group A, Community public water system pursuant to DOH Water Regulations.

### MANAGEMENT STRUCTURE

South Bend is a Code City operated under a Mayor-Council form of government in accordance with RCW 35A.12. The Mayor has the responsibility of appointing the City Supervisor, who is responsible for overseeing utility operation and maintenance. The City Council is responsible for enacting policies that govern the operation of the City and the Public Works Lead carries out those policies. The water system is managed and maintained by the Water Treatment Operator. Responsible parties involved with the water system operation are included in Table 1-1.

**TABLE 1-1**

**South Bend Water System Management Structure**

<b>Title</b>	<b>Name</b>	<b>Water System Responsibility</b>
Mayor	Julie Struck	Policy Implementation
City Council	Wyatt Kuiken	General Policy
City Council	Darren Manlow	General Policy
City Council	Patricia Corcoran	General Policy
City Council	Jan Davis	General Policy
City Council	Clarence “Bunny” Williams	General Policy
City Supervisor	Dennis Houk	Policy Implementation
Clerk-Treasurer	David Johnson	Policy Implementation
Administrative Assistant	Kim Porter	Billing/Questions
Water Treatment Plant Operator	Chris Orkney	Operation/Maintenance
Water Treatment Plant Assistant Operator	Kelly Spoor	Operation/Maintenance

The Water System Operator, Mr. Orkney, reports to the City Supervisor, who reports to the Mayor. Mr. Orkney holds the following DOH certifications: Water Distribution Manager III, Water Treatment Plant Operator III, and Cross-Connection Control Specialist I.

## **WATER FACILITIES INVENTORY FORM**

A copy of City’s Water Facilities Inventory (WFI) form, updated November 13, 2024, is included in Appendix A. The WFI indicates 825 full-time single-family residential connections, 10 apartments, condos, or duplexes, 83 full-time residential units in apartments, condos, duplexes, 60 recreational services, and 124 institutional, commercial/business, school, day care, or industrial services, for a total of 1,032 service connections. The WFI indicates an estimated full-time residential population of 1,630, and an estimated transient population of 11,000 present between the months of October through April, which increases over the summer to 15,000 in May and 22,500 in June through September. The high transient population is due to the fact that Highway 101 runs directly through the City, which is one of two major access thoroughfares to the Long Beach peninsula. In addition, South Bend serves an estimated regular non-residential population of 550 people per month during the school year. This encompasses all months except July and August when the non-residential population is reduced to 150.

Additional planning information about customer classes and service connections are discussed in this chapter under “Current Conditions.”

## **CONTACTING SOUTH BEND WATER DEPARTMENT**

The South Bend Water Department’s mailing address and telephone number is:

South Bend Water Department  
1102 West First Street  
P.O. Box Drawer 9  
South Bend, Washington 98586  
Phone: (360) 875-5571

In addition, the City Supervisor can be contacted by email at the following:

[dennis.houk@southbend-wa.gov](mailto:dennis.houk@southbend-wa.gov)

The Water Treatment Plant Operators can be contacted by email at the following:

[chris.orkney@southbend-wa.gov](mailto:chris.orkney@southbend-wa.gov)  
[kelly.spoor@southbend-wa.gov](mailto:kelly.spoor@southbend-wa.gov)

## **SYSTEM BACKGROUND**

### **HISTORY OF WATER SYSTEM DEVELOPMENT AND GROWTH**

#### **Location**

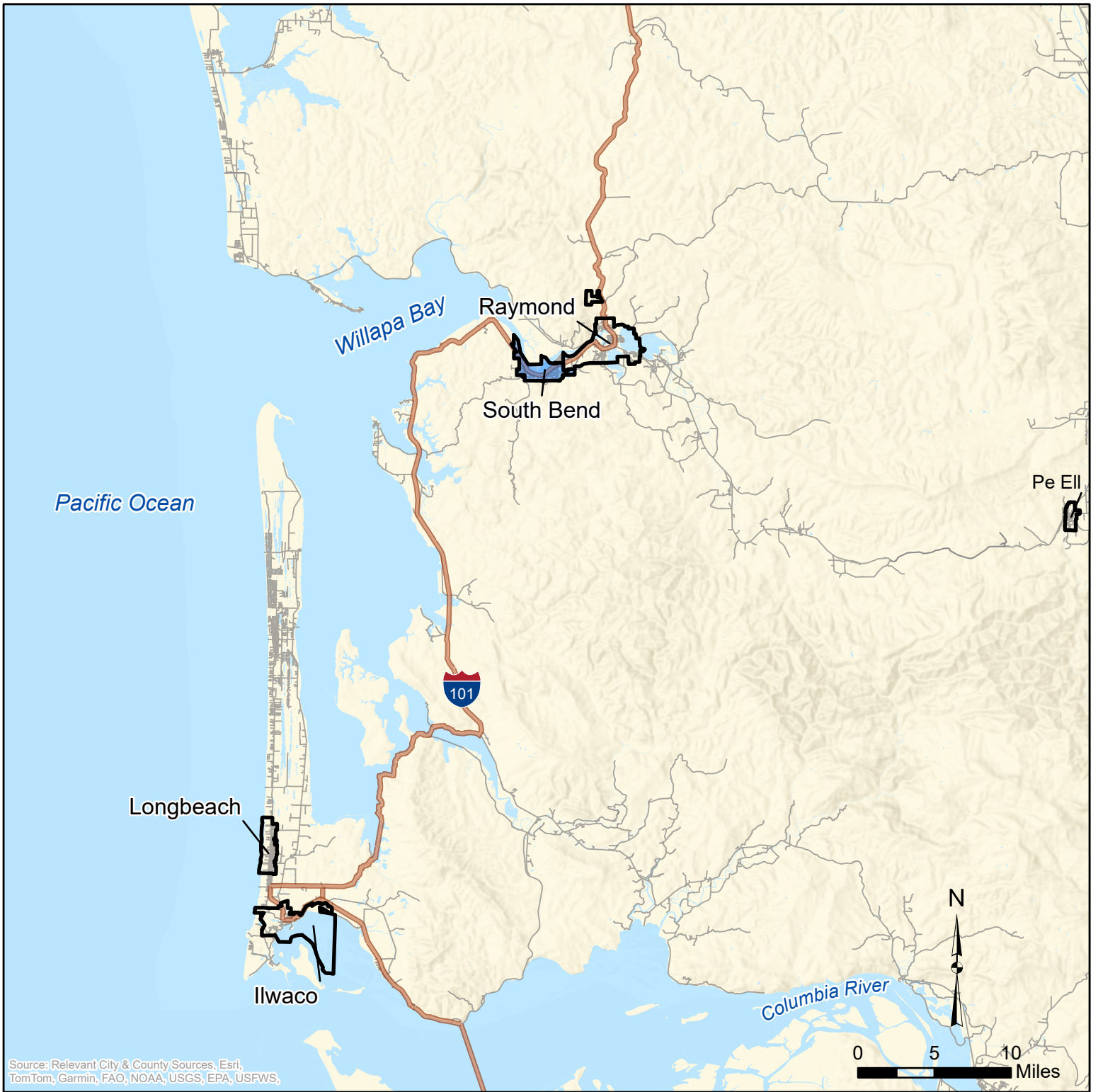
The City of South Bend is located in Pacific County, Washington, and lies west of the City of Raymond along the Willapa River. Approximately 2 miles of the Willapa River is within South Bend City limits. The South Bend Water Department serves a service area of the South Bend City limits and the areas of Eklund Park and Baleville, an area north of the Willapa River, which are outside City limits. Figure 1-1 shows the vicinity map for the South Bend area.

#### **History**

The City was incorporated in 1890, and by 1893 a private company had begun installing a wood-stave, gravity distribution pipe network. Water was originally drawn from log-crib impoundments on Martin and Electric Light Creeks and on both the East and West branches of Fliess Creek. In 1963, a concrete dam and an asbestos-cement (AC) transmission line were constructed on Electric Creek. Similar improvements were made on Martin Creek in 1964. The Fliess Creek watershed was last used in 1989.

A single transmission main transports water across the Willapa River from the source of supply on the north side of the river to the City on the south side. The original steel main failed in 1962, and was replaced by a cathodically protected 12-inch cast iron pipe.

The City constructed its original Water Treatment Plant (WTP) in 1971 consisting of chemical addition, flash mixing, filtration, fluoridation and chlorination processes. The WTP was located on the north side of the Willapa River approximately 500 feet southwest of Martin Creek along Airport Road. The City constructed a new WTP in October 2000 at the same approximate location as the original plant. The new WTP relies on microfiltration units, fluoridation and chlorination. The location of the WTP is shown on Figure 1-2. In 2022, the City completed an upgrade and expansion to the WTP. The City operated a large open water impoundment located approximately 1/4 mile south of the City limits with a capacity of 4.2 million gallons (MG). The reservoir was constructed in a ravine to take advantage of a natural draw, and an earth-fill dike was constructed across the draw to form a storage impoundment with an overflow elevation of 256 feet above Mean Sea Level (MSL). The original date of construction is not known but the reservoir was enlarged to the 4.2 MG capacity in 1962. To reduce leakage, grouting was done in 1973 behind the concrete walls of the reservoir. In 1976, the concrete walls were lined with an impervious membrane and a floating cover was installed. A 218,000-gallon steel standpipe with an overflow elevation of 256.5 feet MSL was constructed along Rixon Road south of the Willapa Harbor Hospital in 1976.



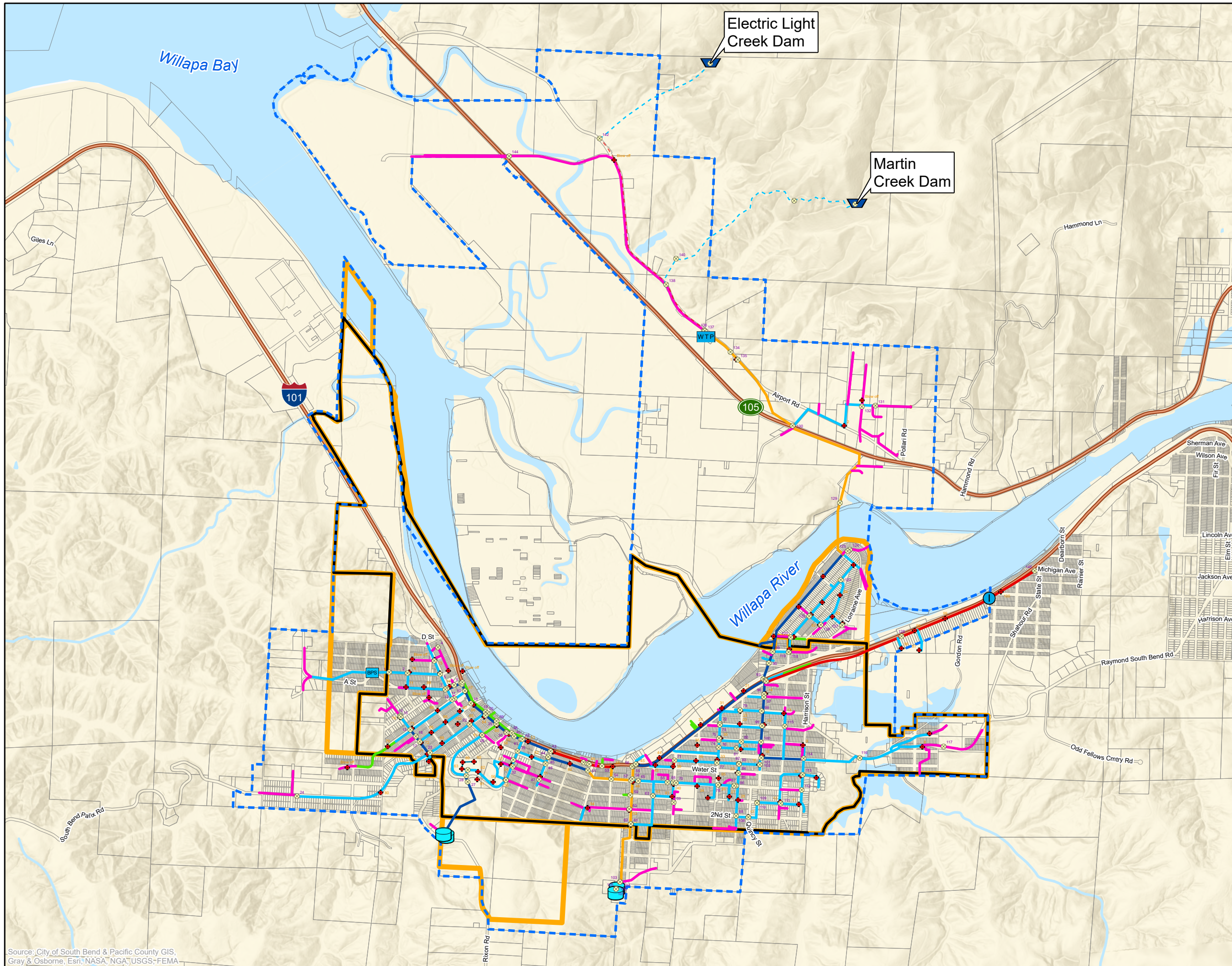
Source: Relevant City & County Sources, Esri, TomTom, Garmin, FAO, NOAA, USGS, EPA, USFWS,



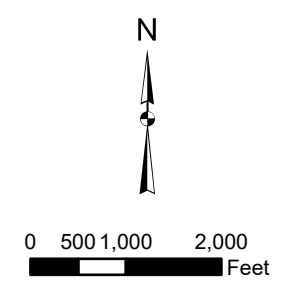
**CITY OF SOUTH BEND**  
 WATER SYSTEM PLAN  
**FIGURE 1-1**  
**VICINITY MAP**



**Gray & Osborne, Inc.**  
 CONSULTING ENGINEERS



- Water Facility**
- ⊗ Valve
  - ⊕ Hydrant
  - ⓘ Intertie
  - Ⓚ BPS Pump Station
  - ▾ Dam
  - ⊕ Reservoir
  - Ⓚ WTP Water Treatment Plant
- Water Main (Diameter)**
- ≤ 3"
  - 4"
  - 6"
  - 8"
  - 10"
  - 12"
  - Lateral
- Raw Water Main**
- - - 6"
  - - - 10"
- Reference**
- Highway
  - - - Retail Service Area
  - ▭ Urban Growth Area
  - ▭ City Limits
  - ▭ Parcel
  - ▭ Surface Water



**CITY OF SOUTH BEND**  
 WATER SYSTEM PLAN  
**FIGURE 1-2**  
 EXISTING WATER SYSTEM



Source: City of South Bend & Pacific County GIS, Gray & Osborne, Esri, NASA, NGA, USGS, FEMA

In 2007-2008 the 4.2 MG storage impoundment was drained and decommissioned. The dam that impounded the water was removed with the removal permitted by the Washington State Department of Ecology. Within the footprint of the impoundment, two glass-lined bolted steel reservoirs were constructed as well as a third glass-lined bolted steel reservoir sited at the existing Rixon Reservoir location. Additionally, perimeter security fencing was installed at both reservoir sites. The dimensions and capacities of the newer reservoirs are detailed in the following section, Inventory of Existing System.

In 1982, an intertie was constructed with the City of Raymond. An Interlocal Agreement stipulates that both Cities will supplement water supplies “in the event of need for industrial consumption, fire, major drought, failure of source and/or transmission or treatment facilities and such other emergencies as may occur.” The intertie consists of 6,400 lineal feet of 10-inch PVC pipe and 3,200 linear feet of 12-inch PVC pipe installed along Highway 101. It conveys water from a 12-inch main at the Willapa Harbor Port Dock in Raymond to an 8-inch asbestos cement main located at the intersection of Quincy Street and Highway 101 in South Bend. A pump station containing two 7.5-hp pumps is used to convey treated City of Raymond water to South Bend. The City of South Bend is responsible for operation and maintaining the pump station intertie. The intertie between South Bend and Raymond was upgraded in 2015 and is detailed in the following section, Inventory of Existing System.

### **Current Conditions**

According to the 2024 WFI, the system serves a total of 1,032 active connections and has a DOH limit of 1,273 connections. Historic billing data shows that billed units fluctuate with each billing period, with between 950 and 1,099 units billed each month. Most of this variation occurs within the residential connections. The City experiences a very high transient population during the summer months when tourists pass through the City on Highway 101 enroute to Willapa Bay and the Pacific Ocean coast. According to the WFI, the population accessing the water system doubles during these months. The full water system is shown in Figure 1-2, and Figure 1-3 shows a closer view of the system within the city limits.

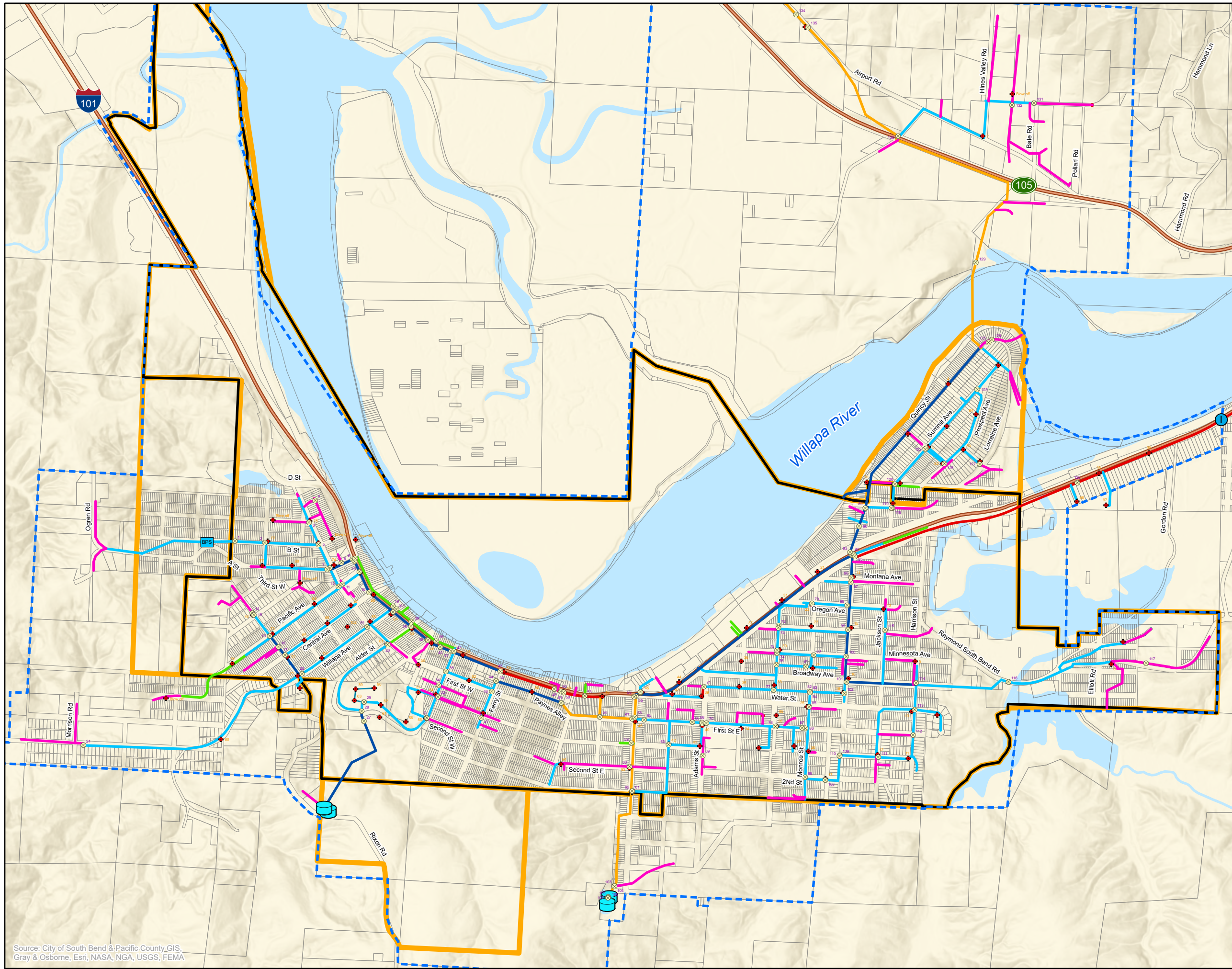
### **PROJECTS COMPLETED SINCE THE 2014 WATER SYSTEM PLAN**

Table 1-2 summarizes the capital improvement projects completed within the water system since the last WSP.

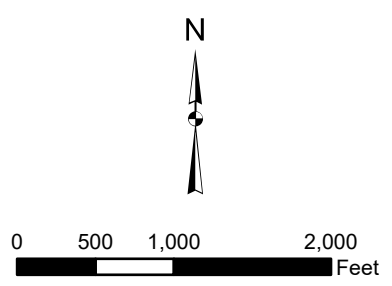
**TABLE 1-2**

**Projects Completed Since Last WSP**

<b>Project Name</b>	<b>Project Description</b>	<b>Year Completed</b>
Intertie Upgrade	Upgrade to the Intertie with the City of Raymond with new Variable Frequency Drives, Panel, and Telemetry	2015
Leak Detection	With Utility Service Associates	2017 and 2018
Raw Water Impoundment (Electric Light Creek)	Drain impoundment, remove sediment and logs, replace screen	2018
Raw Water Impoundment (Martin Creek)	Drain impoundment, remove sediment and logs, replace screen	2018
Fluoride Chemical System	Replace existing Sodium Fluoride Saturator/Pump/Controller with Duplex Fluoride Pump Skid and Analyzer	2018
4 <sup>th</sup> Street Water Main	Replace 875 feet of 6-inch AC with 8-inch PVC water main between Willapa Avenue and Pacific Avenue.	2020
Water Treatment Facility Expansion	Install a new 3 <sup>rd</sup> skid of membranes, new laser turbidimeter on skid, and new 3 <sup>rd</sup> raw water pump. Replace finished water pumps.	2022
Water Treatment Facility Upgrades	Replace Evoqua membranes on two existing skids and install laser turbidimeter on skids. Convert membrane backwash system to low pressure and disinfection from chlorine gas to sodium hypochlorite generation system. Various other upgrades and improvements also implemented.	2022
Broadway Avenue Water Main	Replace 485 feet of 6-inch AC with 6-inch PVC between Jackson Street and Quincy Street.	2023
Light Creek Davit	New swing arm davit on Light Creek	2019
Transmission Main Replacement	300 feet of new raw water transmission line and drain valve from the bottom of Martin Creek impoundment to ravine crossing	2017
Sample Station Installation	Four new coliform monitoring sample stations installed	2022



- Water Facility**
- ⊗ Valve
  - ⊕ Hydrant
  - ⓘ Intertie
  - Ⓚ Pump Station
  - Ⓜ Reservoir
  - Ⓜ WTP Water Treatment Plant
- Water Main (Diameter)**
- ≤ 3"
  - 4"
  - 6"
  - 8"
  - 10"
  - 12"
  - Lateral
- Reference**
- Highway
  - Retail Service Area
  - Urban Growth Area
  - City Limits
  - Parcel
  - Surface Water



**CITY OF SOUTH BEND**  
 WATER SYSTEM PLAN  
**FIGURE 1-3**  
**EXISTING WATER SYSTEM SOUTH**

**Gray & Osborne, Inc.**  
 CONSULTING ENGINEERS

Source: City of South Bend & Pacific County\_GIS, Gray & Osborne, Esri, NASA, NGA, USGS, FEMA

## **ADJACENT AND NEARBY PURVEYORS**

The City has two adjacent purveyors, the City of Raymond and the Bud Runyon water system. The Willapa Valley Water District and Port of Willapa Harbor Tokeland are also nearby, though the City has no interties with these systems. Where available, boundaries of these purveyors are shown in Figure 1-4.

### **City of Raymond**

The City entered into an Interlocal Agreement for Waterline Intertie with the City of Raymond in 1982. More detail is provided on the intertie under the Intertie and Service Area Agreements headings later in this chapter.

### **Bud Runyon Water System**

The Bud Runyon water system is a Group B water system with a total of six connections and is located within the City of South Bend's water system service area north of the Willapa River between the Water Treatment Plant and Highway 101. The City's policies (Duty to Serve) allow for connection to its water system when the customer is within its water service area.

## **GEOGRAPHY**

Topography within the City's service area ranges from approximately 15 feet to 250 feet above mean sea level. The water service area along the Willapa river and Highway 101 is generally flat and zoned either as commercial or residential. Moving away from either bank of the Willapa River, the slopes increase into the Willapa Hills. The north side of the Willapa River includes the Willapa Hills (watershed) where the City's raw water is collected for treatment and the south side of the Willapa River includes a continuation of the Willapa Hills where the storage reservoirs are located.

The landscape in the Willapa River basin ranges from marshes, grasslands, farmlands, and low hills along the lower river to farmland, mixed deciduous forests, and low to moderate elevation hills along the upper river. Elevations in the Willapa River basin range from sea level near the mouth, to 40 feet above sea level near the City of Raymond (RM 7), to 200 feet above sea level near the Town of Lebam (RM 34), to greater than 2,000 feet above sea level near the headwaters (RM 43).

## **INVENTORY OF EXISTING SYSTEM**

A description of the facilities currently owned and operated by the City is provided in the following sections. A copy of the April 2023 Water System Sanitary Survey and Membrane Filter Plant Survey conducted by the Department of Health are included in Appendix A.

## **SOURCE OF SUPPLY**

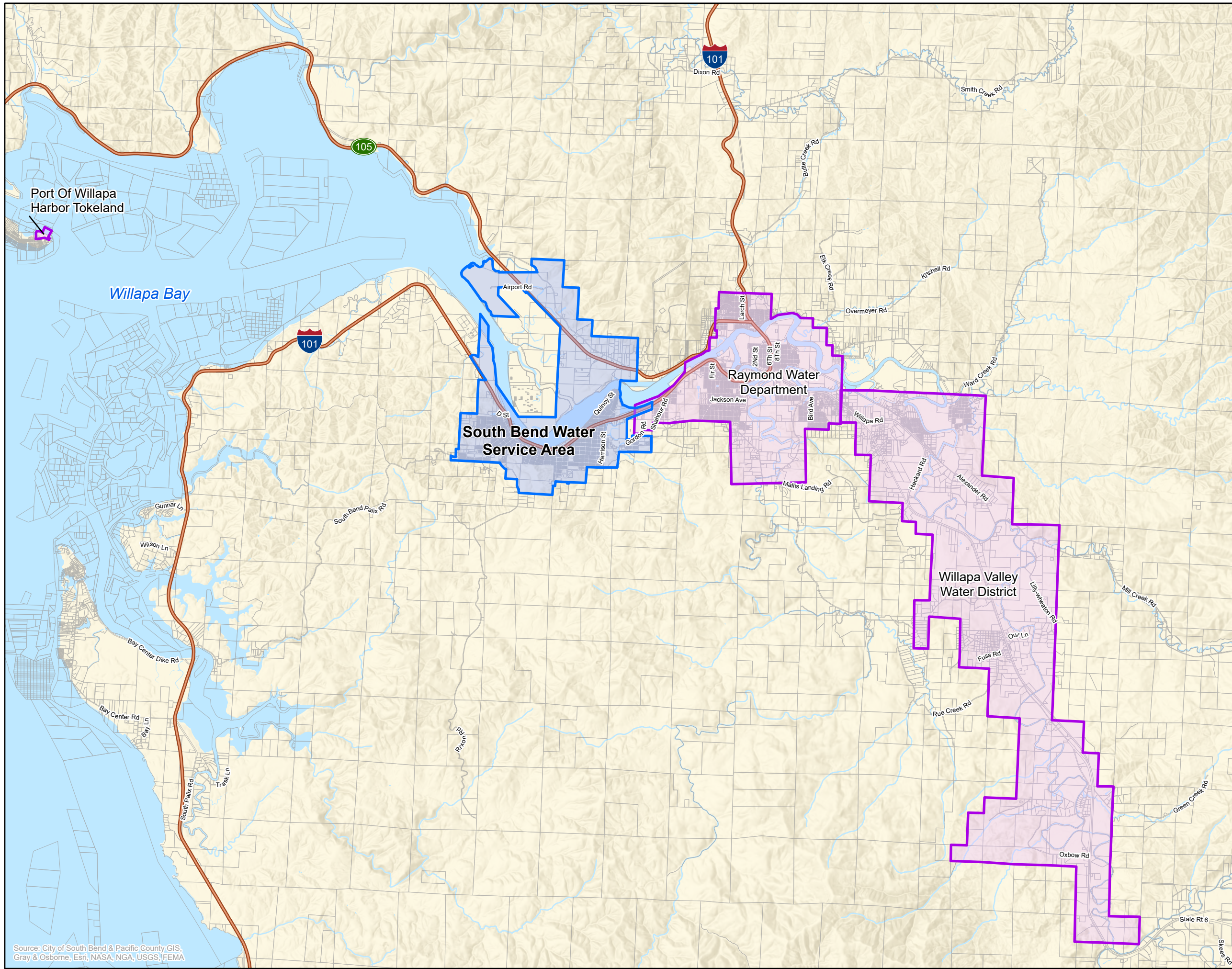
The City currently has three sources of supply available for use. These sources are Martin Creek, Electric Creek, and the City of Raymond Intertie. Fliess Creek was historically utilized by the City between 1942 and 1989, but use of this source diminished and eventually ceased when the wood stave piping was no longer repairable.

The impoundment facilities for Electric and Martin Creeks consist of concrete dams. The impoundment capacities for Electric and Martin Creeks are reportedly 200,000 gallons and 60,000 gallons, respectively. Raw water transmission mains from both impoundments flow via gravity down individual graveled access roads to Airport Road and then along Airport Road to the WTP.

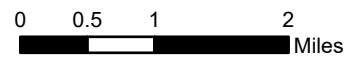
## **WATER RIGHTS**

Information and interpretations of the City's water rights were obtained from records and direct input by the Washington State Department of Ecology (Ecology). The City holds a total of five water rights. Two of these rights are for storage which dictate a limit on storage volume, while three are for surface water diversions (withdrawals). These three rights allow the City to withdraw a total instantaneous flow of 3.76 cubic feet second (cfs) or 1,690 gpm for municipal use. The annual withdrawal limit is only specified on the Martin Creek certificate, and is 1,450 acre-feet per year. From the language of the permit, Ecology has interpreted this to mean that the City's total annual water right is 1,450 acre-feet.

A summary of the City's certificated water rights is provided in Table 1-3. Copies of the individual water right certificates are included in Appendix B, as are the City's water right self-assessment forms. An instantaneous water right limit represents the maximum diversion rate allowed from the surface water source. An annual water right limit represents the total quantity of water that may be diverted during a calendar year. The priority date, based on their date of application to Ecology, provides a means of ranking those water rights that are junior or senior. The water right with the earliest date has the highest priority for withdrawal.



- Service Boundary**
- South Bend Water Service Area
  - Adjacent Purveyor
- Reference**
- Highway
  - Parcel
  - Surface Water



**CITY OF SOUTH BEND**  
 WATER SYSTEM PLAN  
**FIGURE 1-4**  
**ADJACENT PURVEYORS**



Source: City of South Bend & Pacific County GIS, Gray & Osborne, Esri, NASA, NGA, USGS, FEMA

**TABLE 1-3**

**Water Rights**

<b>Name</b>	<b>Record Number</b>	<b>Instantaneous Qi</b>	<b>Annual Qa (acre-feet)</b>	<b>Priority Date</b>
Electric Creek <sup>(1)</sup>	R2-*16186CWRIS	-	-	1960-07-18
Martin Creek <sup>(2)</sup>	R2-*19471CCWRIS	2.0 cfs	1,450	1966-02-23
	S2-*19374CCWRIS			1965-11-26
East Branch of Fliess Creek <sup>(3)</sup>	S2-*04918CWRIS	0.84 cfs <sup>(3)</sup>	-	1939-07-27
West Branch of Fliess Creek <sup>(3)</sup>	S2-*04919CWRIS	0.92 cfs <sup>(3)</sup>	-	1939-07-27
<b>Total</b>		<b>3.76</b>	<b>1,450</b>	

- (1) Subject to Storage Permit R-249 (not to exceed 1.54 acre-feet to be stored annually for municipal supply), which is equivalent to 501,776 gallons.
- (2) Subject to Storage Permit R-332 (identifies storage of up to 2.2 acre-ft., which is equivalent to 716,823 gallons). Priority Date of 02/23/1966 corresponds to a Reservoir Permit, whereas Priority Date 11/26/1965 corresponds to an Appropriation.
- (3) Primary water right. 0.84 cfs = 377 gpm. Total Fliess Creek water right is equivalent to 1.76 cfs or 790 gpm.

Ecology has indicated that because the Electric Creek water right is for storage only, it conveys no right for any diversion. Since the City does use Electric Creek as a source, Ecology has indicated that the City should file an Application for a New Water Right to legally claim withdrawal from Electric (Light) Creek.

The place of use (now, retail service area) for the Electric Creek and Martin Creek water rights is “the area served by the City of South Bend.” The place of use (now, retail service area) for the Fliess Creek water rights is the “City of South Bend.” The Fliess Creek right has not been utilized since 1989, but was identified as a potential source in the 1994, 2004, and 2014 Water System Plans. The Washington Department of Health (DOH) Water Facilities Inventory (WFI), last updated in 2024, notes that the Fliess Creek source (S03) is inactive with a date of November 8, 1996.

**Water Right Relinquishment**

Washington State’s water law includes the principle that a water right is confirmed and maintained for beneficial use. People often use the expression “use it or lose it” to describe this principle. Put simply, a water right may be wholly or partially lost through extended periods of voluntary non-use. The return of unused water to the state is called relinquishment. While water for municipal water use is exempt from relinquishment, it is still subject to abandonment for non-use when coupled with shown intent to relinquish the water right. The City of South Bend has not utilized Fliess Creek as a potable water source since 1989, but has consistently demonstrated its intent to use this source for municipal supply in Washington State Department of Health approved Water System Plans in 1994, 2004 and in 2014. In addition, a Fliess Creek Feasibility Study was completed in November 2009 to investigate options for repairing and replacing the Fliess Creek intake structures and transmission line. The City still anticipates potentially using Fliess Creek at some point in the future.

## **TREATMENT**

The City's Water Treatment Plant (WTP) was put on-line in October 2000 and various facilities were upgraded and expanded in 2022. The WTP uses membrane microfiltration and chlorine disinfection and has a rated capacity of 900 gpm. Water flows by gravity from watersheds into the raw water collection basins at Martin and Electric Light Creek open-water impoundments, then flows by gravity via pipelines to the WTP. The raw water flow rate is controlled by a sleeve valve upstream from the WTP. Three 300-gpm pumps are then utilized to pump the water through the microfiltration trains. The filtered water from the microfiltration units is then disinfected with chlorine hypochlorite prior to entry to a 39,000 gallon clearwell. An on-site generation system is used to produce sodium hypochlorite at the facility. Caustic soda is added prior to distribution for corrosion control. Finished water is supplied to the distribution system by three 450-gpm (two duty and one spare) finished water pumps. The total finished water pumping capacity is 900 gpm with two pumps on and one pump off.

## **STORAGE**

The City owns and operates four finished water storage reservoirs sited at two locations in the hills to the south of the City limits.

### **Main Reservoirs 1 and 2**

Main Reservoir 1 is a 1.65-million-gallon glass-lined bolted-steel reservoir with an overflow elevation of 261 feet. Main Reservoir 2 is an 803,000-gallon glass-lined bolted-steel reservoir with an overflow elevation of 261 feet. The two Main Reservoirs sit side by side within the former open-water impoundment.

### **Rixon Road Reservoirs**

The New Rixon Road Reservoir is a 354,000-gallon glass-lined bolted-steel reservoir with an overflow elevation of 261 feet. The Old Rixon Road Reservoir is a 218,000-gallon welded-steel reservoir with an overflow elevation of 261 feet. The two Rixon Road reservoirs sit side by side in the hills on the western side of the City. There are plans to install solar panels at the reservoir.

Table 1-4 includes a summary of the City’s storage facilities.

**TABLE 1-4**  
**Storage Facilities**

<b>Name</b>	<b>Gross Capacity (Gallons)/ Material</b>	<b>Base Elevation (feet MSL)<sup>(1)</sup></b>	<b>Overflow Elevation (feet MSL)<sup>(1)</sup></b>	<b>Year of Construction</b>	<b>Diameter (feet)</b>
Main Reservoir 1	1,652,588 Glass-lined Bolted Steel	229.08	261.09	2008	92.31
Main Reservoir 2	802,840 Glass-lined Bolted Steel	230.08	261.09	2008	64.34
New Rixon Road Reservoir	354,224 Glass-lined Bolted Steel	243.33	261.09	2007	55.95
Old Rixon Road Reservoir	217,951 Welded Steel	241.15	261.09	1976	42.00
<b>Total</b>	<b>3,027,603</b>				

(1) Feet MSL refers to Feet above Mean Sea Level.

**BOOSTER PUMP STATIONS**

The City operates three booster pump stations. Each booster pump station serves a very limited number of homes. Individual booster pumps are discouraged by DOH since they can create backflow situations within the distribution system.

**B Street Booster Pump Station**

The B Street booster pump station serves 14 residences located along B Street. A 5-hp pump conveys approximately 50 gpm to the system, with pressure control by two 50-gallon pressure tanks. The City maintains a 3-hp backup booster pump in their shop in the event the 5 hp needs maintenance. The booster pump station is located at an elevation of approximately 225 feet above MSL. It is equipped with a transfer switch for generator usage. A summary of the B Street booster pump station is included in Table 1-5.

**Main Reservoir Booster Pump Station**

The Main Reservoir booster pump station is located immediately adjacent to the larger northern reservoir at the Main Reservoir location. This booster pump station was constructed in 2011 to replace the Wolfe Booster Pump Station. Two homes connected to the City water system are served by this booster pump to maintain adequate pressure. The booster pump is housed in an 8-foot by 8-foot secure structure. The booster pump is

located at an elevation of approximately 230 feet above MSL. It is equipped with a transfer switch for generator usage. A summary of the Main Reservoir Booster Pump Station is included in Table 1-5.

**Rixon Road Reservoir Booster Pump Station**

The Rixon Road Reservoir booster pump station is located adjacent to the older welded steel reservoir at the Rixon Road Reservoir location. Two homes connected to the City water system are served by this booster pump to maintain adequate pressure. The booster pump is housed in a small secure structure and is located at an elevation of approximately 235 feet above MSL. It is equipped with a wire transfer switch for generator usage. A summary of the Rixon Road Reservoir Booster Pump Station is included in Table 1-5.

**TABLE 1-5**

**Booster Pump Station Summary**

	<b>B Street Booster Pump Station</b>	<b>Main Booster Pump Station</b>	<b>Rixon Road Booster Pump Station</b>
Manufacturer	Baldor	Jacuzzi	Jacuzzi
Model No.	--	CSSCXHA-3901	CSSCXHA-3901
Horsepower	5	1	1
Capacity (gpm)	50	30	30
Ground Elevation	225 feet	230 feet	235 feet
Residences Served	14	2	2

**TRANSMISSION AND DISTRIBUTION SYSTEM**

The water system base map, shown in Figure 1-2, shows the layout of the City’s distribution system. The locations of fire hydrants and valves are indicated, and the water mains are color coded by pipe size. A majority of the distribution system consists of PVC pipe installed through distribution upgrade projects in the 1980s. Approximately 33 percent of the distribution system is asbestos cement (AC) pipe, which is in need of replacement. The life expectancy of AC pipe is significantly reduced in areas with hydric soils and/or where groundwater is present within the pipe zone for extended periods. The City currently tracks pipe installation and replacement through as-built drawings. As-built drawings are maintained in a file at the Public Works Department. Table 1-6 provides a breakdown of the system by pipe size and material.

Major water mains are 8, 10, and 12 inches in diameter. Static pressures can be as high as 100 pounds per square inch (psi) for portions of the system along the waterfront (elevations of 20 to 25 MSL). Static pressures are considerably lower in the vicinity of Ecklund Park, the Courthouse, Hospital, and at A, B, and C Streets, where ground elevations are 100 to 200 feet above MSL.

**TABLE 1-6**

**Pipe Material, Size, and Length**

Pipe Size	Pipe Material (feet)				Total
	PVC	AC	DI/Cast	Steel	
12-inch	1,306	7,458	1,462	-	10,226
10-inch	5,343	1,157	-	1,497	7,997
8-inch	4,370	6,193	2,262	-	11,950
6-inch	24,807	27,016	-	919	53,617
4-inch	1,670	2,842	-	739	5,251
< 4-inch	34,862	-	-	7,778	42,640
<b>Total</b>	<b>70,998</b>	<b>46,026</b>	<b>3,724</b>	<b>10,933</b>	<b>131,681</b>

The distribution system consists of approximately 131,700 feet of pipe (approximately 25 miles). The distribution system is looped in most areas except for the Willapa River crossing, the area between Kendrick Street and Ferry Street and the area between Highway 101 and Eklund Park.

**TELEMETRY AND CONTROL**

The telemetry system is a spread spectrum radio system with sites at the water treatment plant, the main reservoir site, the Rixon Road site, and City Hall. The telemetry system allows the booster pumps at the WTP to be called on by the level in any of the City’s four reservoirs. Reservoir levels are displayed at City Hall and the WTP; however, control is only available at the WTP.

**INTERTIES**

Upgrades to the intertie were made in 2015 and included the addition of telemetry for remote command and control via radio. South Bend can utilize their SCADA system located at the WTP to operate and view in real time intertie flow and status. The intertie’s Cla-Valves were replaced by Variable Frequency Drives (VFDs) and two swing check valves were added (one for each pump feeding South Bend). Prior to the upgrade, the intertie had a maximum capacity of approximately 375 gpm. The upgraded intertie booster station can deliver a maximum capacity of 600 gpm from Raymond to South Bend, when both pumps are running.

## **GROWTH MANAGEMENT AND ZONING**

### **GROWTH MANAGEMENT ACT CONSIDERATIONS**

One of the primary goals of the 1990 Growth Management Act (GMA) is to channel growth into urban areas where adequate public facilities already exist or can be provided in an efficient manner. Urban Growth Area (UGA) boundaries are utilized to site new development and to determine the acceptable level of service. Typically, a City water system service area is defined as the UGA boundary established in the current comprehensive plan. However, not all areas within the City's service area were included in the UGA. Based on current policies established in the Pacific County Comprehensive Plan, the City cannot provide water service outside the UGA unless there is a public health threat that would be mitigated by providing service to existing development. Therefore, the City can provide service outside of the UGA as long as the service is consistent with GMA. South Bend's UGA extends to a large area north of the City boundaries, as well as to smaller areas to the south, east, and west. The UGA boundary is shown in Figure 1-2.

### **SERVICE AREA CHARACTERISTICS**

#### **Retail Service Area**

Because the City does not have wholesale water service customers, the City's Retail Service Area is the same as its Water Service Area. The retail service area encompasses the City of South Bend and includes areas west, south, and northeast of the city limits. The retail service area, city limits, and Urban Growth Area (UGA) are shown in Figure 1-2.

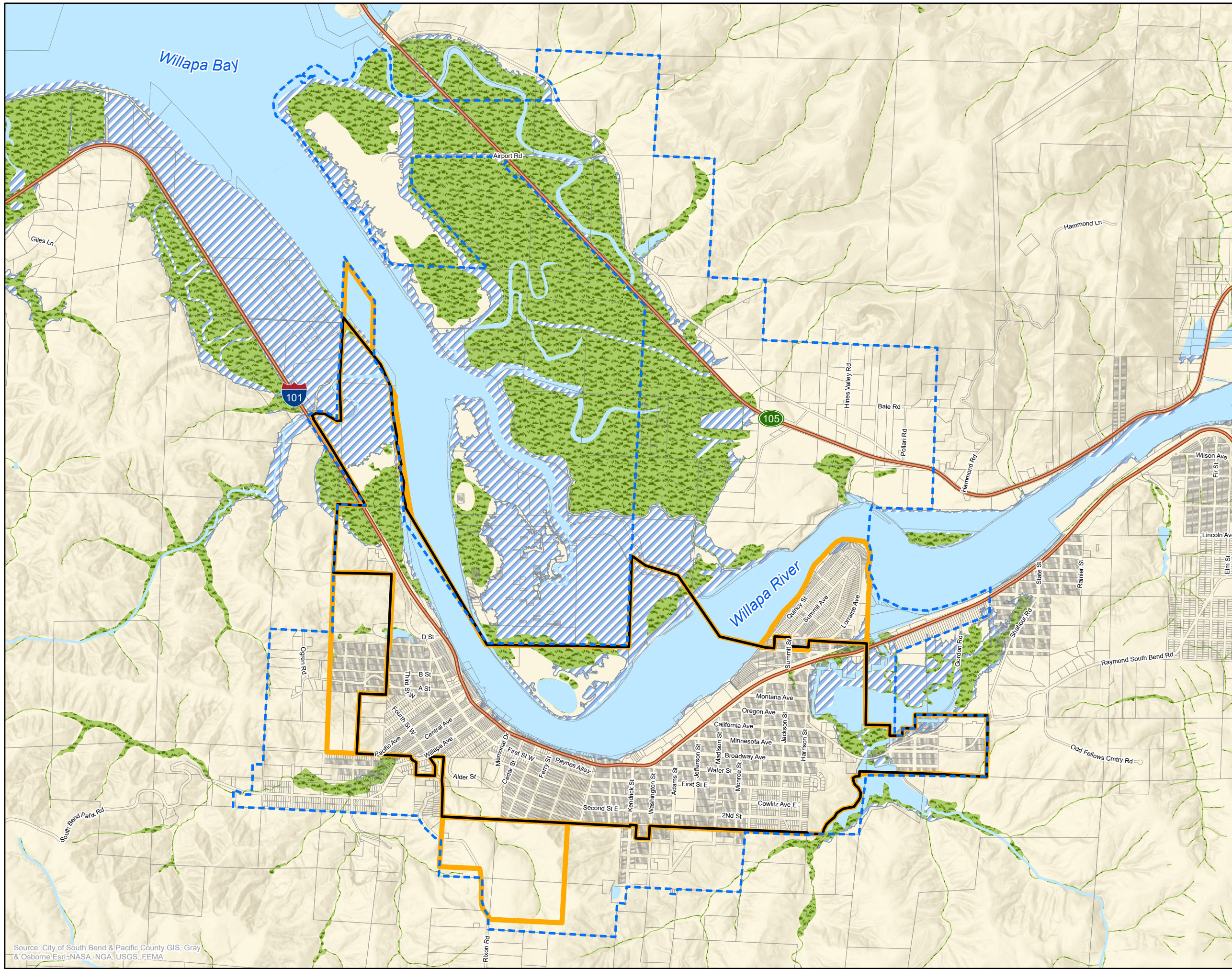
#### **Sensitive Areas**

The City is in the vicinity of a few site sensitive areas. Relevant areas include wetlands, water bodies, and flood and seismic hazard areas. These areas are shown in Figures 1-5 and 1-6. Service area topography is shown in Figure 1-7.

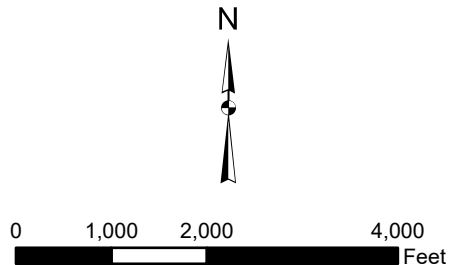
#### **Existing Land Use and Zoning**

Zoning for areas within the city limits was reestablished in Ordinance 1532. Zoning for areas within the Urban Growth Area (UGA), but outside City limits is established by Pacific County Ordinance (184). Zoning and land use for the South Bend area are shown in Figure 1-8.

The following section summarizes each of the zoning designations within the City of South Bend, as defined in Ordinance 1532.



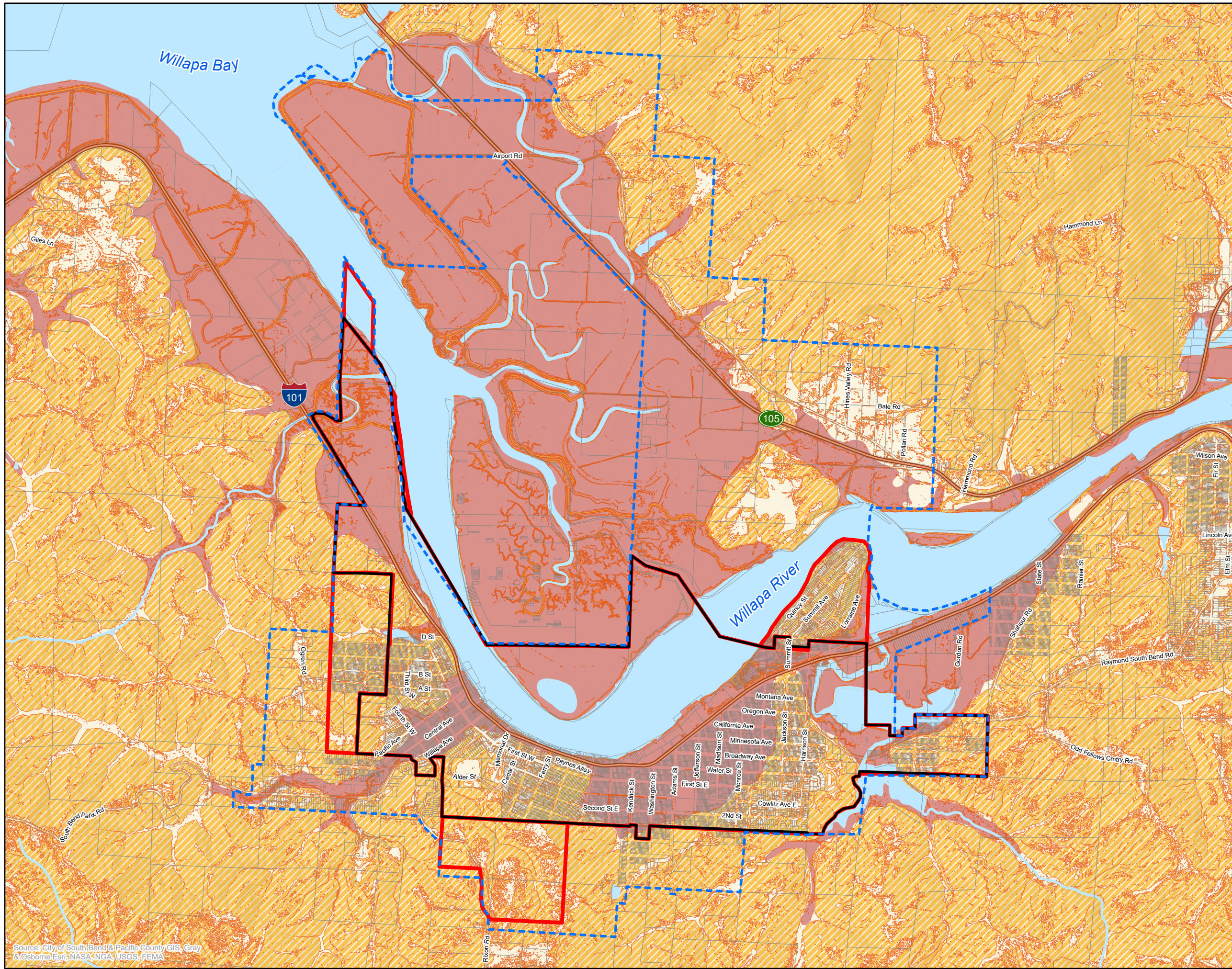
- Sensitive Area**
- NWI Wetland
  - FEMA 100-Year Floodplain
- Reference**
- Highway
  - Retail Service Area
  - Urban Growth Area
  - City Limits
  - Parcel
  - Surface Water



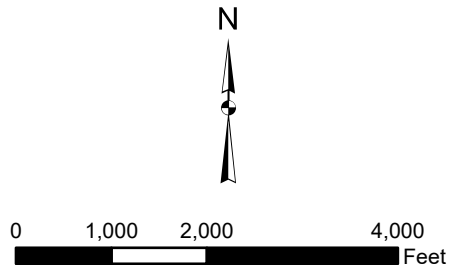
**CITY OF SOUTH BEND**  
 WATER SYSTEM PLAN  
**FIGURE 1-5**  
**SENSITIVE AREAS**



Source: City of South Bend & Pacific County GIS, Gray & Osborne Esri, NASA, NGA, USGS, FEMA



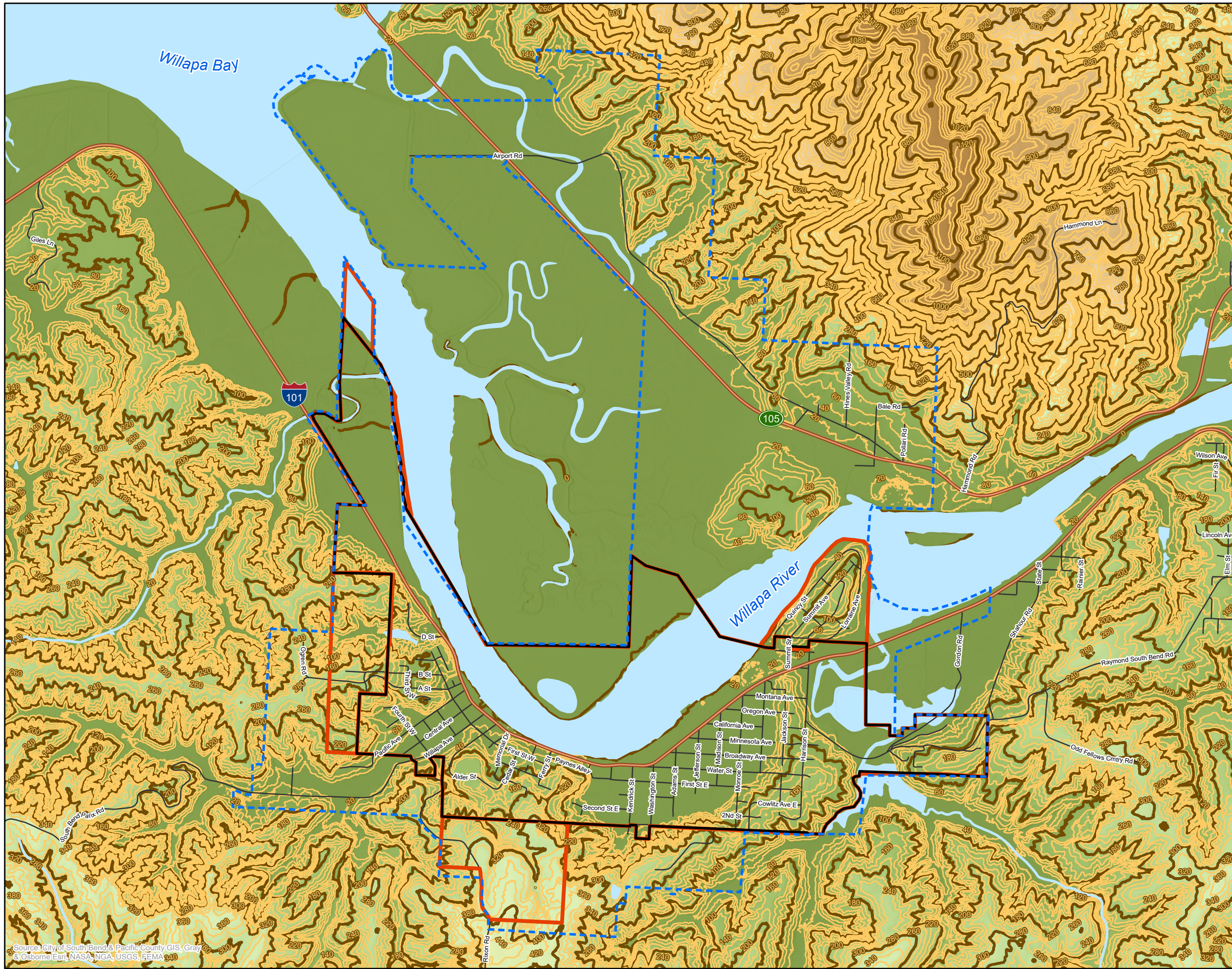
- Hazard**
- Magnitude 9 Tsunami Hazard Area
  - Steep Slope (>40%)
- Reference**
- Highway
  - Retail Service Area
  - City Limits
  - Urban Growth Area
  - Parcel
  - Surface Water



**CITY OF SOUTH BEND**  
 WATER SYSTEM PLAN  
**FIGURE 1-6**  
 HAZARD AREAS

  
**Gray & Osborne, Inc.**  
 CONSULTING ENGINEERS

Source: City of South Bend & Pacific County GIS, Gray & Osborne Esri, NASA, NGA, USGS, FEMA



**Elevation (Ft.)**

- 1175'
- 0'

**Contour (Ft.)**

- 100'
- 20'

**Reference**

- Highway
- Road
- Retail Service Area
- City Limits
- Urban Growth Area
- Surface Water

N

0 1,000 2,000 4,000 Feet

**CITY OF SOUTH BEND**

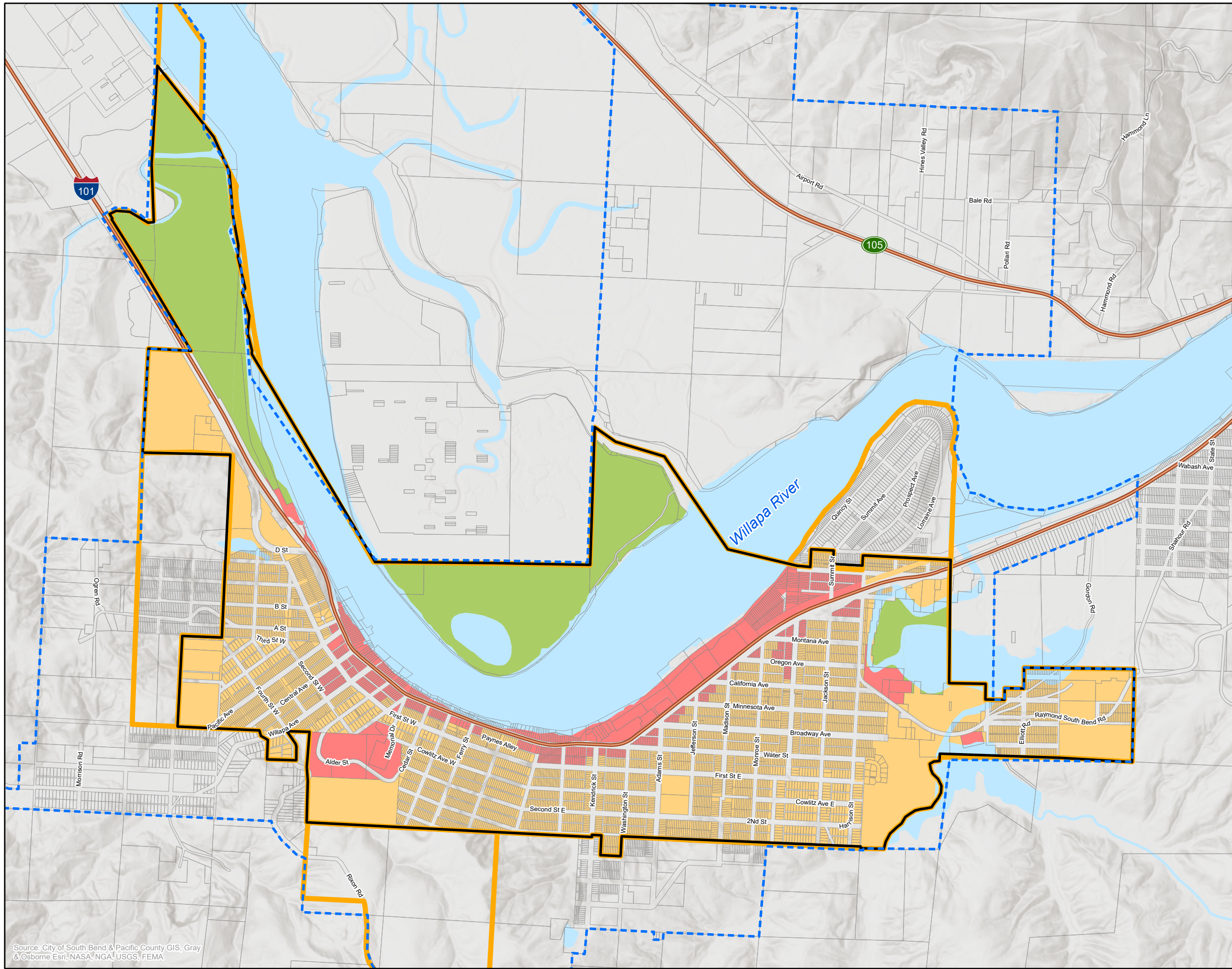
WATER SYSTEM PLAN

**FIGURE 1-7**

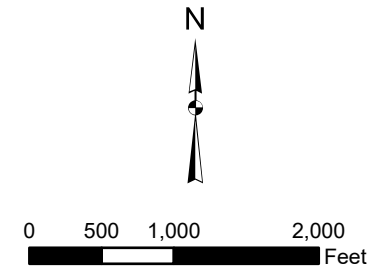
**TOPOGRAPHY**

**Gray & Osborne, Inc.**  
CONSULTING ENGINEERS

Source: City of South Bend & Pacific County GIS, Gray & Osborne Est., NASA, NGA, USGS, FEMA



- South Bend Future Land Use**
- Downtown & Commercial District
  - Environmental Protection District
  - Neighborhood District
- Reference**
- Highway
  - Retail Service Area
  - Urban Growth Area
  - City Limits
  - Parcel
  - Surface Water



**CITY OF SOUTH BEND**  
 WATER SYSTEM PLAN  
**FIGURE 1-8**  
 LAND USE

**Gray & Osborne, Inc.**  
 CONSULTING ENGINEERS

Source: City of South Bend & Pacific County GIS, Gray & Osborne Esri, NASA, NGA, USGS, FEMA

### Neighborhood District (N)

The purpose of the Neighborhood District is to continue the existing pattern of single-family dwellings, open space, and community amenities, such as parks, schools, and places of religious worship. The district also allows for a variety of housing types, home occupations, and other uses meeting specific standards or at appropriate locations upon review.

### Downtown and Commercial District (DC)

The purpose of the Downtown and Commercial District is to accommodate a blend of commercial, manufacturing, residential, and public uses that contribute to the economic vitality of the City. The district extends to the City's working waterfront, downtown, and isolated commercial properties.

### Environmental Protection District (EP)

The Environmental Protection district consists of lands that have extensive critical areas constrains to development that include frequently flooded areas, wetlands, and fish and wildlife habitat conservation areas. The intent of the district is to limit development to low impact uses and activities to protect their functions and values.

## **Service Area Agreements**

The Cities of South Bend and Raymond renewed their intertie agreement on January 1, 1990, replacing the original agreement dated June 3, 1981. Both cities agree that the purpose of the intertie is "to supplement the existing water supplies of either City's water system in the event of need for industrial consumption, fire, major drought, failure of source and/or transmission or treatment facilities and such other emergency needs as may occur." A copy of the intertie agreement is included in Appendix B.

The agreement stipulates that South Bend will operate and maintain the pump station and that the intertie will not be used without prior notification and approval of the supplying entity.

## **WATER SYSTEM POLICIES**

### **SERVICE AREA POLICIES**

Policies and conditions of service allow the City Council to deal with customers on a fair and consistent basis and are developed in the form of codes, resolutions, ordinances, standards or comprehensive plans adopted by the City Council. Where not specifically addressed in these documents, standard operating procedures are outlined in this Plan. Typical policies and conditions of service for water system operations, which must be addressed in accordance with DOH planning requirements, are summarized below. Applicable sections of codes and ordinances are provided in Appendix C.

## Policies

- Annexation Policy: New water customers outside city limits must commit to annexation prior to connection per South Bend Comprehensive Plan (SBCP) Policy 3.5.1. In order to be consistent with more recent GMA policy regarding water service, the City Comprehensive Plan will be amended in the future to allow for water service to rural areas without annexation.
- Cross-Connection Control Program: A Cross-Connection Control Program is required by regulation (WAC 246-290-490) to reduce the potential for system contamination through backflow from potential contaminant sources. The City also has adopted an Ordinance (No. 1312) regulating cross-connections. The Cross-Connection Control Program is addressed in Chapter 6 of this Plan.
- Direct Connection Policy: New development requires direct connection to the water system through individual service connections (Unified Development Ordinance “UDO” 15.76.240).
- Private or Public Wells: No new water systems or private wells will be allowed within the city limits unless approved by the City Council. Approval would need to be based on extreme circumstances, since the existing water distribution system is readily available to most properties within the city limits. Customers with existing wells (used for irrigation or other purposes) shall have an approved backflow prevention device at the meter consistent with the City’s Cross-Connection Control Program.
- Design and Performance Standards Policy: Recommendations of this Plan will follow the DOH Water System Design Manual. Distribution improvements are to be designed in accordance with the policies and standards identified in Chapter 7.
- Formation of Local Improvement District (LID): The City will allow an Applicant to propose formation of and LID to pay for system upgrades in accordance with RCW. The initial costs for an LID feasibility study is borne by the Applicant or rolled into LID costs but in no case is the cost the responsibility of the City. The City will provide an initial construction cost estimate for the proposed project and other technical assistance as needed. Once LID formation is shown to be feasible, the City will take the lead role to ensure proper formation of an LID in accordance with RCW.

- Late-Comer Agreements: The City will allow the use of Late-Comer Agreements to help recover up to 50 percent of the water main extension which directly fronts other properties. All costs for the agreement and construction across the subject property shall be borne by the Applicant/property owner. All agreements will be case specific and subject to City Attorney review and approval. Late-Comer Agreements may be denied if projected future administrative costs exceed the potential benefit to water system customers.
- Individual Booster Pumps: Individual booster pumps are allowed for existing properties along existing distribution mains, where the main has a normal operating pressure below 20 psi. In this case, the property owner shall be responsible for all costs of the booster pump system and shall be required to install a backflow prevention device on the private side of the service meter. The backflow device must then be tested on an annual basis in accordance with the City's Cross-Connection Control Program. The City will manage and control booster pumps for individual service(s) on an interim basis for those services that are unable to meet pressure requirements until that service(s) improvement is made to resolve the pressure deficiency per WAC 246-290-230.

Properties within new developments or existing properties without existing water main frontage can utilize individual booster pumps if the new distribution main along the frontage of the property is designed to provide 30 psi at Peak Hour Demand. The backflow prevention requirements apply to these cases as well.

- Oversizing: The Developer/property owner requiring an extension is required to fund the design and construction of extensions to meet minimum water main size and/or the water main size established in the Capital Improvement Program (if applicable). The City may pay a portion of the cost for oversizing of water mains if the request is in order to meet future City planning goals for an area. The City contribution shall be for the cost difference in materials plus 50 percent to account for additional labor and materials.
- Remote System Policy: It is not likely that the City will own and operate remote water systems within or adjacent to the service area. Decisions regarding this issue will be made on a case-by-case basis by City staff and City Council. If the City decides to own and operate a remote system, the system will need to be designed and constructed to meet both DOH and City Standards. Construction costs specific to the system will be the responsibility of the developer or property owner. Operation and maintenance costs will be based on the actual costs incurred, but in no

case will rates for remote systems be less than those for other City customers.

- Surcharge for Outside Customers: The City's current rate structure includes a higher water rate for customers outside the City limits (South Bend Municipal Code "SBMC" 13.05.020). The surcharge is based on the additional costs associated with service to outside areas.
- Undersized Main Replacement Policy: If a City owned water main is identified as deficient (through modeling or flow tests), the City assumes responsibility for upsizing the main to the minimum size of a 6-inch looped or an 8-inch dead end main. The prioritization of undersized main replacement projects is set in the WSP Capital Improvement Program (CIP) and shall be based upon overall benefit to City customers as well as level of inadequacy of the flow condition. Basic regulatory compliance shall be a higher priority than meeting minimum fire flow goals. Should the City not be able to replace an undersized main in a timeframe to meet service conditions for proposed development, the development Applicant can upgrade the main, but at no cost to the City. In no case, shall new connections be added to small diameter mains, unless the adequacy of service is established through review of field data and subsequent analysis by the City Supervisor.
- Water Wheeling: Water Wheeling is the practice of selling or buying water to or from a water system by using the piping network of a third water system. Since the City of Raymond has interties with the City of South Bend and the Willapa Valley Water District (WVWD), the potential exists for water wheeling between the City of South Bend and the WVWD using the City of Raymond distribution system. However, the current potential for water wheeling is low since both the WVWD or South Bend do not currently have significant excess resources during the summer periods and the Raymond/WVWD intertie has capacity limitations. Therefore, formal water wheeling agreements will not be pursued at this time.
- Wholesaling of Water: Routine wholesale to other water systems is not anticipated. However, the City of South Bend could sell water to the City of Raymond on an emergency basis during non-peak periods, but this sale would be governed by the current Intertie Agreement. Currently, wholesaling to new developments or new water districts would be in conflict with the City's direct connection policy and UGA service policy.

## **Duty to Serve**

Municipal water suppliers have a duty to provide service to all new connections within their retail service area if the purveyor has sufficient capacity and water rights, is consistent with adopted local plans and regulations, and can provide service in a timely and reasonable manner. The City generally installs new facilities within 2 weeks of the connection requirements being completed when the water main is already at the property line.

## **Conditions of Service**

Conditions of service are established in the City's UDO and SBMC Chapter 13.05. The City will provide water of sufficient quantity and quality as required by DOH and the Environmental Protection Agency (EPA). Other obligations to DOH, as required of water purveyors, are the responsibilities of the City. Ownership, operation and maintenance shall be the City's responsibility with reimbursement through customer rates. All rates paid for water service shall be placed into the Water Account and shall be used solely for the Water Utility.

The City will make every effort to provide service to all customers within the service area as it pertains to source of supply, storage and distribution. The City's responsibility does not include main extensions or pump stations to serve new customers unless incidental to improvements required for existing customers. Planning criteria for future improvements shall be a minimum design pressure of 30 psi and a minimum operating pressure of 20 psi under peak hour demands in accordance with applicable regulations.

Customers shall comply with codes, resolutions, ordinances, and standards as adopted by the City Council. Property owners requesting water service shall follow the City water service application process. Connection fees shall be set by the City and paid prior to construction of any water related facilities.

- Water Main Extensions: Conditions for design and construction of main extensions and related improvements for development are addressed in the UDO and City Standards described in Chapter 7. Extensions to the water system are the responsibility of the developer. Billing and conditions of service will be per the current resolution. Properties requesting service which do not currently have complete waterline frontage will be required to extend existing mains across the entire frontage of the property. Frontage shall be at the discretion of the Public Works Department and will be selected to encourage looping and/or access for future extensions. All extensions shall become property of the City following construction and approval by the City and shall include associated easements and rights-of-way. Exceptions will be granted only if the property lies within minimum distance for fire protection and in the opinion of the City Supervisor, the line will not be extended to provide future service beyond the Applicant's property.

- **New Services to Properties with Existing Water Mains:** No main extension or upgrade to the system is required for existing platted properties with existing waterline frontage requesting one service connection (subject to limitations if the service operating pressure is less than 20 psi or if the service line will exceed 150 feet).

Main extensions or upgrades may be required for subdivision of properties with existing water main frontage. Specific requirements for these properties will be based on compliance with minimum design criteria with regard to configuration of the proposed plat.

## COMPLAINTS

### Policy for Dealing with Complaints

The City is required to document customer complaints and respond in a timely manner. The City generally receives complaints at City Hall in-person or in-writing or through customer contact with staff in the field. Telephone complaints are also received and logged by City staff at City Hall and forwarded to the appropriate staff person. Most complaints are minor and are addressed immediately.

### Complaint Record Keeping

Telephone logs of complaints and written complaints are maintained at City Hall. The City utilizes a simple complaint form to document the complaint and the response to the complaint. Following documentation of the City response, the form is filed at City Hall. The City maintains a complaint and resolution file.

## RELATED PLANNING DOCUMENTS

The following documents were consulted in the preparation of this Plan:

**A Streamflow Study of Fredrickson & Meehan Creeks for the City of South Bend, Carey and Kramer, Consulting Engineers, November 1967.**

This report investigated the water supply potentials of Fredrickson Creek, Meeham Creek, and Fliess Creek.

**Water Comprehensive Plan – City of South Bend, Gray & Osborne, Inc., August 1994.**

This document utilized a 0.57 percent growth rate based on growth trend information provided by the Washington State Office of Financial Management (OFM). The Plan identified a future population of 2,172 people for year 2013

with a Maximum Day Demand (MDD) of 1.1 MGD and a Peak Hour Demand (PHD) of 1,752 gpm.

**City of South Bend Comprehensive Plan, October 1996.**

The City's comprehensive plan is an official document adopted by local government as a guide to making decisions about the future physical development of the city. It indicates, in a general way, how residents feel about their community. Until the passage of the Growth Management Act (GMA), a unifying theme and coordinated process on managing growth did not exist. In 1990, Pacific County, at the option of their Board of County Commissioners, elected to prepare a comprehensive plan under the Act, and thus began a coordinated approach and process to address growth. All county incorporated Cities, such as South Bend, were embodied into the growth management planning process and thus began to update or prepare new comprehensive plans consistent with the GMA.

**Pacific County, 1998 GMA Comprehensive Plan Final Environmental Impact Statement, August 1998.**

This document includes the mandated elements on land use and rural areas, critical areas and resource lands, housing, transportation, capital facilities, and utilities. The document also includes a section on Siting Essential Public Facilities.

**Water System Plan Update – City of South Bend, Gibbs & Olson, Inc., August 2004.**

This document discusses planning issues such as a description of the existing water system, water quality analyses, land use and population projections, water system demands, source and storage requirements, and capital improvements.

**Water System Comprehensive Plan Amendment – Pre-Design Report – Reservoir Replacement Project – City of South Bend, Gray & Osborne, Inc., November 2006.**

This document amended the 2004 WSP with a Predesign Report for replacing the earthen dam reservoir with a series of steel reservoirs. The Report describes the Project Need, Project Funding, Regulatory Requirements, Reservoir Design Analysis and Predesign Considerations, and a Financial Analysis.

**Predesign Report Eklund Park and Smith-Greenhouse Booster Pump Stations – City of South Bend, Gray & Osborne, Inc., August 2008.**

This document is intended to serve as a Predesign Report and Water System Plan Amendment to the 2004 WSP. The Report considers two booster pump stations to improve service and maintain adequate pressures to current and new customers in the Eklund Park and Smith-Greenhouse Roads areas. The Report describes the Project Need, Regulatory Requirements, Design Analysis, Capital Improvement Program and a Cost Estimate with Financial Analysis. This project has not yet been constructed.

**Fliess Creek Feasibility Study – City of South Bend, Gray & Osborne, Inc., November 2009.**

This document reviewed alternatives to supplement the City of South Bend raw water resources. The Study covered system background, Fliess Creek Background and Existing Infrastructure, Review of Fliess Creek Alternatives, Recommended Alternative, Source Protection, and a Financial Program.

**Pacific County, Washington – Comprehensive Plan, Final Draft, October 2010.**

This document is intended as a reference guide to the public and is intended to notify citizens, the development community, builders, and other government agencies of how the County is directing its energies and resources to manage growth. It seeks to establish a clear intent and policy base which can be used to develop and interpret county regulations.

**Water System Plan Update – City of South Bend, Gray & Osborne, Inc., March 2013.**

This document discusses planning issues such as a description of the existing water system, water quality analyses, land use and population projections, water system demands, source and storage requirements, and capital improvements. The 3-year rolling average of distribution system leakage reported in this Plan was 52 percent, and a Water Loss Control Action Plan was completed.

**Water System Plan Amendment, August 2017.**

This Amendment was submitted in accordance with Washington Administrative Code (WAC) Section 246-290-100(11). The Amendment detailed the upgrade and expansion of the City's Water Treatment Plant (WTP), which included replacing their existing filter membranes in the two original skids with new continuous micro-filtration; low pressure membranes (CMF-L). The expansion included the installation of a third membrane filtration skid. The existing backwash process was also modified to include new low pressure technology.

**Water Treatment Plant Upgrade Predesign Report, October 2018.**

This document analyzed the City's intent to upgrade their existing Water Treatment Plant (WTP) filters 1 and 2 to the current filtration technology offered by the membrane filter manufacturer (Evoqua). The Report also analyzed an increase in the WTP's treatment capacity by adding a third membrane filter skid. This would allow the City to meet its future water demands and minimize use of its intertie with the City of Raymond.

**Water Treatment Plant Commissioning and Piloting Protocol, May 2020.**

This document is a commission plan that summarizes the systems and instrumentation that must be complete before skid commissioning may begin, as well as the steps that are required for the commissioning of each of the membrane skids.

**City of South Bend Development Guidelines and Public Works Standards, February 2021.**

This document provided standards that shall apply to improvements within the public right-of-way and/or public easements, to all improvements required within the proposed public right-of-way of new subdivisions, for all improvements intended for maintenance by the City and for all other improvements for which the City Code requires approval from the City Public Works Department. These standards are intended as guidelines for designers and developers in preparing their plans and for the City Public Works Department in reviewing plans.

**City of South Bend 2020-2040 Comprehensive Plan, June 2020.**

This document is an update to the 1996 iteration and covers much of the same information, for the 2020-2040 planning period.

**Pacific County, Washington – Comprehensive Plan 2020-2040, Final Draft, February 2021.**

Similarly, to the update done by the City of South Bend, Pacific County updated their comprehensive plan for the 2020-2040 planning period.

## **CHAPTER 2**

### **BASIC PLANNING DATA**

#### **INTRODUCTION**

The objective of this chapter is to present basic planning data and water demand forecasts needed to assess the current and future capacities of the water system to provide service. This chapter provides historic water use data, develops the water demand associated with the planning element known as an Equivalent Residential Unit (ERU), develops Maximum Day Demand (MDD) and Peak Hour Demand (PHD) factors, evaluates historic growth rates, and projects future system demands for 10- and 20-year planning periods.

The water use data and water demand forecasts found in this chapter comprise two of the three elements required for the development of a water use efficiency (conservation) program. The third required element is implementation of the water use efficiency program and its component parts, which is addressed in Chapter 4.

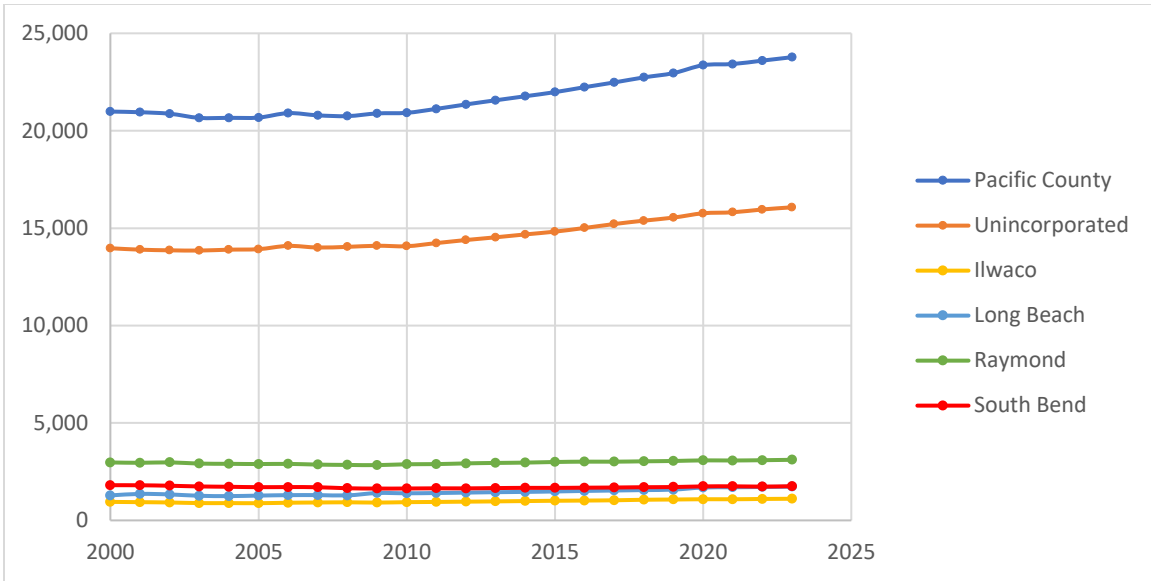
#### **HISTORIC POPULATION AND WATER USE DATA**

##### **POPULATION**

To estimate future water resource and system facility needs, it is important to estimate the future system growth rate. The Washington State Office of Financial Management (OFM) is the main resource for both historical population estimates and future projections. The OFM publishes the April 1 official population estimates, which give annual estimates of the current and historical population on town, city, and county levels. Under the Growth Management Act, the OFM publishes growth projections for counties every 5 years. Our analysis will rely on these sources. Populations throughout the rest of the county will be discussed for context.

##### **COUNTY POPULATION HISTORY**

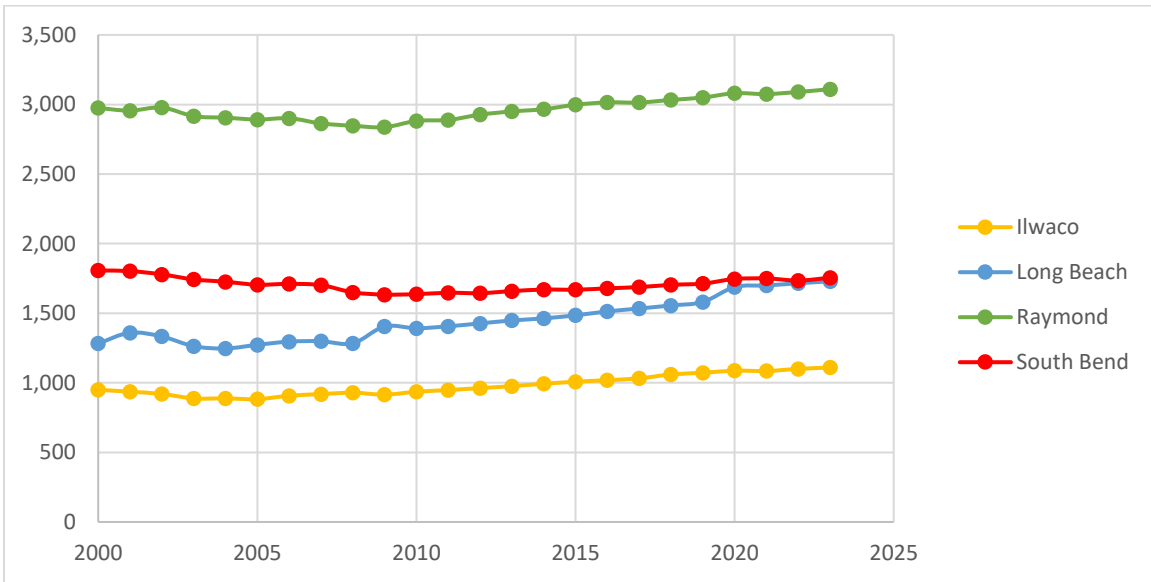
Population history since 2000 for Pacific County, Unincorporated Pacific County, and the four incorporated Cities of Raymond, South Bend, Long Beach, and Ilwaco was obtained from the OFM web site and is shown in Figure 2-1. The unincorporated and incorporated populations of the county increased at similar percentages of 12 percent and 13 percent respectively between 2000 and 2023; however, the unincorporated population is nearly twice the size of the four cities' populations combined. The population of the City of South Bend has decreased since 2000 but has increased slightly since 2010.



**FIGURE 2-1**

**Pacific County Population History**

Figure 2-2 shows the growth rates of only the County’s four incorporated cities.



**FIGURE 2-2**

**Pacific County City Populations**

The City's population appears to have decreased until year 2012 before beginning a gradual increase to the present population of 1,755, although the population is still less than it was in year 2000.

## **COUNTY GROWTH PROJECTIONS**

County growth projections were also obtained from the OFM web site. The OFM generates Low, Medium, and High projections for each county. Pacific County has chosen to use the Medium projections in their 2020-2040 Comprehensive Plan. The medium growth projection predicts gradual growth from 23,365 in 2023 to 25,145 by 2045, which equates to an average annual growth rate of 0.89 percent.

## **CITY OF SOUTH BEND PROJECTED GROWTH**

The Pacific County Comprehensive Plan projected a small amount of growth for the City, estimating a population of 1,661 by 2040 with an average annual growth rate of 0.05 percent. However, the Comprehensive Plan has not yet been updated with data from the 2020 Census, which shows a population of 1,746 in 2020. This suggests that the City could be growing more than was previously expected. For the purposes of this Plan, the City's growth was estimated based on a percentage of the County's overall projected growth.

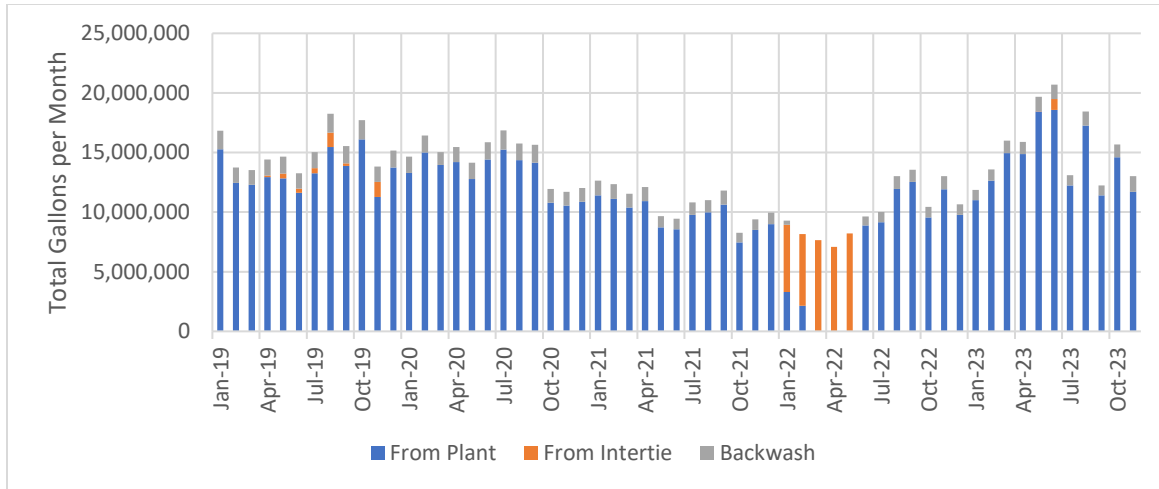
It was calculated that the City made up 5.3 percent of the County's total growth between years 2013 to 2023. The time period (2013 to 2023) was utilized since the City experienced growth throughout this period. Assuming that the proportion of growth remains constant, the City is projected to experience an annual average growth rate of about 0.2 percent during the planning period. This growth rate will be used to project future system demands later in this chapter.

## **HISTORIC WATER PRODUCTION AND CONSUMPTION**

Water production data is available on a daily basis from the City's water treatment plant reports, and can therefore be totaled for any combination of multiple daily time periods. This section summarizes production and consumption data.

### **PRODUCTION**

Historic water production from 2019 to 2023, including contributions from the Raymond intertie, is shown in Figure 2-3 and tabulated in Table 2-1. Water production numbers were taken from billing records, which are calculated from approximately the 19<sup>th</sup> of one month to the 20<sup>th</sup> of the following month. This was done to align production numbers with customer class consumption data, which are summarized in this chapter.



**FIGURE 2-3**

**Historic Water Production**

The majority of the system’s water is produced by the water treatment plant, and about 9 percent of the WTP’s total production is used for backwash. The Raymond intertie is mainly used in emergencies, and so is not used very often. From January 2022 to May 2022, the treatment plant was taken offline for upgrades. During this time, the system was almost entirely supplied by the Raymond intertie. The intertie produced noticeably less water than the WTP typically does, indicating that the system required less production during this period. It's not clear why this is, though the City may have encouraged conservation measures at the time.

Most water systems in Washington have elevated water usage in the summer months and lower water usage during the rest of the year. The City does generally have its highest production during the summer, though seasonal water production patterns in South Bend are not as pronounced as other water systems due to the seafood industry, which increases water usage during the winter. However, these patterns have been changing recently as the demand from the seafood industry dropped dramatically between 2020 and 2021. Total water production increased again in 2023.

**TABLE 2-1**

**Total Water Production (MG)**

<b>Year</b>	<b>J</b>	<b>F</b>	<b>M</b>	<b>A</b>	<b>M</b>	<b>J</b>	<b>J</b>	<b>A</b>	<b>S</b>	<b>O</b>	<b>N</b>	<b>D</b>	<b>Total</b>
2019	16.8	13.7	13.5	14.4	14.6	13.3	15.0	18.2	15.5	17.7	13.8	15.2	182.0
2020	14.6	16.4	15.0	15.5	14.1	15.9	16.9	15.8	15.6	11.9	11.7	12.0	175.5
2021	12.6	12.4	11.5	12.1	9.7	9.5	10.8	11.0	11.8	8.3	9.4	9.9	129.0
2022	9.3	8.2	7.7	7.1	8.2	9.6	10.0	13.0	13.5	10.4	13.0	10.7	120.7
2023	11.9	13.6	16.0	15.9	19.7	20.7	13.1	18.4	12.3	15.7	16.8	12.6	186.6

**METERED WATER CONSUMPTION**

Monthly water consumption from 2019 to 2023 is shown in Table 2-1. Metered water consumption is the total of water sales plus operational usage. Operational usage includes a multitude of water uses by City staff, including waterline flushing, draining reservoirs for maintenance/construction, firefighting, and use of the City of Raymond intertie.

**TABLE 2-2**

**Metered Water Consumption by Month (MG)**

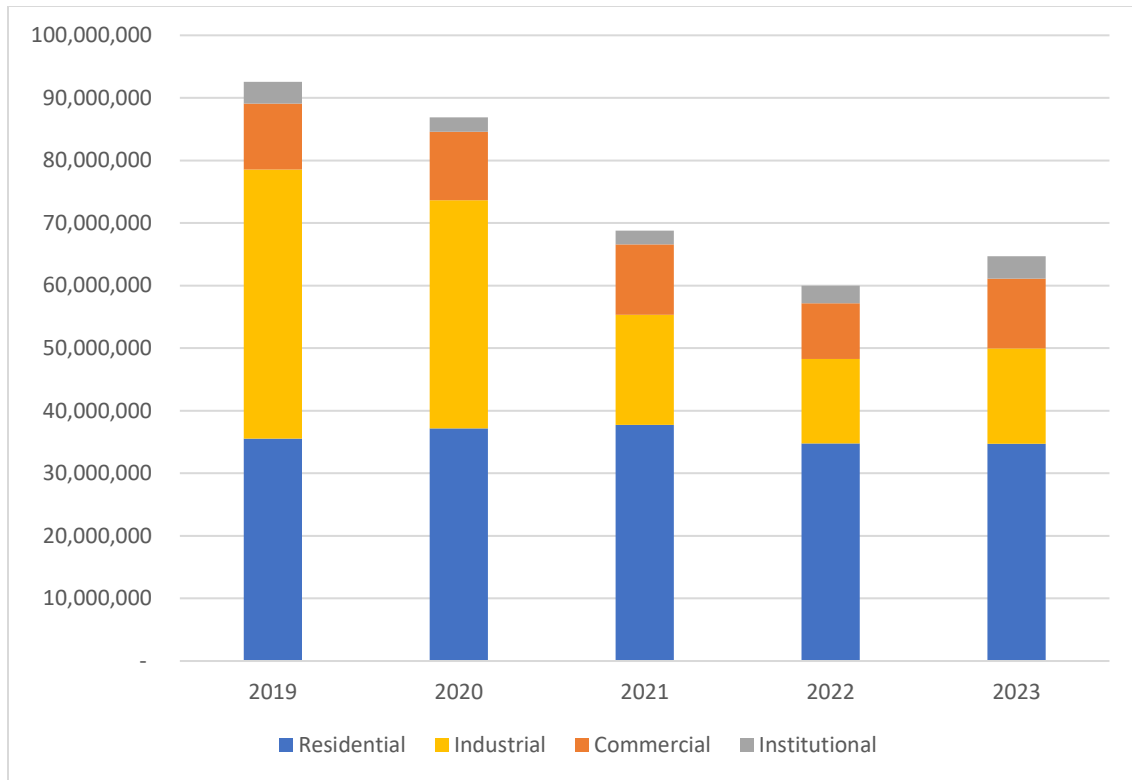
<b>Year</b>	<b>J</b>	<b>F</b>	<b>M</b>	<b>A</b>	<b>M</b>	<b>J</b>	<b>J</b>	<b>A</b>	<b>S</b>	<b>O</b>	<b>N</b>	<b>D</b>	<b>Total</b>
2019	8.67	6.59	6.47	6.89	7.28	7.07	8.19	9.56	8.13	8.45	7.37	7.87	92.6
2020	7.69	8.63	7.79	6.85	7.36	8.36	9.32	8.86	7.46	5.13	5.12	4.86	87.4
2021	4.94	5.44	5.19	5.37	4.93	5.06	7.18	6.56	6.99	5.07	5.67	6.36	68.8
2022	6.16	4.99	4.35	4.14	3.59	4.91	4.65	6.67	6.01	4.77	5.56	4.19	60.0
2023	4.59	4.90	5.01	4.68	5.76	6.67	5.09	7.74	5.05	5.21	5.76	4.45	64.9

These figures are based on the City’s monthly water billing records, which are calculated from approximately the 19<sup>th</sup> of a month to the 20<sup>th</sup> of the following month, though the exact days may change. Therefore, the consumption tabulated under each month is partially from the month prior.

Although total water production in 2019 was similar to 2023, the metered consumption has decreased in this same time frame.

**WATER CONSUMPTION BY CUSTOMER CLASS**

Water billing categories include Residential, Commercial, Institutional, and Industrial. In 2022, Residential usage was 58 percent, Commercial was 15 percent, Institutional was 4 percent, and Industrial was 23 percent of metered water usage. Figure 2-4 and Table 2-3 summarizes the annual consumption data by customer class from 2019 to 2023.



**FIGURE 2-4**

**Water Consumption by Customer Class**

Overall consumption decreased significantly after 2020, dropping by about 25 percent from 2020 to 2021. This is largely due to a sharp decrease in consumption by the industrial customer class in 2021. This seems to be due to a combination of factors including the closure East Point Seafood, which was one of the system’s largest water users. Additionally, Coast Seafoods and South Bend Packers have implemented water recycling in some of their processes, which would greatly decrease their total water usage. South Bend Packers has also since relocated some production to facilities located outside of the City. General industrial water usage also likely declined due to the 2020 COVID-19 pandemic.

**TABLE 2-3**

**Water Consumption by Customer Class (MG)**

<b>Year</b>	<b>Residential</b>	<b>Commercial</b>	<b>Institutional</b>	<b>Industrial</b>	<b>Total</b>
2017	36.7	10.2	3.3	31.4	81.6
2018	39.0	10.0	3.3	35.7	88.1
2019	35.6	10.6	3.5	42.6	92.2
2020	37.1	10.9	2.4	39.5	89.9
2021	37.4	11.0	2.2	16.7	67.3
2022	35.5	9.5	2.6	14.6	62.2
2023	34.8	11.3	3.4	15.5	64.9

**DISTRIBUTION SYSTEM LEAKAGE**

The Water Use Efficiency (WUE) Rule defines the difference between the total of all water production and all authorized consumption as Distribution System Leakage (DSL). A DSL of 10 percent or less is the general requirement for compliance to WAC 246-290-820; above 10 percent, systems are required to submit a water loss control action plan. The requirements for the content of a water loss control action plan are laid out in WAC 246-290-820(4) and depend on the DSL percentage of the system.

Annual water production, water use, and DSL for 2017-2023 are summarized in Table 2-3. The highest production year was in 2018 with 191.5 MG, and the lowest production year was in 2022 with just 120.7 MG. DSL ranged from 56 percent in 2018 to 65 percent in 2023. The 3-year rolling average in 2023 was 54 percent. Systems with 10 percent DSL or greater must submit a water loss control action plan, with additional requirements for systems with above 20 and 30 percent DSL. For a system above 30 percent, the WLCAP must include an assessment of data accuracy and data collection, implementation of field activities such as actively repairing leaks or maintaining meters within 6 months of determining that the DSL has exceeded the standard.

**TABLE 2-4**

**Annual Water Production, Water Use and DSL**

<b>Year</b>	<b>Production, MG</b>	<b>Authorized Consumption</b>	<b>DSL, MG</b>	<b>Annual Percent DSL</b>	<b>3-Year Average Percent DSL</b>
2017	178.0	81.7	96.4	-	54%
2018	191.6	88.6	103.0	-	54%
2019	181.1	92.6	88.5	52%	49%
2020	175.5	87.4	88.1	51%	50%
2021	129.0	68.8	60.2	49%	47%
2022	120.7	60.0	60.7	49%	50%
2023	185.8	64.7	121.1	65%	54%

Annual production values were calculated based on the City’s billing periods in order to properly align the production and customer consumption. Although DSL trended downward for a few years, it nearly doubled in volume from 2022 to 2023. It is unknown why it increased so dramatically, considering consumption did not increase nearly as much.

**MAXIMUM DAY PRODUCTION**

Daily production records were reviewed from January 2019 through December 2023. The highest days of production for each year are summarized in Table 2-4.

**TABLE 2-5**

**Highest Water Production Days for 2019-2023**

<b>Date of Max Production</b>	<b>Max Production, Gallons<sup>(1)</sup></b>	<b>Average Day Production, Gallons<sup>(1)</sup></b>	<b>Maximum Day to Average Day Peaking Factor</b>
Jul 12, 2019	805,000	498,547	1.61
Aug 5, 2020	714,000	480,852	1.48
Aug 20, 2021	545,000	353,454	1.54
Sept 15, 2022	812,000	330,657	2.46
June 6, 2023	991,000 <sup>(2)</sup>	511,153	1.94
<b>Average</b>	<b>773,400</b>	<b>434,933</b>	<b>1.98<sup>(3)</sup></b>

- (1) Quantities are rounded to the nearest 1,000 gallons.
- (2) The actual maximum day demand in 2023 was 1,016,000. This was due to testing being performed on the new water treatment facilities and is not representative of customer-driven maximum production, so the next highest day is used here.
- (3) Average was taken only from 2021 to 2023 to account for reduced non-residential demand (see Figure 2-4).

The highest peaking factor from the last 5 years was 2.46 in 2022. This year was unusual for the City’s water system operations as the WTP was offline from mid-January to late May for upgrades. This likely increased the peaking factor relative to other years as there was notably less water being produced and consumed during this period, reducing the ADD. The 3-year average peaking factor of 1.81 will be used to project future demands later in this Chapter.

In the 2014 Water System Plan, the City’s highest production days were noted to occur in the winter due to the processing of seafood products. However, the peak production days have begun occurring in the summer, which is more typical for water systems in Washington. This change is likely due to the overall reduction in industrial consumption.

**EQUIVALENT RESIDENTIAL UNITS (ERUS)**

The Equivalent Residential Unit (ERU) is a method of evaluating water use based on the equivalent number of residences represented by various categories of water use. The value of an ERU is based on the average of the last 5 years of water use in the City. By definition, residential connections are always counted as one ERU per residence regardless of the actual average water use by residential users in any given year. Typical ERU consumption is calculated by dividing the total volume of water utilized in the residential customer class by the total number of active connections. This number defines the average consumption per ERU, which can be referred to as ERU<sub>ADD</sub>. The volume of water used by any other customer class can then be divided by ERU<sub>ADD</sub> in order to determine the number of ERUs for a given customer class. ERU<sub>MDD</sub> is then calculated by multiplying the ERU<sub>ADD</sub> by the peaking factors in Table 2-5. The calculations for the average day ERU value (ERU<sub>ADD</sub>) and the maximum day ERU value (ERU<sub>MDD</sub>) from 2019 through 2023 are summarized in Table 2-6.

**TABLE 2-6**

**Equivalent Residential Units (ERUs)**

<b>Year</b>	<b>Residential Consumption (gpd)</b>	<b>Residential Service Connections</b>	<b>ERU<sub>ADD</sub> (gpd/ERU)</b>	<b>ERU<sub>MDD</sub> (gpd/ERU)</b>
2019	97,306	889	109	177
2020	101,567	876	116	173
2021	103,374	888	116	179
2022	95,216	860	111	272
2023	95,215	877	109	210
<b>Average</b>	<b>98,535</b>	<b>878</b>	<b>112</b>	<b>221<sup>(1)</sup></b>

(1) MDD has been averaged only from 2021 to 2023 to account for the decrease in industrial consumption.

ERUs have been calculated for each of the customer classes. Non-residential uses are assigned residential equivalents based on the average day water use of the respective categories. All categories were calculated using average water demands from 2019 to 2023, with the exception of the industrial customer class. Annual water consumption from this customer class significantly decreased in 2021, and is not expected to return to previous levels within the planning period. Therefore, the industrial ERUs have been calculated using consumption data from 2021 to 2023. The total ERUs served by the City are estimated in Table 2-7, as calculated using the ERU values in Table 2-6.

**TABLE 2-7**

**2023 Effective ERUs by Customer Class**

<b>Customer Class</b>	<b>Average Daily Consumption (gpd)</b>	<b>ERUs</b>
Residential	95,215	850
Commercial	30,831	275
Institutional	9,324	83
Industrial	42,468	379
DSL	333,316	2,976
<b>Total</b>	<b>511,153</b>	<b>4,564</b>

**PEAK HOUR DEMAND**

Peak Hour Demand (PHD) is a value that applies to the system as a whole, and is estimated using Equation 5-3 from the Water System Design Manual. This formula estimates peak hour system demands, *not including fire flow*:

$$PHD = (MDD/1440)[(C)(N)+F]+18$$

Where

- PHD = Peak Hour Demand, gallons per minute
- C = Coefficient from Water System Design Manual Table 3-1
- N = Number of ERUs served
- F = Factor from Water System Design Manual Table 3-1
- MDD= Maximum Day Demand per ERU, gpd

For a system with more than 500 ERUs, C and F are 1.6 and 225, respectively. As derived above, MDD for the City of South Bend is 221 gpd per ERU. Inserting these numbers into the above equation yields the following:

$$PHD = (221/1440)[(1.6)(N)+225]+18$$

This equation simplifies to the following:

$$PHD = 0.24*N+52.5$$

The above was used to calculate peaking factors from 2019 to 2023. The average of these factors was 1.70. This value is used to calculate projected peak hour demand for future years.

Table 2-8 includes a summary of water demand parameters for the City of South Bend.

**TABLE 2-8**

**Summary of Water Demand Statistics**

<b>Demand Factor</b>	<b>Value</b>
Average Day Demand per ERU, gpd	112
Maximum Day Demand per ERU, gpd	221
Maximum Day to Average Day Factor <sup>(1)</sup>	1.98
Peak Hour to Maximum Day Peaking Factor <sup>(1)</sup>	1.70

(1) Calculated using the average MDD from the last 3 years as shown in Table 2-5.

**FUTURE SYSTEM DEMANDS**

To project future water demands, ERUs for each identified water use are projected forward at a growth rate of 0.2 percent per year, which was determined based on the City’s projected growth. The total projected future ERUs are added together and future water demands are estimated based on projected future ERUs and historic water demand factors. Table 2-8 presents projected ERUs at the growth rate of 0.2 percent per year for the next 20 years. DSL is assumed to make up 54 percent of the total system production throughout the 20-year period, based on the current 3-year average.

**TABLE 2-9**

**Projected ERUs**

<b>Year</b>	<b>Residential</b>	<b>Commercial</b>	<b>Institutional</b>	<b>Industrial</b>	<b>DSL</b>	<b>Backwash</b>	<b>Total</b>
2025	854	276	84	381	2,143	268	4,005
2026	855	277	84	381	2,147	269	4,013
2027	857	277	84	382	2,151	269	4,021
2028	859	278	84	383	2,156	270	4,029
2029	860	279	84	384	2,160	270	4,037
2030	862	279	84	384	2,164	271	4,045
2031	864	280	85	385	2,168	272	4,053
2032	865	280	85	386	2,173	272	4,061
2033	867	281	85	387	2,177	273	4,069
2034	869	281	85	388	2,181	273	4,077
2035	871	282	85	388	2,186	274	4,085
2036	872	282	85	389	2,190	274	4,093
2037	874	283	86	390	2,194	275	4,102
2038	876	284	86	391	2,199	275	4,110
2039	877	284	86	391	2,203	276	4,118
2040	879	285	86	392	2,207	276	4,126

**TABLE 2-9 – (continued)**

**Projected ERUs**

<b>Year</b>	<b>Residential</b>	<b>Commercial</b>	<b>Institutional</b>	<b>Industrial</b>	<b>DSL</b>	<b>Backwash</b>	<b>Total</b>
2041	881	285	86	393	2,212	277	4,134
2042	883	286	86	394	2,216	278	4,142
2043	884	286	87	394	2,221	278	4,151
2044	886	287	87	395	2,225	279	4,159
2045	888	288	87	396	2,229	279	4,167

These projections assume that the proportion of DSL in the system will not change. However, actions should be taken to comply with the WUE Rule which should reduce the volume of DSL over time. It is also assumed that there will not be significant growth within the industrial customer class within the planning period. Some additions and departures of large water users are anticipated, but the overall demand is not expected to increase dramatically. Notably, the Port of Willapa (Port) recently acquired the old Bendiksen Cannery site, which was previously owned by East Point Seafood Co. The Port is currently working with the City to redevelop this stretch into a retail and public space, which may increase the water demand in the area for increased commercial facilities and irrigation within the planning period.

Total projected ERUs from Table 2-8 are used together with historic water demand factors from Table 2-7 to estimate projected water demands in Table 2-9. Projected annual demand in millions of gallons (MG) is projected average day demand times 365 days per year divided by 1 million. Annual demand in acre-feet per year (Ac-Ft/Yr) is annual demand in MG converted to acre-feet.<sup>1</sup>

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<sup>1</sup> One acre-foot is the volume required to cover one acre to a depth of 1 foot. This is 43,560 cubic feet or approximately 325,851 gallons, or 0.325851 MG. There are approximately 3.069 acre-feet per MG.

**TABLE 2-10**

**Projected Water Demands**

Year	Average Day Consumption						Total ERUs	ADD (gpd)	MDD (gpd)	PHD (gpm)	
	Residential (gpd)	Commercial (gpd)	Institutional (gpd)	Industrial (gpd)	Backwash	Total (gpd)					DSL (gpd)
2025	95,592	30,953	9,361	42,636	30,056	208,598	240,000	4,005	448,598	888,223	1,049
2026	95,781	31,014	9,380	42,720	30,115	209,011	240,475	4,013	449,486	889,982	1,051
2027	95,971	31,076	9,398	42,805	30,175	209,424	240,951	4,021	450,376	891,744	1,053
2028	96,161	31,137	9,417	42,890	30,234	209,839	241,428	4,029	451,267	893,510	1,055
2029	96,351	31,199	9,435	42,975	30,294	210,255	241,906	4,037	452,161	895,279	1,057
2030	96,542	31,261	9,454	43,060	30,354	210,671	242,385	4,045	453,056	897,051	1,059
2031	96,733	31,322	9,473	43,145	30,414	211,088	242,865	4,053	453,953	898,828	1,061
2032	96,925	31,385	9,492	43,230	30,475	211,506	243,346	4,061	454,852	900,607	1,063
2033	97,117	31,447	9,510	43,316	30,535	211,925	243,828	4,069	455,753	902,390	1,065
2034	97,309	31,509	9,529	43,402	30,595	212,344	244,311	4,077	456,655	904,177	1,067
2035	97,502	31,571	9,548	43,488	30,656	212,765	244,795	4,085	457,559	905,967	1,070
2036	97,695	31,634	9,567	43,574	30,717	213,186	245,279	4,093	458,465	907,761	1,072
2037	97,888	31,696	9,586	43,660	30,777	213,608	245,765	4,102	459,373	909,559	1,074
2038	98,082	31,759	9,605	43,747	30,838	214,031	246,252	4,110	460,283	911,360	1,076
2039	98,276	31,822	9,624	43,833	30,899	214,455	246,739	4,118	461,194	913,164	1,078
2040	98,471	31,885	9,643	43,920	30,961	214,880	247,228	4,126	462,107	914,972	1,080
2041	98,666	31,948	9,662	44,007	31,022	215,305	247,717	4,134	463,022	916,784	1,082
2042	98,861	32,011	9,681	44,094	31,083	215,731	248,208	4,142	463,939	918,599	1,084
2043	99,057	32,075	9,700	44,181	31,145	216,158	248,699	4,151	464,858	920,418	1,087
2044	99,253	32,138	9,720	44,269	31,207	216,586	249,192	4,159	465,778	922,240	1,089
2045	99,450	32,202	9,739	44,357	31,268	217,015	249,685	4,167	466,700	924,066	1,091

## CHAPTER 3

### WATER SYSTEM ANALYSIS

#### OBJECTIVE

Water system planning is based on an analysis of a water utility's ability to meet service standards for existing and future customers. The City of South Bend has adopted design standards which identify criteria and standards for the water system. These standards can be used to evaluate and analyze the existing water system facilities and water quality within the water service area. Based on these analyses, a summary of deficiencies is presented that will inform recommendations and projects to improve compliance of the water system.

#### SYSTEM DESIGN STANDARDS

The Washington State Department of Health (DOH) relies on various publications of standards, agencies, and the utility itself to establish design criteria. The Standards for planning and design for the City water system are based on commonly accepted standards, including the following:

**WAC 246-290, Group A Public Water Systems, Washington State Board of Health (March 2022).**

This is the primary drinking water regulation used by DOH. It sets basic standards to assess capacity, water quality, and system reliability.

**Water System Design Manual, Washington State Department of Health (June 2020).**

These standards serve as guidance for the preparation of plans and specifications for Group A public water systems in compliance with WAC 246-290.

**Water System Planning Guidebook, Washington State Department of Health (August 2020).**

The Water System Planning Guidebook outlines planning requirements as well as a process framework for water systems to create a WSP that best fits their size and needs. Significant revisions to the former Water System Guidebook were adopted in August 2020.

**Standard Specifications for Road, Bridge and Municipal Construction, Washington State Department of Transportation, American Public Works Association (2025).**

These standards include detailed specifications for materials and workmanship of a wide variety of public works projects, including installation of public water supply facilities and restoration of facilities impacted by water main construction and repair.

**City of South Bend Development Guidelines and Public Works Standards (February 2021).**

These standards include details and specifications for materials and workmanship for installation of water main extensions, including piping installation, thrust blocking, in-line valves, fire hydrants, air release valves, service connections of various types, sample stations, blowoffs, and pavement restoration applicable to developer extensions. A copy of these standards is contained in Appendix C.

## **WATER QUALITY STANDARDS**

The City is a public water supply system regulated by the Washington State Department of Health Drinking Water Regulations, WAC 246-290, the latest edition of which is dated May 2024, as well as sections of Code of Federal Regulations (CFR) Title 40, Parts 141 and 143, adopted by reference in WAC 246-290. City is supplied by surface water sources only, so only surface water supply regulations apply.

## **SYSTEM CAPACITY STANDARDS**

### **General Design Standards**

The City uses the DOH Water System Design Manual as a guide for establishing water system capacity standards. Table 3-1 lists the recommended standards from the DOH Manual and the City's policies regarding each standard for general facility design.

**TABLE 3-1**

**General Facilities Requirements**

<b>Standard</b>	<b>DOH Water System Design Manual (June 2020)</b>	<b>City of South Bend Water System Standard</b>
Average Day Demand	Average Day Demand is determined from previously metered water production and consumption data.	The calculated average day consumption per ERU is 112 gpd.
Maximum Day Demand	Maximum Day Demand is estimated at approximately 2.0 times the average day production requirement if metered data is not available.	The maximum day to average day factor is 1.98, and the maximum day consumption per ERU is 221 gpd, as developed in Chapter 2 of this Plan.
Peak Hour Demand	Peak hour demand is determined using equation 3-1:  $PHD = (MDD/1440)((C)(N) + F) + 18$ C = Coefficient from DOH Water System Design Manual Table 3-1 N = Number of connections, ERUs F = Factor from DOH Water System Design Manual Table 3-1	Peak Hour Demand is determined by applying the DOH Water System Design Manual Formula where MDD = 221, C=1.6 and F = 225, which simplifies to the equation: $PHD = 0.24*N+52.5$
Minimum System Pressure	The system must be designed to maintain a minimum of 30 psi in the distribution system under PHD and 20 psi under fire flow conditions during MDD.	Same as DOH Water System Design Manual.
Minimum Pipe Sizes	The diameter of a transmission line shall be determined by hydraulic analysis. The minimum size distribution system line shall not be less than 6-inches in diameter, except for dead end lines not providing fire flow and only as justified by a hydraulic analysis.	Same as DOH Water System Design Manual, Chapter 8, except that dead end lines greater than 50 feet in length that do provide fire flow shall be a minimum of 8-inches in diameter.
Valve Spacing	Sufficient valving should be placed to keep a minimum number of customers out of service when water is turned off for maintenance or repair.	Valves every 1,000 feet, two gate valves at every tee and three at every cross unless otherwise directed by the City Supervisor. Valves on each end of a water main within an easement.
Source Reliability	Recommends 18 hours of source pumping to meet Maximum Day Demand. Source capacity to replenish fire storage capacity within 72 hours while meeting Maximum Day Demand. Redundancy in all critical pumping systems. Backup power supply for all critical pumping systems.	Same as DOH Standard.

## **Fire Suppression Standards**

Fire flow requirements are specific to both the water system performance and to specific building projects. The Washington Survey and Rating Bureau (WSRB) classify municipalities according to firefighting capabilities and establish guidelines for rating overall fire protection. The insurance rating of a local district is based upon a variety of criteria distributed among three key components. 10 percent of the rating is based upon the “911” center’s ability to answer and dispatch calls, 40 percent is based upon the fire department itself, and 50 percent is based upon the reliability of the water system and its ability to provide required fire flows.

The City’s Municipal Code Chapter 15.86 Fire Code adopts the following model codes, as approved and adopted by the State Building Code Council (SBCC), together with any amendments or additions:

- International Fire Code (IFC) and Standards; and
- International Fire Code, Appropriate Chapters and Chapter 34 (Flammable and Combustible Liquids)

The WAC 246-293-601, et seq., sets state minimum fire flow standards for water systems with 1,000 or more service connections, or located within a critical water supply service area. The City water system has more than 1,000 service connections, so this regulation does apply. WAC 246-293-640 has set the minimum fire flow standard for residential development at 500 gpm for 30 minutes, commercial and multifamily structures greater than 4,000 square feet at 750 gpm for 60 minutes, and the industrial development classification at 1,000 gpm for 60 minutes.

For planning purposes, the City’s fire storage is based on a capacity of 3,000 gpm for 3 hours (540,000 gallons) to accommodate industrial needs.

## **WATER QUALITY ANALYSIS**

Water quality monitoring is important for both regulatory compliance and for general water system oversight. The following sections summarize relevant water quality regulations and the water quality record for the City water system.

### **SOURCE WATER QUALITY**

For the following sections, source water quality refers to the quality of water which has been fully treated but not yet distributed. It does not refer to raw, untreated source water. The WTP includes a microfiltration system and an automated continuous chlorine feed pump. Sampling results are discussed in the following sections for the source water quality beginning in year 2010 to the present.

**Inorganic Chemical and Physical Water Quality**

General IOC Tests

The two most recent inorganic chemical and physical (IOC) water quality monitoring results are summarized in Table 3-2. The Maximum Contaminant Level (MCL) for all inorganic chemical and physical water quality parameters for which there are MCLs are listed in the right hand column. The City currently has a nine-year waiver for IOC testing, so additional testing is not required until at least December 2028. MCL exceedances are indicated in bold.

**TABLE 3-2**

**Inorganic Chemical Sampling Results from Treated Water**

<b>Contaminant</b>	<b>9/14/2020</b>	<b>4/25/2011</b>	<b>MCL<sup>(1)</sup></b>
<b>Primary Contaminants</b>			
Antimony	<0.001	<0.001	0.006
Arsenic	<0.001	<0.002	0.0104
Barium	<0.005	<0.005	2
Beryllium	<0.0003	<0.005	0.004
Cadmium	<0.001	<0.001	0.005
Chromium	<0.001	<0.001	0.1
Copper <sup>(2)</sup>	<0.01	<0.01	-
Cyanide	<0.01	<0.01	0.2
Fluoride <sup>(3)</sup>	2.08	0.21	4
Lead <sup>(2)</sup>	<0.001	<0.001	-
Mercury	<0.0002	<0.0005	0.002
Nickel	<0.001	<0.001	0.1
Nitrate-N	0.23	1.06	10
Nitrite-N	<0.1	<0.1	1
Selenium	<0.001	<0.005	0.05
Sodium <sup>(4)</sup>	6.72	5.16	-
Thallium	<0.001	<0.001	0.002
Turbidity (NTU) <sup>(5)</sup>	1.29	<0.2	-
<b>Secondary Contaminants</b>			
Chloride	6.83	7.11	250
Fluoride <sup>(3)</sup>	<b>2.08</b>	0.21	2
Iron	<0.02	<0.02	0.3
Manganese	<0.005	<0.005	0.05
Silver	<0.001	<0.001	0.1
Sulfate	1.81	1.44	250
Zinc	<0.01	<0.01	5

**TABLE 3-2 – (continued)**

**Inorganic Chemical Sampling Results From Treated Water**

<b>Contaminant</b>	<b>9/14/2020</b>	<b>4/25/2011</b>	<b>MCL<sup>(1)</sup></b>
Color (color units)	<5	<5	15
TDS – Total Dissolved Solids	92.7	79	500
Conductivity (µmho/cm) <sup>(6)</sup>	88.9	84.1	700
Hardness (as CaCO <sub>3</sub> )	27.8	23.4	-

- (1) In mg/L unless otherwise specified. Mg/L indicates milligrams per liter. For solids in water, 1 mg/L is equivalent to 1 part per million (ppm).
- (2) The standards for Lead and Copper are distribution system action levels based on 90<sup>th</sup> percentile distribution sample values.
- (3) Fluoride has both a primary and a secondary MCL. Concentrations above the secondary MCL cause aesthetic problems, while concentrations above the primary MCL are a public health concern.
- (4) Sodium does not actually have an MCL, but EPA has established a level of 20 mg/L as a level of concern for individuals on a low sodium diet.
- (5) The turbidity MCL applies only to surface water sources.
- (6) A µmho is a micro-mho, or 1 millionth of a mho. A mho is a unit of electrical conductance, the inverse of an ohm, a unit of electrical resistance. One mho of electrical conductance is capable of transmitting 1 amp of electrical current across a potential of 1 volt. One µmho of conductance will transmit 1 millionth of an amp (1 micro-amp) at 1 volt, or 1 amp at 1-million volts (one megavolt).

There was only one MCL exceedance in this time period, when fluoride exceeded the secondary MCL in 2020. It is not clear why this occurred, but it is possible it was a temporary overfeed issue during treatment.

Annual Nitrate Tests

Additional source water IOC samples include annual nitrate samples. These samples are required annually in years when complete inorganic chemical samples are not required. Table 3-3 summarizes additional source water nitrate monitoring results. **All nitrate test results are well below the MCL of 10 mg/L, so the City is in compliance with the standard for nitrate.**

**TABLE 3-3**

**Nitrate Monitoring Results (mg/L)**

<b>Sample Date</b>	<b>S-01</b>	<b>S-02</b>	<b>MCL</b>
06/07/2022	<0.5	<0.5	10
12/05/2023	0.62	0.62	10

### Radionuclides

Radionuclide sampling is required every six years. The City is required to sample for radionuclides again by November 2024. Results of all source water radionuclide testing since 2012 are shown in Table 3-4. **All radionuclide samples are well below their respective MCLs, so the City is in compliance with the radionuclide standards.**

**TABLE 3-4**

**Test Results for Radionuclides<sup>(1)</sup>**

Date	Analyte	S-01	S-02	MCL
10/15/2012	Gross Alpha	<3.0	<3.0	15
10/15/2012	Radium 228	<1.0	<1.0	5
11/07/2018	Gross Alpha	<3.0	<3.0	15
11/07/2018	Radium 228	<1.0	<1.0	5

(1) All radionuclide test results are picocuries per liter (pCi/L).

### Volatile Organic Chemicals and Synthetic Organic Chemicals

There are currently 21 regulated Volatile Organic Chemicals (VOCs) and 33 regulated Synthetic Organic Chemicals (SOCs). A list of these compounds and their MCLs is included in Table 3-5. There are additional chemicals which do not have MCLs but do have state reporting limits (SRLs); these are not listed.

**TABLE 3-5**

**Regulated VOCs and SOCs**

Organic Chemical	Primary MCL (mg/L)	Organic Chemical	Primary MCL (mg/L)
Vinyl chloride	0.002	Chlordane	0.002
Benzene	0.005	Dibromochloropropane	0.0002
Carbon tetrachloride	0.005	2,4-D	0.07
1,2-Dichloroethane	0.005	Ethylene dibromide	0.00005
Trichloroethylene	0.005	Heptachlor	0.0004
para-Dichlorobenzene	0.075	Heptachlor epoxide	0.0002
1,1-Dichloroethylene	0.007	Lindane	0.0002
1,1,1-Trichloroethane	0.2	Methoxychlor	0.04
cis-1,2-Dichloroethylene	0.07	Polychlorinated biphenyls (PCBs)	0.0005
1,2-Dichloropropane	0.005	Pentachlorophenol	0.001
Ethylbenzene	0.7	Toxaphene	0.003
Monochlorobenzene	0.1	2,4,5-TP	0.05
Ortho-Dichlorobenzene	0.6	Benzo(a)pyrene	0.0002

**TABLE 3-5 – (continued)**

**Regulated VOCs and SOCs**

<b>Organic Chemical</b>	<b>Primary MCL (mg/L)</b>	<b>Organic Chemical</b>	<b>Primary MCL (mg/L)</b>
Styrene	0.1	Dalapon	0.2
Trichloroethane	0.005	Di(2-ethylhexyl) adipate	0.4
Toluene	1	Di(2-ethylhexyl) phthalate	0.006
Trans-1,2-Dichloroethylene	0.1	Dinoseb	0.007
Xylenes (total)	10	Diquat	0.02
Dichloromethane	0.005	Endothall	0.1
1,2,4-Trichlorobenzene	0.07	Endrin	0.002
1,1,2-Thrichloroethane	0.005	Glyphosate	0.7
Alachlor	0.002	Hexachlorobenzene	0.001
Aldicarb	0.003	Hexachlorocyclopentadiene	0.05
Aldicarb sulfone	0.002	Oxamyl (Vydate)	0.2
Aldicarb sulfoxide	0.004	Picloram	0.5
Atrazine	0.003	Simazine	0.004
Carbofuran	0.04	2,3,7,8-TCDD (Dioxin)	3x10 <sup>-8</sup>

VOCs were last tested in September 2023, and SOCs were last tested in April 2017. The City has a 6-year waiver for VOC testing, and will not need to test again until at least December 2025. Four VOCs were detected, but there were no MCL exceedances. The detected VOCs are summarized in Table 3-6. No SOCs were detected.

**TABLE 3-6**

**Detected VOCs**

<b>Chemical Name</b>	<b>Concentration (ug/L)</b>	<b>SRL</b>	<b>MCL</b>
Chloroform	9.3	0.5	-
Bromodichloromethane	4.2	0.5	-
Dibromochloromethane	0.73	0.5	-
Trihalomethane	14.23	-	80.4

**DELIVERED WATER QUALITY**

Delivered water quality refers to the water quality within the distribution system. Monitoring of delivered water quality is necessary because some water quality parameters have been demonstrated to change in the distribution system, or even in the plumbing of buildings. The following sections summarize the standards and regulations

for delivered water quality relevant to the City, as well as the actions taken by the City to comply with these regulations.

### **Surface Water Treatment Regulatory Requirements**

The Long-Term 1 and 2 Enhanced Surface Water Treatment Rules (LT1ESWTR and LT2ESWTR) build upon the existing Surface Water Treatment Rule requirements. For systems using conventional filtration, the maximum turbidity allowed is 1 NTU with at least 95 percent of all combined filter effluent turbidity measurements below 0.3 NTU.

Under the Surface Water Treatment Rule, filtered water systems must meet certain removal criteria for *Giardia lamblia* and viruses. Purveyors are required under WAC 246-290-630 to provide 3-log (99.9 percent) removal of *Giardia lamblia* and 4-log removal (99.99 percent) removal of viruses. The removal is attained with a combination of filtration and disinfection. Disinfection is used in addition to filtration to provide additional *Giardia* and virus inactivation to comply with the requirements.

LT2ESWTR establishes treatment technique requirements for filtered systems based on their risk level for contamination, calculated from the system's average *Cryptosporidium* concentration. Additional requirements include up to 2.5-log *Cryptosporidium* treatment in addition to existing requirements under the IESWTR and LT1ESWTR. Filtered systems which demonstrate low levels of risk are not required to provide additional treatment. Unfiltered systems must achieve at least log-2 removal if the source water is monitored for *Cryptosporidium*, and 3-log removal if source water is not monitored.

The LT2ESWTR also addresses systems with unfinished water storage facilities. Under this rule, systems must either cover their storage facilities, provide at least a 4-log virus removal, or perform state-approved risk mitigation. Lastly, the rule extends the requirement of the disinfection profiles mandated under the LT1ESWTR to the Stage 2 D/DBPR.

The City is currently in compliance with these treatment rules.

### **Revised Total Coliform Rule**

The Revised Total Coliform Rule updated coliform monitoring regulations in 2013. Coliform bacteria describe a broad category of organisms routinely monitored in potable water supplies. Though not all coliform bacteria are pathogenic in nature, they are relatively easy to identify in laboratory analysis and they represent an indicator organism. If coliform bacteria are detected, then pathogenic organisms may also be present. Bacterial contamination in a water supply can cause a number of waterborne diseases, so these tests are strictly monitored and regulated by the DOH. The revised rule requires more monitoring than under the prior requirements. In addition, every public water system is required to develop a coliform monitoring plan, subject to approval by DOH.

WAC 246-290 establishes bacteriological testing requirements for public water systems. Compliance with this rule is based on the presence/absence of total coliforms. The number of routine samples required depends on the system size. For systems like South Bend that collect fewer than 20 samples per month, one sample that contains coliforms would exceed the legal limit and trigger the follow-up sampling requirements.

The Revised Total Coliform Monitoring Rule specifies each total coliform positive routine sample must be tested for the presence of *E. coli*.; if any total coliform positive sample is also *E. coli*. positive, then the sample must be reported to the state by the end of the day. If a routine sample is positive for total coliform, repeat samples are required.

In the event that a sample tests positive for coliform, at least three repeat samples shall be collected and analyzed for total coliform. One repeat sample shall be taken at the same location as the suspect sample and two additional samples shall be taken within five service connections upstream and downstream of the suspect sample. These repeat samples shall be taken and submitted for analysis within 24-hours after receiving the unsatisfactory result. If one or more repeat sample is positive for total coliform, the sample must be analyzed for *E. coli*. If the total coliform positive sample is positive for *E. coli*, the sample must be reported to the state. Another set of repeat samples must then be collected unless an assessment has been triggered and the state has been notified. Public notification requirements are discussed in the Emergency Response Plan in Chapter 6.

Based on the residential population listed in the City's Water Facilities Inventory Form in Appendix A, the City is required to collect a minimum of three coliform samples per month from different locations throughout the system. The City collects a sample from one of several locations each month and has not detected coliform since 2018. Regulations for bacteriological testing schedule are given in WAC 246-290-300(3). The City's Coliform Monitoring Plan is located in Appendix D.

### **Disinfectant Byproduct Monitoring**

WAC 246-290-300(6) requires purveyors of public water systems that provide water treated with chemical disinfectants to monitor for disinfectants and disinfection byproducts. The Disinfection/Disinfectants Byproduct Rule (D/DBP Rule) establishes residual disinfectant concentrations and maximum contaminant levels for disinfection byproducts.

The Stage 1 D/DBP rule was first announced in December 1998 and established the MCLs for TTHM and HAA5 at 80 µg/L and 60 µg/L, respectively, based on the running annual average of four quarterly samples. The Stage 1 D/DBP Rule remained in effect for compliance until October 1, 2013.

Stage 2 of the D/DBP Rule was published in January 2006 and compliance with the new regulations began on October 1, 2013. Under Stage 2 of the D/DBP Rule, the MCLs for

TTHM and HAA5 remain 80 µg/L and 60 µg/L, respectively; however, compliance with the MCL is based on the running annual average of each individual sample site instead of the running annual average of all samples combined. The South Bend system is required to collect samples quarterly (four times per year).

The City has updated their Stage 2 DBPR IDSE Standard Monitoring Plan with this Water System Plan, and it is included in Appendix D.

Table 3-7 shows the results from quarterly sampling since 2019. The distribution system has produced a few samples with MCL exceedances during this timeframe, which are indicated in bold. However, these samples did not raise the LRAA above the MCL, so the City has been in compliance for many years.

**TABLE 3-7**

**TTHM and HAA5 Sample Results**

Date	TTHM			HAA5			
	Sample Location	Sample Result (ug/L)	LRAA (ug/L) <sup>(1)</sup>	Sample Location	Sample Result (ug/L)	LRAA (ug/L) <sup>(1)</sup>	
2/11/2019	810 A Street	25.8	-	1207 Morrison	8.8	-	
5/21/2019		45.9	-	810 A St	37.2	-	
8/6/2019		69.6	-	1207 Morrison	42	-	
11/4/2019		55	49.1		26.9	25.9	
2/10/2020		25.6	49.0		6.5	25.1	
6/9/2020		17.5	41.9		14.2	22.4	
8/4/2020		53.1	37.8		30.7	19.6	
11/2/2020		74.5	42.7		36	21.9	
2/1/2021		21.2	41.6		20.7	25.4	
5/3/2021		37.4	46.6		22.2	27.4	
8/16/2021		76.8	52.5		<b>62</b>	35.2	
11/1/2021		32.7	42.0		23.7	32.2	
2/8/2022		1207 Morrison	20.3		-( <sup>1</sup> )	2.1	27.5
5/11/2022		810 A Street	18.3		42.6	5.6	23.4
8/8/2022	17.6		22.9		7.3	9.7	
11/1/2022	<b>91</b>		42.3	<b>89</b>	26.0		
2/14/2023	37.8		41.2	12.4	28.6		
5/1/2023	38.3		46.2	6	28.7		
8/23/2023	28.1		48.8	12.9	30.1		
12/4/2023	32.3		34.1	20.6	13.0		
<b>MCL (ug/L)</b>		<b>80</b>		<b>60</b>			

(1) The LRAA is based on the running average of the last 4 calendar quarters at a given location.

## Asbestos

Asbestos fibers are measured as million fibers per liter greater than 10 micrometers in length (MFL>10  $\mu\text{m}$ ). The MCL is 7 MFL>10  $\mu\text{m}$ . WAC 246-290-300(2)(b)(v) requires distribution system monitoring for asbestos in accordance with Federal regulation 40 CFR 141.23(b). The Federal regulation requires 1 sample during the first 3 years of each 9-year sampling cycle, unless the state grants a waiver to asbestos sampling based on a demonstrated lack of vulnerability to asbestos in both the source water and the distribution system. If an asbestos sample is required, it is to be taken under conditions where asbestos contamination is most likely to appear.

The City currently has a 9-year waiver for asbestos testing, and the next sample is due by September 2027. There are only three asbestos sampling results on record for the City, the most recent of which was in November 2018. **All samples showed results less than the reporting limit of 0.20 MFL>10  $\mu\text{m}$ , which is less than the MCL for asbestos of 7 MFL>10  $\mu\text{m}$ .**

## Lead and Copper Monitoring

In 1991, the EPA promulgated the Federal Lead and Copper Rule. The State of Washington adopted this rule in 1995, with minimal changes. The Lead and Copper Rule is intended to reduce the tap water concentrations of lead and copper that can occur when corrosive source water causes lead and copper to leach from water meters and other plumbing fixtures.

90 percent of the distribution system lead samples collected according to the procedures outlined in WAC 246-290, must have concentrations below the “Action Level” of 0.015 mg/L. Similarly, 90 percent of the copper samples must have concentrations less than 1.3 mg/L. If the 90<sup>th</sup> percentile concentration of either lead or copper from the group of samples exceeds these action levels, a corrosion control study must be undertaken to evaluate strategies and make recommendations for reducing the lead or copper concentration below the action levels. The rule requires systems that exceed the lead level to educate the affected public about reducing its lead intake. Systems that continue to exceed the lead action level after implementing corrosion control and source water treatment may be required to replace piping in the system that contains the source of lead. Corrosion control is typically accomplished by increasing the pH of the water to make it less corrosive, reducing its ability to break down water pipes and absorb lead or copper.

Table 3-8 provides the results of the City’s lead and copper testing completed in 2020 and 2023. Exceedances are indicated in bold.

**TABLE 3-8**

**Lead and Copper Monitoring Results**

Date	Lead, mg/L		Copper, mg/L	
	Highest Level	90 <sup>th</sup> Percentile	Highest Level	90 <sup>th</sup> Percentile
7/21/2020	0.029	0.007	1.25	1.19
9/26/2023	0.034	<b>0.023</b>	0.327	0.215
Action Level		0.0150		1.300

Following the lead exceedance in 2023, the City issued a public notice informing and educating customers on the issue. The City plans to activate a corrosion control program at the WTP in the spring of 2024.

**Revised Lead and Copper Rule**

The Revised Lead and Copper Rule (RLCR) will focus on replacing 100 percent of lead service lines and establishing a “trigger level” and “action level” for each contaminant. The EPA has also signaled its intent to test for lead and copper in schools and child care facilities. Water systems will be required to develop a lead service line inventory, which will identify and make public the locations of lead service pipes. These revised regulations took effect in October 2024.

The City investigated 200 service lines for its initial inventory. These 200 service lines were inspected on both the City side and the customer side of the meter during routine meter reading. Out of these 200 service lines, 141 were found to be non-lead and the remaining 59 were categorized as "lead status unknown." However, none of the inspected service lines were found to definitively contain lead. There were also no service lines designated GRR (galvanized requiring replacement).

**WATER QUALITY REPORTING**

As discussed previously, the City has obtained several water quality monitoring waivers, which affect the monitoring requirements. These are summarized in Table 3-9 as shown on the Water Quality Monitoring Report for the Year 2023 (Copy included in Appendix E).

**TABLE 3-9**

**Source Monitoring Requirements and Waivers in 2023**

<b>Monitoring Parameter</b>	<b>Sampling Requirement</b>	<b>Sampling Location<sup>(1)</sup></b>	<b>Next Sample Due</b>
Coliform	Three per month	Distribution system	Monthly
Nitrate	One per year each location	S01, S02	Annually
Inorganic Contaminants	One sample each between 1/2020 – 12/2028	S01, S02	After 2028
Volatile Organic Contaminants	One sample each between 1/2020 – 12/2025	S01, S02	After 2025
Iron	One per year each location	S01, S02	Annually
Asbestos	One sample every nine years	Distribution system	Sep 2027
Lead and Copper	One set of 10 samples every three years	Distribution system	2026
Herbicides, SOC 515.2	One sample every nine years	S01, S02	April 2026
General Pesticides, SOC 525.2	No sampling required between 1/2023 – 12/2025	S01, S02	After 2025
Soil Fumigants	No sampling required between 1/2023 – 12/2025	S01, S02	After 2025
Gross Alpha	One sample each between 1/2020 – 1/2025	S01, S02	November 2024
Halo-Acetic Acids	One sample per treatment plant every three months <sup>(2)</sup>	Distribution system	Quarterly <sup>(2)</sup>
Total Trihalomethane	One sample per treatment plant every three months <sup>(2)</sup>	Distribution system	Quarterly <sup>(2)</sup>
PFAS	One sample each every three years	S01, S02	August 2025

(1) S01 = Martin Creek, S02 = Electric Light Creek.

(2) Increased testing due to exceedances in 2022. If quality improves, this may be reduced to the standard annual testing.

**WATER QUALITY COMPLAINTS**

The City handles water quality complaints pursuant to their policy for dealing with complaints as described in Chapter 1. In response to water complaints, the Water System Operator will check out the validity of the complaint by an on-site investigation. Following the investigation an appropriate action will be taken to remedy the complaint.

## SYSTEM FACILITIES ANALYSIS

The following sections evaluate the existing water system facilities in terms of their capacities, physical conditions, and performance capabilities. Facilities are evaluated relative to existing requirements and to projected requirements based on growth and demand projections from Chapter 2.

## WATER RIGHTS ANALYSIS

### Current and Historic Withdrawals

The City holds four water right certificates to allow the City to withdraw a total instantaneous flow of 3.76 cubic feet per second (cfs) (1,690 gpm) for municipal use. These water rights are summarized in Chapter 1.

The installed design capacity of the WTP is 900 gpm, which is essentially equivalent to the City’s instantaneous active water right limit of 898 gpm from Martin Creek. From Table 2-3, it can be seen that the City’s maximum annual production since 2017 was 191.5 million gallons (in 2018), equivalent to 587.7 acre-feet, which is within the limits of the City’s annual water right of 1,450 acre-feet from Martin Creek. **Therefore, the City’s current instantaneous and annual usage rates have historically been within their water rights limits.**

### Projected Withdrawals

Projected withdrawal rate requirements are compared to current water rights in Table 3-10. **The City has adequate water rights to meet projected demands through 2043 and beyond.**

**TABLE 3-10**

### Projected Water Rights Status

Year	Annual Withdrawal $Q_a^{(1)}$			Instantaneous Withdrawal $Q_i^{(2)}$		
	Authorized by Water Right (ac-ft/yr)	Projected Production (ac-ft/yr)	Surplus/ (Deficit) (ac-ft/yr)	Authorized by Water Right (gpm)	Projected Peak Day Production (gpm)	Surplus/ (Deficit) (gpm)
2025	1,450	502	948	898	617	281
2035	1,450	512	938	898	629	269
2045	1,450	523	927	898	642	256

- (1) The total annual water right is the Martin Creek water right of 1,450 acre-ft.
- (2) Instantaneous Water Rights Surplus is the total available instantaneous water rights of 2.0 cfs (898 gpm) from Table 1-3, less the Recommended Source Capacity. The Fliess Creek water right is not considered in this total as the City does not currently have infrastructure to use it.

## **SOURCE CAPACITY ANALYSIS**

The City currently has three sources available for their use. These sources of supply are Martin Creek, Electric Light Creek, and the City of Raymond Intertie.

### **Electric Light Creek Dam**

The impoundment capacity at Electric Light Creek is reportedly 200,000 gallons. This capacity can be reduced over time due to sedimentation within the impoundment. In 2018, the impoundment was drained and cleared of sediment; prior to this cleaning, it is estimated that the sedimentation had significantly reduced reservoir capacity by approximately half. The impoundment is now drained annually and cleared of sediment, logs, and branches.

The dam is located in a narrow rock-walled canyon with the access road terminating at the face of the dam. The dam is constructed of concrete and is approximately 31 feet in height and 77 feet in length across the canyon. There are two 12-inch drain valves located at the bottom of the dam and an 8-inch raw waterline located in the face of the dam approximately 16 feet below the top of the dam. The 8-inch cast iron (CI) waterline is reduced to 6-inch PVC outside the dam. The Electric Light Creek transmission main runs from the raw water impoundment to Airport Road and from that intersection follows Airport Road southeast approximately 4,200 linear feet to the intersection of the Martin Creek transmission main and Airport Road. At this junction, the transmission mains from both Electric Light and Martin Creeks intersect and flow the remaining few hundred feet to the WTP in a 10-inch asbestos cement (AC) pipe.

### **Martin Creek Dam**

The impoundment capacity at Martin Creek is reportedly 60,000 gallons. This capacity can be reduced over time due to sedimentation within the impoundment. The impoundment was drained and the sediment and debris was removed in 2018. The impoundment is now drained annually and cleared of sediment, logs, and branches.

The dam is located in a rock-walled canyon with the access road running above the along almost the entire length of the impoundment, which allows access for sediment and debris removal. The dam is constructed of concrete and is approximately 23 feet in height and 70 feet wide across the floor of the canyon. The Martin Creek transmission main is 6-inch poly-vinyl chloride (PVC), which was constructed in 2007 to replace the original damaged main from the impoundment to Airport Road. At this junction, the transmission mains from both Electric Light and Martin Creeks intersect and flow the remaining few hundred feet to the WTP in a 10-inch asbestos cement (AC) pipe.

**Raymond Intertie**

The Cities of South Bend and Raymond have an Intertie Agreement that Raymond will supply potable water to South Bend as needed. The intertie has a maximum capacity of approximately 600 gpm and is typically utilized to supplement the City supply at times when total available combined source capacity of Martin and Electric Light Creek does not keep up with system demands. The intertie is located within Raymond City limits on the south side of the Willapa River, which is the opposite side of the river from the City’s raw water sources and WTP. The intertie is typically used for emergencies or when the WTP is taken offline for maintenance or upgrades such as the WTP upgrade and expansion project in 2022.

**Source Water Capacity**

The City has adequate water rights on Electric Light and Martin Creeks to meet the long-term needs of the system users, and the WTP design capacity of 900 gpm. The creeks appear to provide adequate supply year-round. Therefore, the source capacity is limited mainly by the water treatment plant. The Electric Light and Martin Creek impoundments are in generally good condition, and are maintained on a consistent basis to keep them clear of debris and sediment buildup. The intertie is not considered as part of source water capacity as it is typically for emergency use.

DOH recommends that the source capacity is evaluated based on 20 hours of pumping as it is not always possible or practical to operate pumps for 24 hours. Therefore, the source capacity is evaluated based on 20 hours of WTP pump operation. Table 3-11 compares the current source capacity with the projected maximum day demands throughout the planning period.

**TABLE 3-11**

**Projected Water Demands and Source Capacity**

<b>Year</b>	<b>20-Hour Source Pumping Capacity (gpd)</b>	<b>Projected Peak Day Production (gpd)</b>	<b>Production Surplus/(Deficit) (gpd)</b>
2025	1,080,000	888,223	191,777
2035	1,080,000	905,967	174,033
2045	1,080,000	924,066	155,934

It should be noted that the MDD in 2023 was 991,000 gallons, which is much higher than the projections calculated for Table 2-9. This value is unusually high when compared to previous years’ MDDs. If similarly high MDDs are observed in the coming years, these projections should be updated.

## **WATER TREATMENT ANALYSIS**

The current Water Treatment Plant has been operating since 2000, receiving a significant upgrade and expansion in 2022. The current design capacity of the WTP is 900 gpm, with 300 gpm each pumped through three microfiltration units. The Operations and Maintenance Manual indicates that the filters can operate at up to 400 gpm each.

Subsequent to the upgrade and expansion the WTP has three 300-gpm pumps (two duty and one spare) are used to supply the necessary hydraulic conditions for treatment through the microfiltration trains. The filtered water from the microfiltration units is then disinfected with sodium hypochlorite prior to entry to a 39,000-gallon clearwell. Finished water is supplied to the distribution system by three 450-gpm (two duty and one spare) finished water pumps.

The WTP is equipped with full automation. WTP functions and readings are accessed by the operator from remote locations when needed or prompted by the auto-dialer. The WTP is operated via a telemetry system that allows the booster pumps at the WTP to be called on by the level in any of the four reservoirs.

Turbidity is measured from each filter unit and at the combined filter discharge to the clearwell. The individual filter turbidimeters receive unchlorinated water and as a result, tend to display high readings due to bio-fouling. This is not a significant issue since compliance is based on the combined turbidimeter, which receives chlorinated finished water.

The primary filter diagnostic tool is the Pressure Decay Test (PDT), which is conducted daily to check the membrane filters integrity.

Raw water is utilized to backwash the outer membranes. Approximately 50 percent of the backwash was originally designed to be recycled to the raw water basin; however, the recycle system has never been functional since the WTP was constructed. The daily backwash rate in recent years is approximately 30,000 to 35,000 gpd, which is a significant amount of production during low flow periods. The WTP expansion in 2022 upgraded the chemical clean-in-place backwash by improving automation and increasing the reliability of the valves used to control the CIP backwashes. This was done by equipping the valves with pneumatic actuators similar to the other automatic valves on the skids. In addition, new limit switches were integrated with the new pneumatic operators allowing the valves to report the same status signals to the control panel. The PLC programming was modified to include new control signals to control the sequenced opening and closing of the valves during backwash operations and also allow WTP operators to exercise the valves on a regular basis.

The City has previously installed a Pelton wheel in the former WTP building. The Pelton wheel is intended to recover some of the energy that is lost when the head pressure from the impoundments is broken at the WTP. The energy that is generated is sold back to the Pacific County PUD.

Currently, there is no source of backup power to run the WTP during power outages. During extended periods when the WTP does not have electricity, the City could rent large generators from outside sources; however, this would require additional wiring and a transfer switch to be installed. The treatment capacity is identical to the source capacity shown on Table 3-11.

## **TELEMETRY AND CONTROL SYSTEM**

The City's telemetry system serves all of its basic components based on radio communication between remote sites and a master-receiving unit at the City's WTP. The system utilizes three system Remote Telemetry Units (RTUs) and the WTP office control panel. The telemetry is generally in good working condition.

The telemetry system allows the booster pumps at the WTP to be called on by the level in any of the four reservoirs. The telemetry system is a spread spectrum radio system with sites at the treatment plant, the main reservoir site, the Rixon Road site, and City Hall. Water levels in all four reservoirs are transmitted to a programmable logic controller (PLC) located at the WTP. The PLC calls one or two of the three booster pumps depending on the level in the lead (controlling) reservoir. The operator can designate any one of the four reservoirs as the controlling reservoir. The lead and lag and standby booster pumps are automatically rotated by the PLC to ensure balanced use.

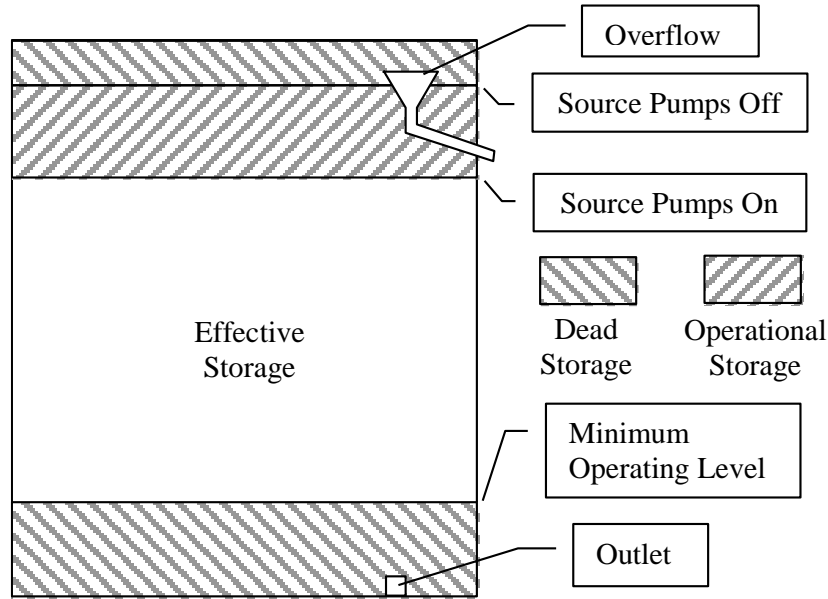
## **STORAGE**

The nominal volume of a water reservoir is generally the name given to a reservoir based on an approximation of the gross volume of the reservoir, which is the amount of water the reservoir could hold if filled all the way to the top of the reservoir wall. However, practically speaking, a reservoir cannot be filled to the top of the wall and a reservoir also cannot, under normal operational conditions, be drained completely while meeting system demand. Therefore, there is a need to determine how much of a reservoir volume is *effective* or available storage and how much of that effective storage the City needs.

The DOH Water System Design Manual identifies the following components of reservoir storage volume:

- Operational Storage
- Equalizing Storage
- Standby Storage
- Fire Suppression Storage
- Dead Storage

A reservoir’s effective storage volume is the gross volume minus operational storage and dead storage. This volume must be large enough to accommodate the requirements for equalizing storage, standby storage and fire suppression storage. Figure 3-1 illustrates an elevation view of a typical reservoir indicating dead storage, operational storage and effective storage volumes.



**FIGURE 3-1**

**Typical Storage Reservoir Components**

**General Condition**

The City operates four steel reservoirs; three are glass-lined bolted steel and the fourth is welded steel. The main water storage facility consists of two reservoirs constructed in 2008 within the footprint of the former finished water impoundment at the head of Smith Greenhouse Road. These reservoirs are 92 feet and 64 feet in diameter, respectively, and are each 33 feet in height. The overflow elevations are the same but the base and top of wall elevations differ slightly to account for different freeboard requirements to meet seismic design standards. The respective gross volumes are 1.65 MG and 0.80 MG.

The two Rixon Road reservoirs are located on the west side of the water system. The newest one (constructed in 2007) is glass-lined bolted steel, 56 feet in diameter and 19.26 feet in height. The old Rixon Road reservoir is welded steel, 42 feet in diameter and 21 feet in height. The respective gross volumes are 0.22 MG and 0.35 MG.

The three glass-lined bolted steel tanks were constructed in 2007 and 2008. The welded steel tank was constructed in 1967 and recoated both inside and outside in 2008. All reservoirs are in excellent condition.

## Storage Capacity Analysis

### Existing Effective Storage

The effective storage capacity is that capacity of the reservoir that is reliably available in the reservoir and capable of being withdrawn from the reservoir at the rates and pressures required for the water use purposes. Details regarding dimensions and capacities of the City’s reservoirs are presented in Table 3-12. Based on the operational dimensions and water levels in Table 3-12 it is estimated that the total effective storage capacity for the City is 2,620,000 gallons.

**TABLE 3-12**

### Reservoir Dimension and Capacity Details

<b>Parameter<sup>(1)</sup></b>	<b>Main Reservoir 1</b>	<b>Main Reservoir 2</b>	<b>Rixon Road Reservoir 1</b>	<b>Rixon Road Reservoir 2</b>
Diameter, feet	92.31	64.34	42	55.95
Volume per Foot, gallons	50,063	24,321	10,364	18,392
Top of Wall Elevation, feet	262.09	263.09	262.18	262.59
Overflow Elevation, feet	261.09	261.09	261.09	261.09
Base Elevation, feet	229.08	230.08	241.15	243.33
Height, feet	33.01	33.01	21.03	19.26
Gross Volume, gallons	1,652,588	802,840	217,951	354,224
Freeboard Requirement, feet	1.5	2.5		2
WTP Off Elevation, feet	260.59	260.59	260.59	260.59

**TABLE 3-12 – (continued)**

### Reservoir Dimension and Capacity Details

<b>Parameter<sup>(1)</sup></b>	<b>Main Reservoir 1</b>	<b>Main Reservoir 2</b>	<b>Rixon Road Reservoir 1</b>	<b>Rixon Road Reservoir 2</b>
WTP On Elevation, feet	260.09	260.09	260.09	260.09
Minimum Operating Elevation, feet	231.08	231.08	242.65	244.83
Outlet Elevation, feet	230.08	231.08	242.65	244.83
Operating Depth, feet	29.01	29.01	17.44	15.26
<b>Effective Storage, gallons</b>	<b>1,452,000</b>	<b>706,000</b>	<b>181,000</b>	<b>281,000</b>
<b>Total Available Storage</b>	<b>2,620,000</b>			

(1) The vertical elevations in this table are based on a previous survey, which referenced vertical datum NAVD88.

### Operational Storage

Operational storage is the volume of the reservoir devoted to supplying the water system while under normal operating conditions with the source(s) of supply in “off” status. This volume is dependent upon the sensitivity of the reservoir water level sensors, and the tank configuration necessary to prevent excessive cycling of source pump motors. Operational storage is in addition to other storage components, thus providing a factor of safety for equalizing, standby, and fire suppression components.

Each of the reservoirs have half a foot between the operational levels, leaving a total operational storage of 51,570 gallons.

### Equalizing Storage

Equalizing storage is used to meet peak hour demands that exceed the installed system source capacity. The volume of equalizing storage recommended depends on peak hour system demands, the length of time the peak hour demands persist, the source production rate, and the mode of system operation. Sufficient equalizing storage must be provided in combination with available water sources and pumping facilities such that peak system demands can be satisfied.

The Water System Design Manual recommends that equalizing storage be calculated using the following equation, but in no case should it be less than zero:

$$V_{ES} = (Q_{PH} - Q_S) \times 150 \text{ minutes}$$

Where

- $V_{ES}$  = Equalizing storage component, gallons
- $Q_{PH}$  = Peak hourly demand, gpm
- $Q_S$  = Total source of supply capacity, excluding emergency sources, gpm

$Q_{PH}$  is the Peak Hour Demand from Table 2-7.  $Q_S$  is generally defined as the installed source pumping capacity, which in the case of City is 900 gpm. Recommended equalizing storage capacities for years 2023 through 2045, based on the DOH Water System Design Manual, are shown in Table 3-13.

### Standby Storage

Standby storage is provided in order to meet demands in the event of a system failure such as a power outage, an interruption of supply, or break in a major transmission line. The amount of emergency storage should be based on the reliability of supply and pumping equipment, standby power sources, and the anticipated length of time the system could be out of service. Because these factors are unique to each water system, there is no specific requirement for this storage component. However, the Water System

Design Manual provides several recommendations for estimating a reasonable volume for standby storage.

The WSDM provides the following equation for calculating standby storage:

$$V_{SB} = (N)(SB_i)(T_d)$$

Whichever is greater, where

- $V_{SB}$  = Total standby storage component, gallons
- $N$  = Number of system ERUs
- $SB_i$  = Locally adopted unit SB volume in gallons per day per ERU
- $T_d$  = Number of days selected to meet water system-determined standard of reliability

The WSDM currently recommends that standby storage be equal to one day of MDD with  $SB_i$  equal to the  $ERU_{MDD}$  and  $T_d$  equal to 1 day. Therefore, we will assume standby storage throughout the planning period is equal to the projected MDD values.

### Fire Suppression Storage

Fire suppression storage is provided to ensure that water for fighting fires is available when necessary. Fire suppression storage also reduces the impact of firefighting on distribution system water pressure. The amount of water required for firefighting purposes is specified in terms of rate of flow in gallons per minute (gpm) and an associated duration. Fire flows must be provided at a residual water system pressure of at least 20 pounds per square inch (psi) at all water service connections.

Fire suppression storage is calculated using the following equation:

$$V_{FSS} = FF * T_m$$

Where

- $V_{FSS}$  = Volume of fire suppression storage component, gallons
- $FF$  = Fire flow rate, gpm
- $T_m$  = fire flow duration, minutes

The City's fire flow analysis assumes a fire storage reserve based on a fire flow standard of 3,000 gpm for 3 hours, enough necessary to encourage the development of industry in the City (3,000 gpm x 3 hours = 540,000 gallons).

Dead Storage

Storage in a reservoir that is below the minimum elevation for serving residences is termed dead storage. Any storage volume below the level required to maintain the required pressures of 30 psi during normal operation or 20 psi during fire flow is considered dead storage. All four of the reservoirs are well above the elevation necessary to provide adequate pressures to the system, so there is no dead storage in the system.

Total Recommended Effective Storage

The total recommended effective storage capacities are summarized in Table 3-13 together with Existing Effective Storage as calculated in Table 3-12, and the projected storage surplus or deficit. Total effective storage is the additive sum of equalizing, standby, and fire suppression storage. Table 3-13 shows that **the City has adequate storage to meet the projected storage capacity recommendations through 2045 planning period.**

**TABLE 3-13**

**Projected Effective Storage Capacity Analysis**

<b>Zone/Year</b>	<b>Operational Storage (gal)</b>	<b>Equalizing Storage (gal)</b>	<b>Standby Storage (gal)</b>	<b>Fire Suppression Storage (gal)</b>	<b>Total Required Storage (gal)</b>	<b>Available Storage (gal)</b>	<b>Surplus/ (Deficit) (gal)</b>
2025	51,572	22,290	888,223	540,000	1,502,084	2,620,000	1,117,916
2035	51,570	22,601	905,967	540,000	1,520,138	2,620,000	1,099,862
2045	51,570	22,913	924,066	540,000	1,538,549	2,620,000	1,081,451

**BOOSTER PUMP STATIONS**

The City operates three booster pump stations within its service area; the B Street Booster Pump Station, the Main Reservoir Booster Pump Station, and the Rixon Road Reservoir Booster Pump Station. The characteristics of these booster stations are provided in Table 1-4 of Chapter 1. Based on DOH guidelines, a booster station pumping into a zone with atmospheric storage (the water surface is open to the atmosphere) is considered an “open” system. A “closed” booster system relies solely upon pumps to pressurize the distribution zone, without the advantage of a storage reservoir.

In 2008, the City completed a Booster Pump Stations Predesign Report in order to improve service and maintain adequate pressures to current and new customers in the Eklund Park and the Smith-Greenhouse Road areas. However, the proposed improvements, as described below, have not yet been implemented.

### **Eklund Park Booster Pump Station**

Based on past and more current hydraulic analysis conducted as part of the Predesign Report, Eklund Park residences, in the area of the proposed booster pump station experience several hydraulic limitations under certain future operational conditions. A new booster pump station will remedy those deficiencies. The new booster pump station will serve approximately 12 homes with a peak pump flow of 70 gpm.

The booster pump station will include a bypass with a check valve to allow fire flows to reach the area and supply continued service if a power outage occurs. The pump station will be equipped with a low suction cut out switch (proposed to be 20 psi), a discharge pressure switch, flow meter, suction and discharge header pressure gages, a hydropneumatic tank, electrical controls, alarm, and two pumps each capable of 70 gpm/60 feet TDH.

The Eklund Park Booster Pump Station is not designed to convey fire flows, only to maintain adequate pressures within the service area under future peak hour demands and when fire flow demands occur elsewhere in the South Bend distribution system.

### **Smith-Greenhouse Booster Pump Station**

The Smith-Greenhouse Booster Pump Station is proposed to serve four existing and six future homes on Smith-Greenhouse Road. Two existing homes within the Smith-Greenhouse Booster Pump Station service area are currently served by the water system and are served by the Main Reservoir Booster Pump Station to maintain adequate pressure. Other existing homes in the vicinity are served by individual wells, but will be connected to the City's system and served by the new booster pump station.

Using a similar flow analysis as presented for the Eklund Park Booster Pump Station in the 2008 Predesign Report, the pumps would be designed to supply a peak flow of 60 gpm. The Smith-Greenhouse Booster Pump Station is proposed to be located at an elevation of 127 feet. The booster pump is proposed to supply 180 feet of TDH to account for bends, friction losses, elevation gain, and other minor losses. The booster pump station suction pressure is approximately 30 psi.

A new water main would be required to service the homes within the Smith-Greenhouse Booster Pump Station area. Approximately 1,500 linear feet of 6-inch water main would be required, including valves, service connections, and a blowoff at the line termination. The booster pump station is not designed to convey fire flows.

## **DISTRIBUTION SYSTEM**

The water distribution system includes all the piping distributing water from the source and storage facilities to the water customers. The full water distribution system is shown in Figure 1-2 with a closer view of the City in Figure 1-3. The following sections

evaluate the general condition and the hydraulic capacity of the water distribution system.

### **General Description and Condition**

The City water distribution system is described in general terms in Chapter 1 under the heading *Transmission and Distribution System*. The water distribution system has water mains of various ages, materials and sizes. Some older portions of the water system still contain 10-inch and smaller asbestos concrete (AC) pipe installed in the 1960s and 1970s. Approximately 33 percent of the system was made up of AC pipe as of the City's 2020 Comprehensive Plan. More recently installed water mains are polyvinyl chloride (PVC) and ductile iron (DI) pipes ranging in size from 1-1/2 inch to 10 inch.

Life expectancy of distribution mains can vary significantly depending on the water main materials used, local soil conditions, and the construction practices used during water main installation. For planning purposes, it is estimated that the life expectancy of the AC pipe installed in the City is approximately 50 years. Water mains are generally the most expensive part of a water system. Water main replacement costs in 2023 dollars can be expected to range from approximately \$1.0 million to \$1.5 million per mile of water main. Based on Table 1-5, replacement of the entire distribution system could be expected to cost between \$26 and \$39 million. Since the City's water mains were installed over a period of time, the mains can also be expected to require replacement over a similar time span.

In reality not all water mains reach the end of their useful life in the same time span, and the process of system replacement and renewal can usually be spread out over a longer period than the original installation period. To avoid having a wave of water facilities replacements hit the system at one time, the City has begun to implement a water main replacement program. To replace the entire distribution system over a 50-year time period, 1/50<sup>th</sup> of the system will be replaced annually. This would represent an average of approximately 2,800 feet of water main replacement per year at an average estimated annual cost of approximately \$500,000 to \$750,000 per year in 2023 dollars. As the system grows, the amount of water main to replace per year will also eventually increase. Water main replacement would be prioritized based on experience regarding the areas of the system that have the most problems with existing water mains, both in terms of water main failures and in terms of water main capacity. At this time, the areas with the highest priority for water main replacement are areas of existing 4-, 6-, 8-, and 10-inch AC water main.

## **WATER SYSTEM CAPACITY**

There are several factors that could limit water system capacity, including source capacity, treatment capacity, instantaneous water rights capacity, annual water rights capacity, and storage capacity. This section discusses the maximum number of ERUs that these components could support.

## SOURCE CAPACITY

Ideally, sources should be capable of meeting maximum day demand over 20 hours of pumping. As discussed previously, the source capacity appears to be mainly limited by the WTP maximum output of 900 gpm.

$$\text{Source Capacity ERU Capacity} = \frac{900 \text{ gpm} \times 1,200 \text{ min/day}}{221 \text{ gpd per ERU}} = 4,887 \text{ ERUs}$$

## TREATMENT CAPACITY

The treatment capacity of a water system is based on the physical capacity of the treatment equipment. The number of ERUs supportable by the existing treatment plant, the total amount of water that can be produced by the water treatment plant in 20 hours of operation per day at design capacity is divided by the maximum day demand per ERU as follows:

$$\text{Treatment Capacity ERU Capacity} = \frac{900 \text{ gpm} \times 1,200 \text{ min/day}}{221 \text{ gpd per ERU}} = 4,887 \text{ ERUs}$$

At 20 hours of operation, it is identical to the source capacity above. However, the WTP can nominally operate 24 hours a day, which results in the following number of ERUs capable of being served. In actuality, the WTP generates water for only 22 hours since backwashing the filters is required.

$$\text{Treatment Capacity ERU Capacity} = \frac{900 \text{ gpm} \times 1,320 \text{ min/day}}{221 \text{ gpd per ERU}} = 5,375 \text{ ERUs}$$

## INSTANTANEOUS WATER RIGHT CAPACITY

From Table 1-2, the City has 2.0 cfs (898 gpm) of instantaneous water rights at Martin Creek and an unspecified quantity for Electric Light Creek. Use of these rights is limited to 18 hours per day per DOH reliability recommendations; therefore, the instantaneous water rights limit can be calculated as follows:

$$\frac{\text{Instantaneous Water Rights}}{\text{ERU Capacity}} = \frac{898 \text{ gpm} \times 1,080 \text{ min/day}}{221 \text{ gpd per ERU}} = 4,388 \text{ ERUs}$$

The City has adequate instantaneous water rights to support projected demands through the 20-year planning period.

**ANNUAL WATER RIGHT CAPACITY**

From Table 1-2, the City has 1,450 acre-feet of annual water rights at Martin Creek and an unspecified quantity for Electric Light Creek. The Average Day Demand per ERU from Table 3-1 is 112 gpd. Therefore, the limit on ERUs due to the annual water right can be calculated as follows:

$$\frac{\text{Annual Water Rights}}{\text{ERU Capacity}} = \frac{1,450 \text{ AF/Y} \times 325,651 \text{ gal/AF}}{365 \text{ days/year} \times 112 \text{ gpd per ERU}} = 11,551 \text{ ERUs}$$

The City has adequate annual water rights to support projected demands through the 20-year planning period.

**STORAGE CAPACITY**

Table 2-8 projects 4,167 ERUs at the end of the 20-year planning period in year 2045. Therefore, existing storage capacity covers the storage requirements. To determine the number of ERUs supportable by the existing storage, the storage required for various numbers of ERUs is calculated until the result is a storage volume greater than the existing effective storage. Table 3-14 shows that the existing storage can support up to 8,316 ERUs, given either the estimated low stream flow conditions in Electric Light and Martin Creeks or one of the three filter pumps at the WTP inoperable.

**TABLE 3-14**

**Storage Capacity in Terms of ERUs**

ERUs	Operational Storage (gal)	Equalizing Storage (gal)	Standby Storage (gal)	Fire Suppression Storage (gal)	Total Required Storage (gal)	Available Storage (gal)	Surplus/ (Deficit) (gal)
8,316	51,572	190,450	1,837,836	540,000	2,619,858	2,620,000	142
8,317	51,572	190,489	1,838,057	540,000	2,620,118	2,620,000	-118

**SUMMARY OF CAPACITY LIMITS**

The water system capacities derived above are summarized in Table 3-15. There are no current deficiencies in ERU capacity, but the most limiting factor is the system’s treatment plant capacity limit, followed by the system’s source capacity. The WTP can operate 24 hours a day minus filter backwashing cycles for an effective operating time of 22 hours.

**TABLE 3-15**

**Water System ERU Capacities**

<b>Component</b>	<b>Capacity (gpd)</b>	<b>ERU Capacity</b>	<b>Current ERUs</b>
Source	1,080,000	4,887	4,005
Treatment (22-hour)	1,188,000	5,375	
Water Rights (Qi)	1,648,080	4,388	
Water Rights (Qa)	2,192,575	11,551	
Equalizing Storage	190,450	8,316	
Standby Storage	1,837,836		

(1) Based on 24 hours of WTP operation with an assumed 2 hours of backwashing, resulting in 22 hours of production.

There are currently no deficient components of the system capacity.

**HYDRAULIC MODELING PROGRAM**

The existing water system was analyzed using Innovyze’s InfoWater hydraulic modeling program, which operates in an ArcMap GIS environment to identify areas of the distribution system which are deficient in flow and pressure.

The InfoWater model is configured with a graphical user interface. Each water system element, including pipes, valves, sources, and reservoirs, is assigned a unique graphical representation within the model. Each element is assigned a number of attributes specific to its function in the actual water system. Typical element attributes include spatial coordinates, elevation, water demand, pipe lengths and diameters, and critical water levels for reservoirs. With attributes of each system element as the model input, the InfoWater software produces the model output in the form of flows and pressures throughout the simulated water system.

**MODEL ASSUMPTIONS**

To develop the hydraulic model, the basic layout of the water system is recreated within the InfoWater model. The lengths, diameters, and connection points of system piping are assigned using an updated base map of the water system. Elevations of nodes are assigned using County LiDAR data, using the NGVD88. The locations of normally

closed valves, check valves, and pressure reducing valves (PRVs) are found on water system base maps. The assumptions regarding the modeling of the City’s water sources, system demands, and the settings of PRVs are included in the following sections.

**Sources**

The WTP and Raymond Intertie are included in the model. The WTP is modeled as a reservoir with 30 ft of head, with two pumps connecting it to the transmission pipeline. The intertie is modeled similarly, as a reservoir with one pump connecting it to the distribution system. However, the intertie is “closed” during all scenarios, since it is only used in emergency situations.

**Storage**

Storage reservoirs in InfoWater are modeled as “tanks” with finite size, using actual reservoir dimensions and elevations. The model includes the City’s four active storage tanks. Tank levels were modeled to reflect full utilization of operational, equalizing and fire flow storage.

**Booster Stations**

The City’s booster pump stations were not included in the hydraulic model since they cannot provide fire flow due to their size. Together, the three booster stations serve just 18 residences and are assumed to provide adequate pressure.

**System Demands**

A key element in the hydraulic modeling process is the distribution of demands throughout the water system. Total demand of the system is based on existing and projected demands developed in Chapter 2 of this Plan, which are used as model inputs. Demands are assigned to all areas of the system in which service meters are present in order to evaluate the system pressure at service locations in accordance with DOH requirements. For example, demands are not just assigned to nodes immediately adjacent to the reservoirs or booster stations. In general, the demand was assumed to be evenly distributed. The exceptions to this were made for the two largest industrial customers, which were assigned slightly higher demands based on billing data from 2021 to 2023. The modeling software allows numerous hydraulic scenarios to be loaded into the model. In order to evaluate the system under different demand conditions, several demand scenarios are included in the model. These scenarios consisted of MDD and PHD demands for 2024, 2033, and 2043 along with corresponding tank levels. These are summarized in Tables 3-16 and 3-17.

**MODEL CALIBRATION**

The calibration of a hydraulic model provides a measure of assurances that the model is an accurate and realistic representation of the actual system. The hydraulic model of the City’s water system was calibrated using data obtained through fire hydrant flow testing performed throughout the water system in August 2024.

**Field Test**

Five hydrant tests were conducted with the assistance of City personnel on August 7, 2024. Each hydrant test used two hydrants, one outfitted with a pressure gauge and one with a diffuser nozzle. During these tests, the hydrant with the pressure gauge was opened and static pressure was read before the second hydrant with the diffuser nozzle was opened. After the flow hydrant was opened, flow was calculated based on the pressure measured at the diffuser pitot tube while a residual pressure was recorded at the first fire hydrant. Field results were used to calibrate the hydraulic model through verification and adjustment of pipe sizes and roughness coefficients, and hydrant elevations.

The system conditions during each hydrant test were recorded, including reservoir levels and source on/off status, for an accurate model. During testing, the treatment plant was shut off and no sources were pumping directly into the distribution system.

**TABLE 3-16**

**Hydrant Flow Test Calibration**

Site No.	Flow Node	Pressure Node	Field flow (gpm)	Field Pressure, psi			Model Pressure, psi			Model vs Field Δ (psi)
				Static	Residual	ΔP	Static	Residual	ΔP	
1	201	J60	1,424	78	62	16	76	55	11	5
2	65	69	1,126	107	98	9	104	96	8	1
3	J62	40	750	53	39	14	49	37	12	2
4	J52	J54	1,547	102	98	4	100	94	6	2
5	J42	127	1,061	103	78	25	103	71	32	7

**MODELED SCENARIOS AND RESULTS**

The results of the peak hour and maximum day demand fire flow scenarios are described below. The full results from the modeling are included in Appendix F.

**Peak Hour Analysis**

Water systems must maintain a minimum pressure of 30 psi in the distribution system with equalizing storage depleted, under peak hour demand conditions in accordance with WAC 246-290-230(5). To evaluate the water system’s ability to meet future demands, the City’s existing distribution system has been modeled under 2025, 2035, and 2045 peak hour demand conditions. Table 3-17 provides the modeled system conditions used for the peak hour analysis.

**TABLE 3-17**

**Modeled System Conditions During Peak Hour Analyses**

<b>Maximum Day Demand (Fire Flow)</b>			
<b>Condition</b>	<b>2025</b>	<b>2035</b>	<b>2045</b>
Maximum Day Demand, total (gpm)	594	606	619
Main Reservoir 1 HGL (ft) <sup>(1)</sup>	250.7	250.5	250.2
Main Reservoir 2 HGL (ft) <sup>(1)</sup>	250.5	250.3	250.1
Old Rixon Reservoir HGL (ft) <sup>(1)</sup>	258.3	258.2	258.2
New Rixon Reservoir HGL (ft) <sup>(1)</sup>	256.7	256.6	256.5

(1) Elevations are provided in NAVD88. In Pacific County, the difference between NAVD29 and NAVD 88 is approximately plus 3.5 feet.

There are no pressure deficiencies projected in the system at peak hour demand, which is when system pressure is generally expected to be lowest. However, a majority of the system is shown to have pressures in excess of 100 psi even at peak hour demands. There are no regulations on maximum system pressure, but the DOH Water System Design Manual recommends that no part of a system exceed 80 psi unless the high pressure can be justified. This is because excessive water pressure greatly increases the risk of pipe damage and leaks. It is suspected that these excessive pressures are a contributing factor to the City’s ongoing DSL issues. The results are summarized in Figure 3-2.

**Available Fire Flow Analysis**

The hydraulic model was used to assess the availability of fire flows throughout the water system. WAC 246-290-230(6) requires systems providing fire flow to be designed to provide maximum day demands plus the required fire flow, while maintaining system-wide pressure of 20 psi. The fire flow analyses also incorporate the depletion of operational, equalizing, and fire suppression storage as recommended by the DOH June 2020 Water System Design Manual.

**TABLE 3-18**

**Modeled System Conditions During Fire Flow Analyses**

<b>Peak Hour Demand</b>			
<b>Condition</b>	<b>2025</b>	<b>2035</b>	<b>2045</b>
Peak Hour Demand, total (gpm)	1,004	1,025	1,046
Main Reservoir 1 HGL (ft) <sup>(1)</sup>	260.3	260.3	260.3
Main Reservoir 2 HGL (ft) <sup>(1)</sup>	260.3	260.3	260.3
Old Rixon Reservoir HGL (ft) <sup>(1)</sup>	260.8	260.8	260.8
New Rixon Reservoir HGL (ft) <sup>(1)</sup>	260.6	260.6	260.6

(1) Elevations are provided in NAVD88. In Pacific County, the difference between NAVD29 and NAVD 88 is approximately plus 3.5 feet.

It is assumed that the minimum recommended fire flow is 500 gpm. Fire flow modeling indicated that the system has four hydrants that are incapable of providing 500 gpm while maintaining 20 psi throughout the system. However, one of the four hydrants is outside of City limits, so the City is not required to provide fire flow. The three deficient hydrants within City limits are indicated in Table 3-19. The system fire flow results are also summarized in Figure 3-3.

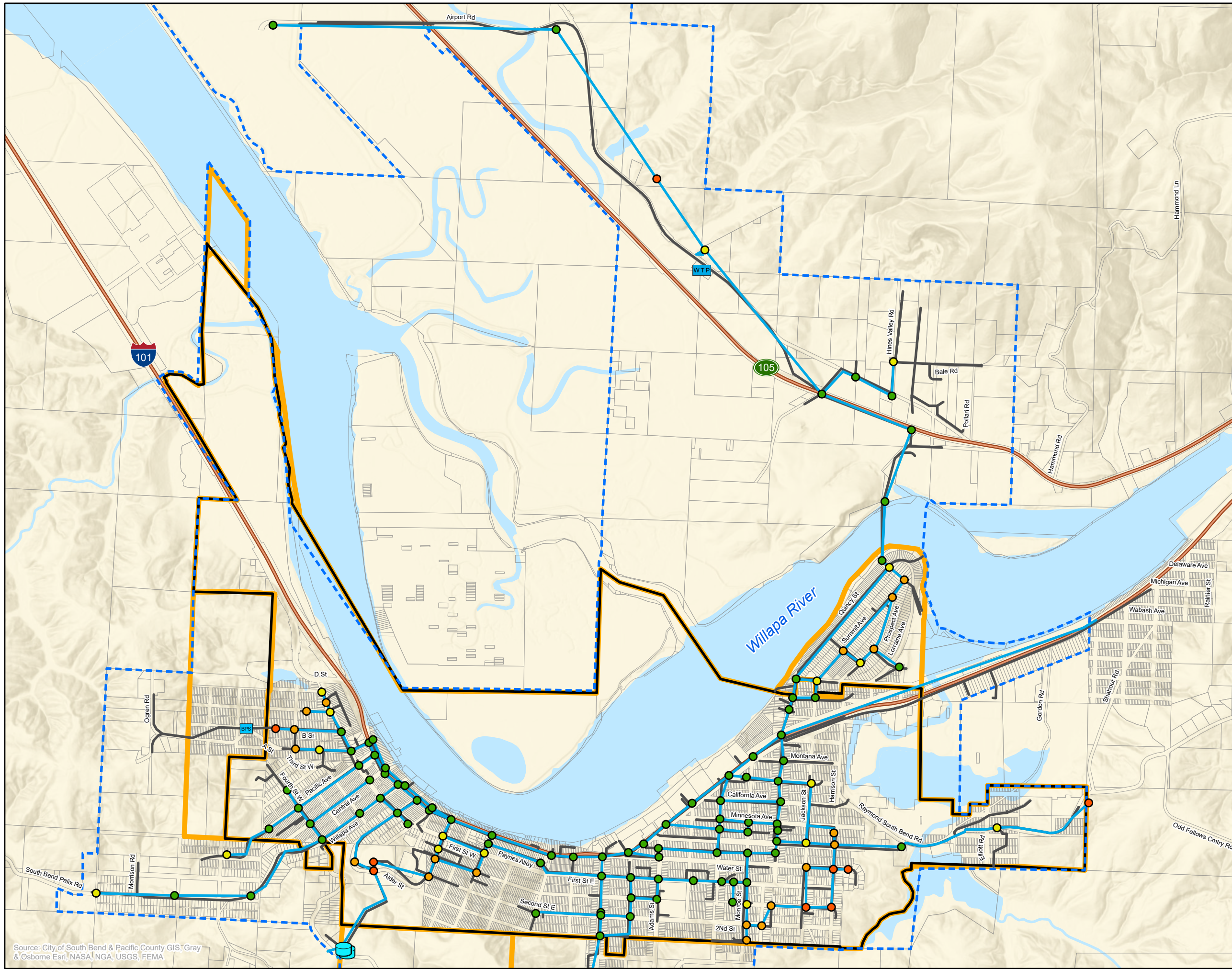
**TABLE 3-19**

**Fire Flow Deficiencies**

<b>Node</b>	<b>Location</b>	<b>2025 Design Flow</b>	<b>2045 Design Flow</b>
38	Harrison and Minnesota Street	181	180
148	End of C Street	119	118
J54	End of Second Street East	81	81

**SUMMARY OF SYSTEM DEFICIENCIES**

From the foregoing discussions, the following are the identified water system deficiencies. No attempt is made here to prioritize the deficiencies. Improvements to correct identified system deficiencies will be prioritized in Chapter 8, Capital Improvements.



**Modeled 2045 Peak Hour Demand (PSI)**

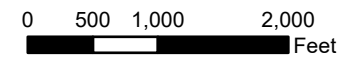
- ≤ 60
- 60.01 - 80
- 80.01 - 100
- > 100

**Water System**

- BPS Pump Station
- R Reservoir
- WTP Water Treatment Plant
- Modeled Pipe
- Existing Water Main

**Reference**

- Highway
- Retail Service Area
- Urban Growth Area
- City Limits
- Parcel
- Surface Water



**CITY OF SOUTH BEND**

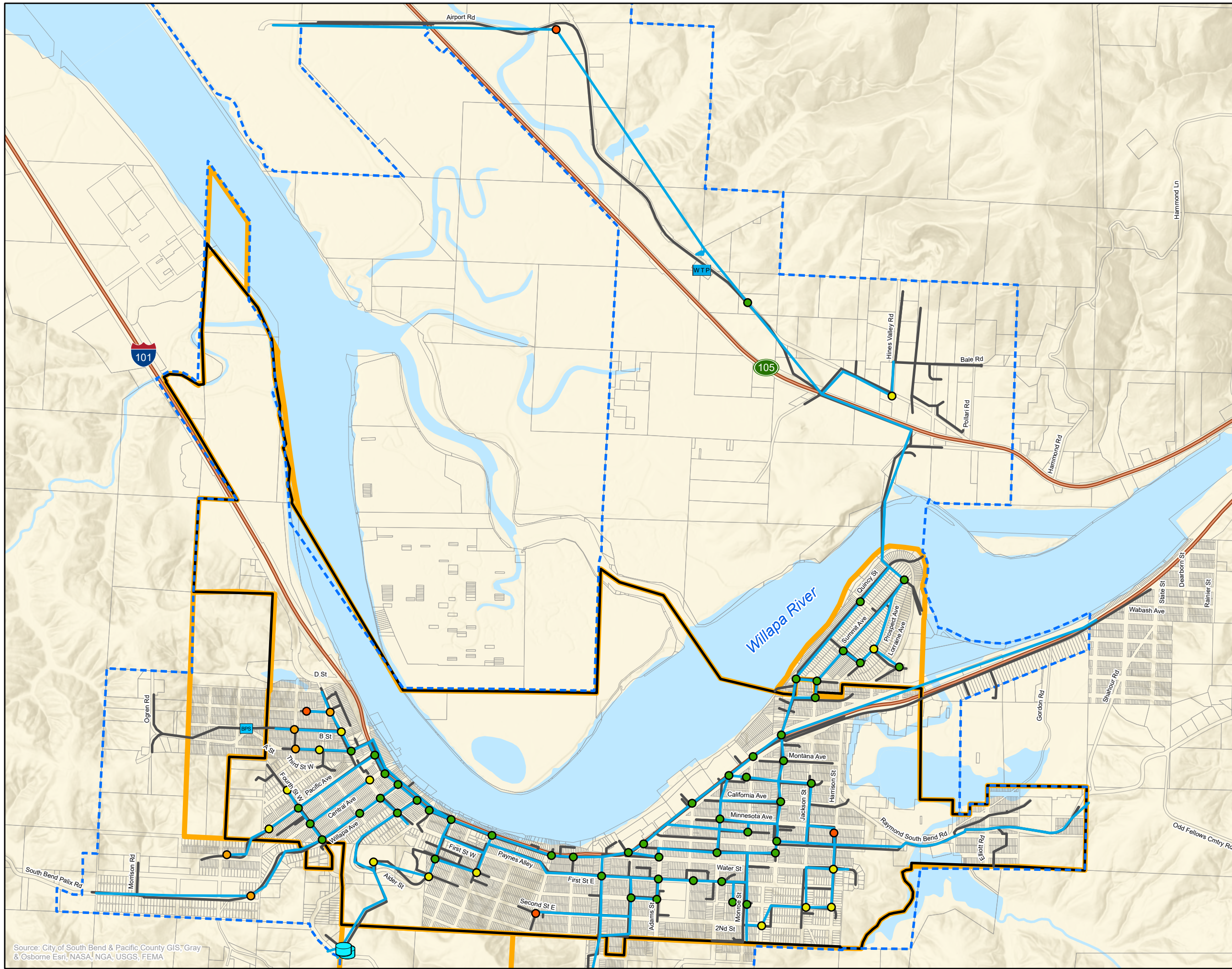
WATER SYSTEM PLAN

**FIGURE 3-2**

**2045 PEAK HOUR DEMAND**



Source: City of South Bend & Pacific County GIS; Gray & Osborne Esri, NASA, NGA, USGS, FEMA



**Modeled 2045 Available Hydrant Flow (GPM)**

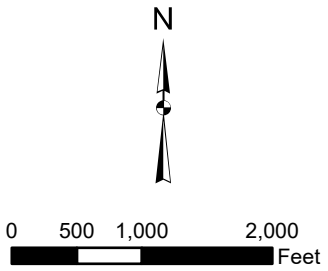
- ≤ 500
- 500.01 - 1000
- 1000.01 - 1500
- > 1500

**Water System**

- BPS Pump Station
- Reservoir
- WTP Water Treatment Plant
- Modeled Pipe
- Existing Water Main

**Reference**

- Highway
- Retail Service Area
- Urban Growth Area
- City Limits
- Parcel
- Surface Water



**CITY OF SOUTH BEND**

WATER SYSTEM PLAN

**FIGURE 3-3**

**2045 AVAILABLE FIRE FLOW**



Source: City of South Bend & Pacific County GIS; Gray & Osborne Esri, NASA, NGA, USGS, FEMA

## **SOURCE**

The City currently demonstrates a source deficiency during summer low flows when relying only on surface water. Since Electric Light and Martin Creeks are the water systems sole sources of supply, the City has investigated alternatives to increase supply. The City is considering re-activating its raw water sources on Fliess Creek, which will require reconstruction of the Fleiss Creek transmission main. The City has been utilizing the City of Raymond intertie to supplement Electric Light and Martin Creeks when necessary. For the past several years, all source deficits have been made up by using the intertie, reducing the system's distribution leakage, and increasing storage in both its raw water impoundments and finished water reservoirs.

## **TREATMENT**

The City has a treatment capacity of 900 gpm without the Raymond intertie and 1,500 gpm with the Raymond intertie. Currently, the City's 900 gpm capacity is sufficient to meet projected demands beyond the 20-year planning period.

It should be noted that the maximum day demand is not necessarily predictable, and can be much lower or higher than projected estimates for a given year. In 2023, the MDD was 1,016,000 gallons, which is higher than the projected MDD at the end of the planning period. Therefore, it is possible that the maximum day demand could exceed the capacity of the treatment plant alone at some point within the planning period. However, the added capacity of the Raymond intertie would likely mitigate this issue far beyond the planning period.

## **WATER RIGHTS**

This analysis indicates that the City will not need additional instantaneous water right or annual water rights during the current 20-year planning period. The City does not have an instantaneous water right for Electric Creek but does have a storage water right. A review of the City's water rights by the Washington State Department of Ecology noted the storage right does not authorize the diversion of water from Electric Creek for beneficial use.

The Report of Examination, dated January 31, 1961, for SWC 9148 states:

*“Special mention should be made of the fact that no permit for the appropriation of surface waters has been submitted by the applicant; however, it appears that the City of South Bend may have title to some of the waters of Electric Creek by virtue of claimed vested rights through use initiated prior to 1917.”*

Furthermore, in the explanation of water rights held by South Bend in SWC 9682's Report of Examination, dated June 24, 1966, it states:

*“Reservoir Certificate No. 8148 – 1.54 acre-feet; Electric (Light) Creek (Note: Diversion from Electric Creek being made under claim to vested right; about 1910, Western Water Company)”*

Because these Reports of Examination pre-date the first water right claims registration period (July 1, 1967) South Bend should have filed a water right claim to record the amount and location of pre-code water usage. According to Ecology's records, a water right claim to divert water from Electric Creek for municipal purposes has not been filed despite a water right to impound the Electric Creek. The City of South Bend has submitted an Application for a New Water Right for diversion of Electric Creek for municipal use.

## **WATER STORAGE**

The four storage facilities are in excellent condition, one of which (Rixon Road – welded tank) had interior and exterior recoats in 2008, the remaining three tanks are new glass-lined bolted steel reservoirs. The capacity of the existing storage facilities is adequate for the projected storage needs through the entire 20-year planning period.

## **CONTROL SYSTEM**

No control system deficiencies have been identified.

## **BOOSTER PUMP STATIONS**

The City is evaluating installation of two new booster pump stations to improve service and maintain adequate pressures to current and new customers, which include the Eklund Park Booster Pump Station and Smith-Greenhouse Booster Pump Station. These projects were initially planned for construction in 2014 and 2015 but did not end up going forward at the time.

## **WATER DISTRIBUTION SYSTEM**

Water distribution mains are repaired or replaced when they have failed. Older sections of main are scheduled to be replaced from a prioritized list. Out of the current fire hydrant locations, there are three that do not appear to have sufficient fire flow. Fire flow deficiencies are typically corrected by upsizing the pipe sections that the hydrants are connected to. Based on the model, the hydrants at nodes 38 and 148 can achieve 500 gpm by increasing the inner diameter of the connected water mains to 4 inches, while the hydrant at node J54 requires a water main with a diameter of 6 inches.

The system pressure is largely set by the reservoir HGLs, which are around 100 to 200 feet above most of the service connections. The head provided by the HGL allows most of the system to meet pressure requirements, aside from the few residences that are currently served by booster stations. However, as previously mentioned, the pressures are somewhat excessive throughout most of the system. It is not uncommon for water systems to have similarly high system pressures, but given the City’s DSL levels, it may be beneficial to attempt to reduce these pressures.

**BACKUP POWER SUPPLY**

The City is pursuing the installation of an emergency generator for backup power supply at the Water Treatment Plant. Installation is planned once sufficient funds become available.

**ASSET MANAGEMENT PLAN**

Asset management is defined by DOH as “... the practice of managing all utility assets to address the total cost of owning, operating, upgrading, and replacing them, while delivering the appropriate level of service.” As part of this Water System Plan, the City has completed an Asset Management Plan. This Asset Management Plan includes an Asset Inventory, which summarizes the age, condition rating, replacement cost, and criticality of the City’s major water system assets and relates these items to planned Capital Improvement Projects described in depth in Chapter 7. This inventory is used to assess the adequacy of the Town’s Capital Improvement Program to maintain current levels of service over the long term.

The Condition Rating methodology used in preparing City’s Asset Management Plan is adapted from the document “Asset Management: The 5 Core Components” prepared by the Southwest Environmental Finance Center. The Condition Rating system used is summarized in Tables 3-20 and 3-21.

**TABLE 3-20**

**Asset Condition Rating System**

<b>Rank</b>	<b>Condition</b>	<b>Description</b>
A	Excellent	Asset is new or nearly new; asset has no known or suspected condition issues
B	Very Good	Asset has no known or suspected condition issues, but is no longer a new asset
C	Good	Asset has few known or suspected issues
D	Average	Asset has known or suspected issues
E	Fair	Asset had known or suspected issues that may impact the asset’s ability to continue to perform in the next several years
F	Poor	Asset has known or suspected condition issues and they are likely to impact the asset’s ability to function in the near future (1 to 2 years)

Each asset is assigned a Consequence of Failure (CoF) and a Likelihood of Failure (LoF) on a scale of 1 to 5 in accordance with the rating system shown in Table 3-21. The Criticality of each asset is defined as the product of the CoF rating and the LoF rating, with the lowest possible Criticality being 1 ( $1 \times 1 = 1$ ) and the highest possible Criticality being 25 ( $5 \times 5 = 25$ ).

**TABLE 3-21**

**Consequence/Likelihood of Failure Rating System**

<b>Rating</b>	<b>Consequence of failure (CoF) or Likelihood of Failure (LoF)</b>
1	Very Low
2	Low
3	Moderate
4	High
5	Very High

**ASSET INVENTORY**

The City of South Bend's asset inventory is shown in Table 3-22. The inventory includes all major components of the water system.

**TABLE 3-22**  
**Asset Inventory**

No.	Asset	Asset Description	Asset Type	Year Installed	Age (years)	Expected Useful Life (years)	Remaining Useful Life (years)	Condition Rating	Consequence of Failure (CoF)	Likelihood of Failure (LoF)	Criticality (CoF x LoF)	Replacement Cost (\$2024)	Annualized Replacement Cost (\$2024)
1	Water Treatment Plant Original Facilities	Microfiltration plant	Treatment Plant	2000	24	50	26	C	4	2	8	\$2,500,000	\$50,000
2	Water Treatment Plant New Facilities	New membrane skids, laser turbidimeter	Treatment Plant	2022	2	50	48	A	4	2	8	\$2,500,000	\$50,000
3	Finished Water Pumps	Three 450-gpm pumps	Pump	2022	2	30	28	A	4	2	8	\$80,000	\$2,667
4	Main Reservoir 1	1.65 MG bolted-steel reservoir	Reservoir	2008	16	30	14	B	4	2	8	\$2,000,000	\$66,667
5	Main Reservoir 2	803,000-gallon bolted-steel reservoir	Reservoir	2008	16	30	14	B	3	2	6	\$1,500,000	\$50,000
6	New Rixon Road Reservoir	354,000-gallon bolted-steel reservoir	Reservoir	2007	17	30	13	B	3	2	6	\$1,200,000	\$40,000
7	Old Rixon Road Reservoir	218,000-gallon welded-steel reservoir	Reservoir	1976	48	80	32	B	3	2	6	\$1,000,000	\$12,500
8	B Street Booster Pump Station	BPS conveying ~50 gpm w/ a 5-hp Baldor pump	Booster Pump Facilities	Unknown	Unknown	30	Unknown	C	2	1	2	\$160,000	\$5,333
9	Main Reservoir Booster Pump Station	BPS conveying 30 gpm with a 1-hp Jacuzzi pump	Booster Pump Facilities	2011	13	30	17	C	1	1	1	\$130,000	\$4,333
10	Rixon Road Booster Pump Station	BPS conveying 30 gpm with a 1-hp Jacuzzi pump	Booster Pump Facilities	Unknown	Unknown	30	Unknown	C	1	1	1	\$130,000	\$4,333
11	Transmission Pipeline	Approx. 2 miles? 12-inch CI pipe	Pipeline	1962	62	80	18	C	5	2	10	\$3,200,000	\$40,000
12	Distribution Pipeline	26 miles of pipeline; varying material	Pipeline	Varies	Varies	80	1 to ?	D	2	3	6	\$41,000,000	\$512,500
13	Raymond Intertie Booster Station	600 gpm intertie facilities with the City of Raymond	Booster Pump Facilities	2015	9	30	21	B	3	2	6	\$475,000	\$15,833
14	Electric Creek Impoundment	200,000-gallon concrete dam impoundment	Impoundment	1963	61	100	39	C	4	1	4	\$1,000,000	\$10,000
15	Martin Creek Impoundment	60,000-gallon concrete dam impoundment	Impoundment	1964	60	100	40	C	3	1	3	\$700,000	\$7,000
16	Service Meters	Over 1,000 active service meters	Meters	Varies	Varies	20	Varies	C	1	1	1	\$200,000	\$10,000

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## **CHAPTER 4**

### **WATER USE EFFICIENCY PROGRAM**

#### **OBJECTIVE**

Water is an essential and valuable resource, and therefore one that must be used wisely. Water System Plans are required to include a water use efficiency (WUE) program under WAC 246-290-810. The goal of a WUE program is to provide an approach to increase water use efficiency within a water system. This Chapter will outline and provide reasoning for the City's WUE Program for the next 10 years.

#### **WATER USE EFFICIENCY PLANNING REQUIREMENTS**

In 1989, the Washington Legislature passed the Water Use Efficiency Act (43.20.230 RCW), which directed DOH to develop procedures and guidelines relating to water use efficiency.

In 2003, the Municipal Water Supply – Efficiency Requirements Act (Municipal Water Law) was passed. This legislation amended RCW 90.03 to require additional conservation measures. The Municipal Water Law applies to all Municipal Water Suppliers. Among other things, the Municipal Water law directed DOH to develop the Water Use Efficiency Rule (WUE Rule), which was adopted in October 2006 and was most recently revised in January 2017.

These documents provide guidelines and requirements regarding the development and implementation of conservation and efficiency programs for public water systems. Conservation and efficiency programs developed in compliance with these documents are required by DOH as part of water system planning documents, and by the Washington State Department of Ecology (Ecology) as part of a public water system water right application. Conservation must be evaluated and implemented as an alternate source of supply before state agencies approve applications for new or expanded water rights.

Conservation can be used effectively to help meet the increased demand for water, to protect the environment, to delay the development of costly infrastructure, and to ensure that water is available to meet economic and population growth consistent with the Growth Management Act by using existing supplies more efficiently. Public awareness and participation are necessary for the City to develop an active and beneficial conservation plan.

In addition, DOH has developed the Water Use Efficiency Guidebook (WUE Guidebook). The fourth and most recent edition of the WUE Guidebook was released in May 2025. The WUE Rule and the WUE Guidebook now provide all the currently effective water use efficiency planning requirements.

The WUE Rule consists of a series of amendments to existing sections and addition of new sections to WAC 246-290, the Group A Public Water System Regulations, and sets additional requirements for public water purveyors. The WUE Rule is comprised of six main sections:

1. Water Use Efficiency Requirements
2. Water Metering
3. Data Collection and Reporting
4. Distribution System Leakage
5. Water Demand Forecasting
6. Water Use Efficiency Goals

### **WATER USE EFFICIENCY REQUIREMENTS**

The Water Use Efficiency Guidebook establishes varying implementation and evaluation requirements for Municipal Water Suppliers (MWS). The requirements focus on the importance of measuring water usage and evaluating the effectiveness of the WUE program. The Rule outlines three fundamental elements which include planning, distribution leakage standards, and goal setting and performance reporting.

The following WUE Rule requirements are applicable to the City:

- Include WUE Program in planning documents
- Set WUE goals for the system
- Submit service meter installation schedule
- Submit first annual performance report
- Meet DSL standard (a three-year average of less than 10 percent)
- Complete installation of all service meters

The City is compliant with these requirements, with the exception of the DSL standard.

### **WATER METERING**

The WUE Rule requires all sources and customer service connections be metered by 2017. The City currently meters all sources and customers and is therefore in full compliance with this requirement. All new sources and customers will continue to be metered.

**DATA COLLECTION AND REPORTING**

The WUE Rule requires regular collection of production and consumption data. Data must be reported in the City’s planning documents and annual performance report to DOH. This water use data is required for following tasks:

- Calculating leakage;
- Forecasting demand for future water needs;
- Identifying areas for more efficient water use;
- Evaluating the success of your WUE program;
- Describing water supply characteristics;
- Aiding in decision-making about water management.

Table 4-1 summarizes the City’s data collection practices associated with the WUE Rule requirements.

**TABLE 4-1**

**WUE Data Type Summary**

<b>Required Data Type</b>	<b>City Collection Frequency</b>	<b>Comments</b>
Water Production Meter Reading	Daily	Finished water is metered leaving the treatment plant.
Peak Month	-	Peak month is determined annually from monthly water production reports
Distribution System Leakage	Annual	Based on the annual difference of water produced and consumed. Reported to DOH annually.
Unmetered, Unbilled Authorized Uses	-	Estimated from City records of flushing, testing, and construction uses
Customer Service Meter Readings	Monthly	-

**DISTRIBUTION SYSTEM LEAKAGE**

The WUE Rule requires that water distribution systems maintain a DSL rate less than 10 percent of finished water production based on a 3-year rolling average. DSL is defined as the difference between the total water production and authorized consumption. Authorized consumption includes metered water consumption by customers and known or credibly estimated uses that were unbilled or unmetered. Unmetered uses typically include cleaning reservoirs, flushing mains, and fire flows. DSL is typically attributed to water loss due to leaks or unauthorized uses such as illegal service connections,

accounting errors, inaccurate source and customer meters, and water leaving the system for any unmetered use.

DSL calculated from 2017 to 2023 is summarized in Table 4-2. The City’s three-year rolling average DSL is currently 54 percent, which is well above the maximum allowable leakage requirement. Production and consumption numbers are taken from Table 2-1.

**TABLE 4-2**

**DSL Summary**

<b>Year</b>	<b>Production, MG</b>	<b>Authorized Consumption</b>	<b>DSL, MG</b>	<b>Annual Percent DSL</b>	<b>3-Year Average Percent DSL</b>
2017	178.0	81.7	96.4	54%	-
2018	191.6	88.6	103.0	54%	-
2019	181.1	92.6	88.5	49%	52%
2020	175.5	87.4	88.1	50%	51%
2021	129.0	68.8	60.2	47%	49%
2022	120.7	60.0	60.7	50%	49%
2023	186.5	64.9	121.6	65%	54%

Overall consumption dropped in 2021, which also decreased the total volume of DSL but did not significantly decrease the percentage of DSL. In 2023, both the volume and percent DSL increased significantly. Current data suggests that this percentage of DSL continued into 2024, though it is unclear exactly why it is so high or why it has increased so substantially.

Due to the high DSL value, the City previously submitted a Water Loss Control Action Plan (WLCAP) prior to the approval of the 2014 Water System Plan. The WLCAP is updated in this Plan and discussed later in this chapter.

**WATER DEMAND FORECASTING**

The water demand forecast is presented in Table 2-9 and is based on historic water use data and anticipated population growth. A detailed discussion of demand forecast assumptions and parameters can be found in Chapter 2.

**GOAL SETTING**

The WUE Rule requires that water conservation goals must include a measurable outcome, address water supply or demand characteristics, and include an implementation schedule. The goal setting process must be held through a public forum and be re-evaluated with each Water System Plan Update. The first water use efficiency goals

were required to be set by July 1, 2009, for municipal water suppliers with more than 1,000 service connections.

Annual water use efficiency performance reports must be available to the public and submitted to customers and DOH. The first annual reports were due by July 1, 2009, for municipal water suppliers with more than 1,000 service connections, and annually by July 1 each year thereafter.

## **WATER USE EFFICIENCY GOALS**

This section will evaluate the City's previous WUE goals, before outlining new goals for the next 10-year planning period.

### **Previous Goals**

For the City of South Bend, the first WUE goals were due in January 2009. The WUE Rule further requires that WUE Goals must "be set in a public forum that provides opportunity for consumers and the public to participate and comment on the water use efficiency goals." These goals are meant to be reevaluated with each Water System Plan update, or when deemed appropriate by the system owner. The City has not changed the demand side goal since setting it in 2009, but the supply side goal was updated in 2017.

The previous WUE goals adopted by the City are as follows:

- Supply Side Goal: Reduce water loss by 30 percent within 6 years.

The City has been carrying out its leak detection program throughout the past decade and has fixed numerous leaks and saved millions of gallons each year. However, the DSL continues to be high.

- Demand Side Goal: Save 5 gallons per service per day by 2014.

According to previous WUE Reports, the City was able to reduce per service consumption by 5 gallons between 2009 and 2012. Additionally, the ERU<sub>ADD</sub> in 2014 was calculated to be 124 gpd/ERU in the 2014 Water System Plan. Since then, the ERU<sub>ADD</sub> has been further reduced to 112 gpd/ERU.

As the water system continues to grow, it is anticipated that water use efficiency may continue to improve. This improvement is anticipated due to plans to improve the water distribution system, water system control, and water accounting, as well as further measures to promote conservation. New home construction practices may also result in a decline in the average ERU value, because current building codes require the installation of higher efficiency plumbing fixtures that result in lower water consumption.

**Revised Goals**

Under the WUE Rule, the City must outline new water use efficiency goals as part of the WSP update, adopt these goals through a public process, and measure progress towards these goals each year. These goals must include a measurable outcome, and address water demand and supply characteristics. The City’s new goals are as follows:

- Supply Side Goal: Reduce water loss by 30 percent in the next 10 years.
- Demand Side Goal: Reduce ERU<sub>ADD</sub> by 1 gallon in the next 10 years.

**Target Water Savings Projections**

It is anticipated that the value of an ERU will change as the system grows. With promotion of water conservation, the water usage represented by an ERU may go down. However, for projection of water system needs, it is safer not to assume that water usage per ERU will decrease.

Table 4-3 summarizes the estimated water savings if the demand goal is successfully met.

**TABLE 4-3**

**Water Savings Projections**

Year	Projected ERUs (Excluding DSL and Backwash)	No Conservation		Conservation		Total Savings (MG)
		ERU <sub>ADD</sub>	Annual Metered Consumption (MG)	ERU <sub>ADD</sub>	Annual Metered Consumption (MG)	
2025	1,594	112	65.2	112.0	65.2	0.00
2026	1,597		65.3	111.9	65.2	0.06
2027	1,600		65.4	111.8	65.3	0.12
2028	1,603		65.6	111.7	65.4	0.18
2029	1,607		65.7	111.6	65.4	0.23
2030	1,610		65.8	111.5	65.5	0.29
2031	1,613		65.9	111.4	65.6	0.35
2032	1,616		66.1	111.3	65.7	0.41
2033	1,619		66.2	111.2	65.7	0.47
2034	1,623		66.3	111.1	65.8	0.53
2035	1,626		66.5	111.0	65.9	0.59
<b>Total</b>						<b>3.24</b>

## **WATER USE EFFICIENCY MEASURES**

The WUE Rule requires the evaluation or implementation of different water use efficiency measures to help meet the WUE goals. The WUE Guidebook gives a list of mandatory measures that must be implemented or evaluated as well as a list of supplemental measures that can be counted toward the WUE Program. WAC 246-290-810 identifies the minimum number of water use efficiency measures that must be evaluated based on system size. The City of South Bend frequently bills over 1,000 connections, and is therefore required to implement five WUE measures.

### **Mandatory Measures**

The mandatory WUE measures are listed below, followed by a discussion of the City's compliance with each measure.

#### Install Source and Service Meters and Implement Regular Calibration

The City currently meters all sources and costumers and is therefore in compliance with this requirement. The City was previously required to investigate meter accuracy due to high DSL. Several issues were identified and corrected as a result of this investigation. The City also implements a water meter calibration/replacement program to assure meter accuracy. All new customers and sources will be metered.

#### Evaluate DSL and Implement Water Loss Control Action Plan if 10 Percent is Exceeded

If a water system's DSL exceeds 10 percent, the WUE Program must also implement a Water Loss Control Action Plan (WLCAP). The required content of the WLCAP depends on the system's percent DSL.

The City has a three-year average of 54 percent DSL. Under WAC 246-290-820 (4), a system with over 30 percent DSL is required to create a WLCAP which includes discussions regarding data accuracy and collection, implementation of field activities such as repairing leaks and maintaining meters, and additional control methods to reduce leakage within 6 months of determining that the system has exceeded the standard.

The City submitted a WLCAP with the 2014 Water System Plan. At the time, it was found that there was a variety of metering and data issues which resulted in underreporting consumption at certain meters. Some meters were not converted to gallons when billed, which resulted in underreporting by a factor of 7.5 for the affected meters. Several services were also unmetered at the time. While there has been some reduction in overall water usage and total DSL volume since 2012, the proportion of DSL in the system is generally the same or higher. The WLCAP also notes that thorough leak detection can be difficult in the area due to the high water table and the soil type.

The previous WLCAP also asserted that a large amount of leakage was suspected to be from a finished water impoundment, which was replaced with steel tanks in 2009. For a time, this did decrease the DSL somewhat. However, despite the City's previous and ongoing efforts, the DSL has continued to increase.

It is clear that more aggressive measures need to be taken to reduce DSL going forward. More frequent and strategic leak detection is one option that should be pursued. It may also be necessary to develop a meter testing program to ensure that both production and service meters are collecting accurate data. It may also be productive to work on replacing parts of the main line in State Route 101, as it is suspected that there may be issues in the pipe due to the age and pipe material.

The full updated WLCAP is included in Appendix G.

#### Educate Consumers About Water Use Efficiency Once Per Year

The WUE Program requires education and promotion of water use efficiency to water system customers once a year. Educational efforts may include distribution of DOH brochures, bill inserts, or notifications included with the annual consumer confidence report. The City includes conservation tips in their annual Consumer Confidence Report (CCR).

#### **Supplemental Measures**

Measures that the WUE Guidebook suggests can count toward satisfying the required number of water use efficiency measures include the following:

- Implementation of a conservation rate structure.
- Implementation of a water reclamation program.
- Customer assistance in repair of leaks in customer service lines and in homes.
- Additional consumer education, such as student education and consumer education at fairs.
- Bills showing water consumption history.

Note that implementation of measures by customer class count as separate measures for each customer class for which they are implemented.

The City has adopted the following WUE Measures:

### **Customer Assistance in Repair of Leaks**

- Leak detection and repair program assistance to residents between the meter and the service for all four customer classes.

### **Additional Consumer Education**

- A second educational mailing to the Residential customer class.
- An educational booth at the City's annual Labor Day Celebration.

### **Bills Showing Consumption History**

- Since the last WSP, the City has begun using a billing system that shows water consumption history. This measure takes place across all four customer classes, so it counts as four measures.

The City is currently implementing ten supplementary WUE measures.

The City is utilizing the following additional WUE Measures in order to attain their stated goal; however, these measures cannot be counted towards the total number of measures:

- Implementation of a program that provides water-saving tools to customers. This has either taken place or will take place through the following measures instituted by the City.
  - Toilet or urinal retrofit.
  - Rebate program.
  - Showerhead or faucet replacement.
- Provide notification to customers on a regular basis of any spikes in consumption across all customer classes.

## **SOURCE OF SUPPLY ANALYSIS**

### **OPTIMIZING USE OF CURRENT SUPPLIES**

The City has increased the efficiency of its water system in the past by replacing its former open-water finished water impoundment with bolted-steel reservoirs, finding and repairing water system leaks, by promoting water conservation amongst their customers, and by improved water accounting. The City plans to continue these efforts to further

optimize current water supply. The City may be able to delay the expenses of additional source capacity by reducing Distribution System Leakage and implementing water conservation measures.

### **ENHANCED CONSERVATION MEASURES**

As technology for water leak detection and repair advances, and as more water efficient building fixtures and appliances become more standard, water conservation will be enhanced by implementation of standard building codes and replacement of aging fixtures and appliances with newer, more water efficient units.

### **WATER RATES AND RATE IMPACTS ON WATER DEMAND**

The City currently has a uniform block rate structure with an additional volume surcharge of \$12 per 4,500 gallons. The City's average residential water use rate, at 112 gallons per residential connection per day, is quite low. However, the distribution system leakage is very high. Further promotion of water conservation may result in further reduction of water use, and increased vigilance regarding system leakage should result in a lower distribution system leakage rate.

The City is generally reluctant to increase water rates due to the overall cost of utilities and the City's proportion of low- to medium-income rate payers. If the City were to adopt a conservation rate structure, it may be most effective to adopt a rate structure that increases during the peak season or that penalizes only the largest residential water users while keeping the average water bill the same.

Continued promotion of conservation and vigilance regarding system leakage are necessary to maintain the low water use and to lower distribution system leakage. However, for planning purposes, it is assumed that very little in the way of further conservation savings will be available to support system growth.

### **WATER RIGHT CHANGES**

Based on Table 3-11, the City's instantaneous water rights are adequate through the 20-year planning period at current use rates and projected growth. The City of South Bend is considering reactivating its existing water rights on Fliess Creek to increase redundancy.

### **ARTIFICIAL RECHARGE**

At this time there are no plans for any kind of artificial recharge of the aquifers in the City of South Bend area. The Cities of South Bend and Raymond are jointly constructing a new regional Wastewater Treatment Facility in the City of Raymond to treat sanitary flows from both cities. In addition, a new outfall has been constructed in the Willapa River to discharge the treated effluent. As part of the original scoping for this project a

comprehensive analysis of reclamation options including aquifer recharge was reviewed and determined not to be cost effective.

## **WATER RECLAMATION**

The WUE Rule requires that water utilities with more than 1,000 service connections include an evaluation of water reclamation and reuse opportunities in their water system plans. Table 2-6 shows that in the last five years, the City billed an average of just over 1,000 connections. The City provided a detailed evaluation of water reclamation and reuse opportunities in the jointly produced City of South Bend and Raymond Comprehensive Regional General Sewer Plan/Wastewater Facilities Plan as the prerequisite to constructing a new regional Wastewater Treatment Facility (May 2007). The cities completed an in-depth analysis of reuse of treatment plant effluent. The conclusion drawn from Chapter 11 of that Plan is the cost to produce 1,000 gallons of treated water from effluent is approximately \$77, whereas the cost of producing potable water from the City's raw water sources is approximately \$5 per 1,000 gallons.

## **WATER SUPPLY CHARACTERISTICS**

The WUE Guidebook indicates that a Water Use Efficiency Program should include a description of the water system source characteristics. The source characteristics for the City water system are thoroughly described in Chapters 1 and 3.

## **PERFORMANCE REPORTING**

Pursuant to the WUE Rule, the City must submit a performance report to DOH by July 1 each year. The annual report must include the following:

- Total source production and customer consumption;
- Distribution system leakage in percentage and volume; and
- Goal description, schedule, and progress toward meeting goals.

DOH has developed an online reporting form that must be used by water systems to file their annual report. Previous year's WUE annual performance reports are also available on the DOH website. The City is currently up-to-date on performance reporting. The City will continue to monitor overall water use and the amount of distribution system leakage on an annual basis. The City will monitor the success or failure of its water conservation program by analyzing this data and determining the long-term trend in water usage. Due to the large proportion of DSL, it may take some time to see a significant reduction in DSL.

## **CHAPTER 5**

### **WATERSHED CONTROL PROGRAM**

#### **INTRODUCTION**

In Washington State, water supply systems using a surface water source must develop and implement a watershed control program in order to protect the water supply and the health of water system customers. A watershed control program is an effort to identify and inventory any existing contaminants in the surface water of a watershed and prevent any additional contaminants from entering the water system. Chapter 5 will provide a summary of the City of South Bend's watershed control program. This chapter has been prepared to fulfill the watershed control program requirements for a filtered system, in accordance with WAC 246-290-668.

#### **WATERSHED CONTROL PROGRAM**

A watershed control program must consist of the following elements per WAC 246-290-135(4)(c):

- Watershed description and inventory, including location, hydrology, land ownership, and activities that may adversely affect source water quality;
- An inventory of all potential surface water contamination sources and activities, including identification of site locations and owner/operators, located within the watershed and having significant potential to contaminate the source water quality;
- Watershed control measures, including documentation of ownership and relevant written agreements, and monitoring of activities and water quality;
- Description of system operation, including emergency provisions; and
- Documentation of water quality trends.

#### **WATERSHED DESCRIPTIONS**

The City obtains raw water from two diversion dams on two separate creeks; Electric Light Creek and Martin Creek. The City also has water rights for two branches of Fliess Creek, but has not utilized that source for a number of years due to the disrepair of the wood transmission main and impoundment structures. All of these creeks are located in the Willapa Hills in Water Resources Inventory Area (WRIA) 24, on the north side of the

Willapa River. All the creeks are tributaries of the Willapa River with the two active sources separated by a single creek and drainage, N.P. Creek. The Fliess Creek watershed is located west of the active sources and separated from Electric Light Creek by a single creek and drainage, Meehan Creek. The Willapa River flows predominantly northwesterly from South Bend and drains directly into the Willapa Bay estuary and then to the Pacific Ocean. Figure 5-1 shows each creek’s watersheds and their location in relation to one another. Table 5-1 summarizes the size of each watershed.

**TABLE 5-1**

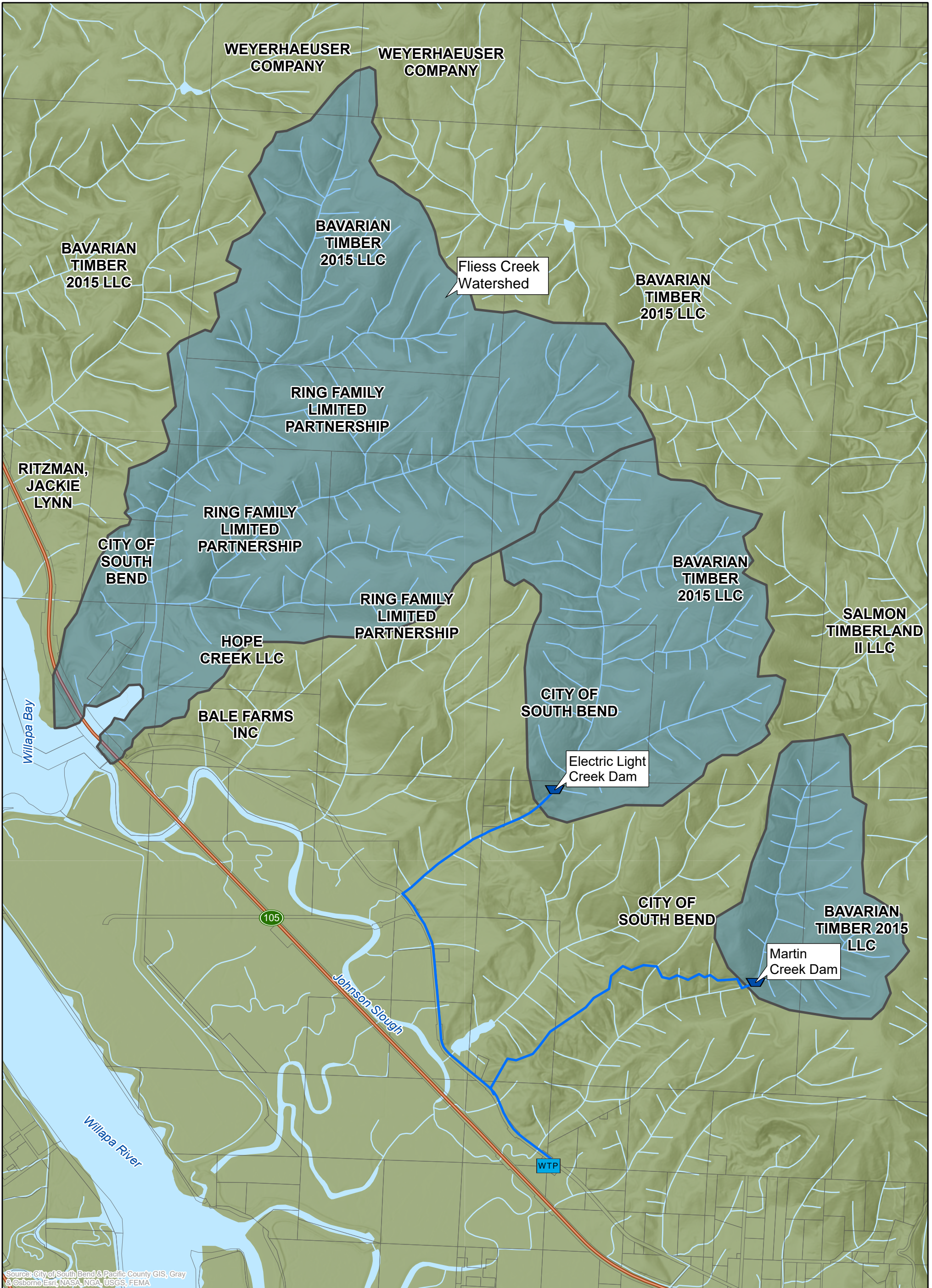
**Watershed Characteristics**

<b>Name of Watershed</b>	<b>Total Acreage</b>	<b>High/Low Elevation (ft above MSL)</b>
Electric Light Creek	412	1,200/440
Martin Creek	180	1,260/520
Fliess Creek	514	840/10

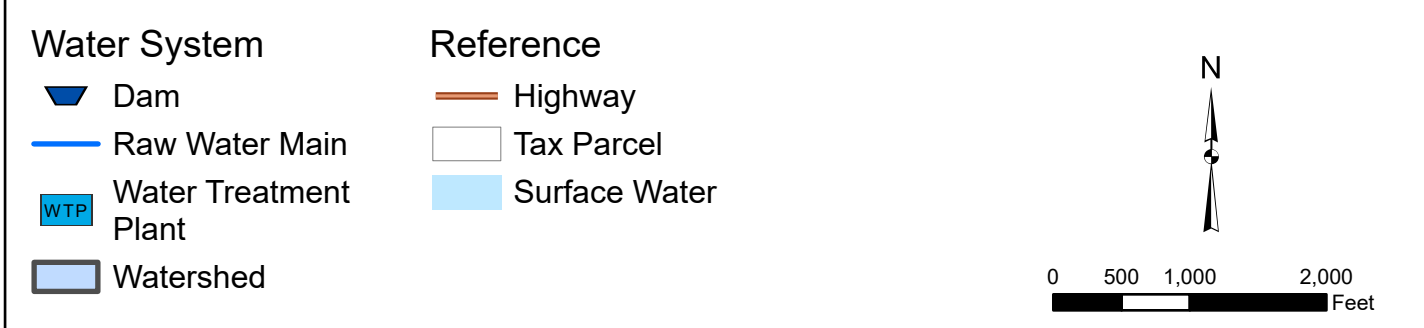
According to WAC 173-201A-602 and 173-201A-200, the Willapa River and tributaries are designated as “core summer salmonid habitat.” Located north of the City, both active sources are collected in impoundments. From the impoundments, raw water is either piped or allowed to overflow the impoundment into their respective creek beds. Both the pipelines and creek beds run southwesterly to Airport Road and cross the pipeline that conveys raw water to the Water Treatment Plant located approximately 300 feet east of the Martin Creek intersection with Airport Road.

The two watersheds that actively supply South Bend with raw water are owned by the City and other timber resource companies. Figure 5-1 shows the ownership within each watershed. In 2025, the City commissioned a Forest Stewardship Timber Management Plan performed by Cascade Forest Management. The Plan assessed the property owned by the City of South Bend in the area of the two watersheds. The assessment included discussions of access, topography, elevation, historic/current use, intended use, and adjacent land use. It also provided descriptions of the timber, forest health, soils, water quality, fish and wildlife habitat, threatened and endangered species, cultural resources, and recreation. Finally, the Plan included recommendations for the City-owned property.

The Timber Management Plan only covers the City owned properties and both watersheds have private ownership as well. Figure 5-1 shows the City of South Bend property ownership. The Plan breaks down the City’s parcels into four separate units that are characterized by the age and species of the standing timber. Of the four units, only Unit 1 incorporates the Electric Light Creek and Martin Creek watersheds. The other three units are downstream of the impoundments. It should be noted that the property within each watershed not owned by South Bend is managed for timber production; however, the timber stands (age) are not the same as the South Bend units as they are managed privately.



Source: City of South Bend & Pacific County GIS, Gray & Osborne, Esri, NASA, NGA, USGS, FEMA



**CITY OF SOUTH BEND**  
 WATER SYSTEM PLAN  
**FIGURE 5-1**  
**WATERSHED BOUNDARY MAP**

**Gray & Osborne, Inc.**  
CONSULTING ENGINEERS

Of the two watersheds that supply water to South Bend (Electric Light and Martin), South Bend owns approximately 40 percent of those watersheds immediately upstream and surrounding the impoundments discussed later in this chapter. This property, surveyed as part of the Timber Management Plan and classified as Unit 1 includes the following characteristics.

The timber in this unit is an overstocked stand of 15 year old Douglas fir with some red alder and western hemlock. In many areas, the unit is most heavily stocked with Douglas fir at 500 to 600 stems per acre with some red alder adding another 300 to 500 stems per acre. The unit is recommended to be pre-commercially thinned and weeded by removing timber species of lesser value and shrub species competing with the Douglas fir, generally by slashing. The City plans to manage its property within the watershed as a drinking water source first but also as a possible source of revenue from timber production through selective logging. The Plan recommends thinning Unit 1 in 2025-2027 and again in 2035-2040. Selective harvesting can take place when the stand is age 40 to 60 years in 2050-2070.

## **WATERSHED HYDROLOGY**

The City of South Bend and surrounding area has a mild and wet climate, primarily due to the moderating influence of the Pacific Ocean. Winters are wet and mild and summers are warm and dry. Due to its proximity to the Pacific Ocean coastline, the area receives significantly more precipitation than most other areas in western Washington.

Data from the National Weather Service, Raymond weather station, located approximately 3.7 miles southeast of the Martin Creek impoundment was used to establish the weather patterns for the watershed. For a recent 30-year period the mean annual temperatures range from 39 to 61 degrees Fahrenheit (F), with a mean low temperature of 32 degrees F in January and a mean high temperature of 72 degrees F in August. An average of 84 inches of rain is received per year, with approximately 58 percent occurring in the period from November through February. December is historically the wettest month and July the driest. Table 5-2 includes the precipitation data that was measured at the Raymond weather station for the years 1971 through 2000.

**TABLE 5-2**

**Monthly Average Precipitation  
Raymond National Weather Station, 1971 Through 2000**

<b>Month</b>	<b>Average Monthly Precipitation (inches)</b>
January	12.05
February	10.75
March	9.25
April	6.31
May	4.03
June	2.84
July	1.45
August	1.47
September	3.24
October	6.82
November	12.67
December	12.76
<b>Ave. Annual Total</b>	<b>83.64</b>

Streamflow in Electric Light and Martin Creeks have never been officially measured. However, streamflow in these drainages typically mimic precipitation with January experiencing the highest streamflow and July the lowest. Sediment that results from extreme precipitation events is typically mitigated by settlement within each individual impoundment. There are at least two cases where extreme precipitation has resulted in small slides within the watershed that have impacted raw water transmission to the Water Treatment Plant. In both cases, the slide occurred below the impoundment and damaged the raw water main. In these cases, the water mains were quickly repaired while the other drainage supplied the City’s water demand. Slides occur as a result of a relatively thin soil layer over rock on steep slopes. With the added weight of the precipitation on the soil layer and the increased moisture at the interface between the soil and rock, slippage can result. This occurs during the wetter winter months when the impoundments are typically full and has never occurred within both drainages at the same time. If this were to occur, the City would rely on its intertie with the City of Raymond until emergency repairs were completed.

**STREAM TYPES**

Watercourses within forestlands have been classified (typed) by the Washington Department of Fish & Wildlife. In the case of both watersheds, Electric Light and Martin Creeks, the waterway is type “F” from their outlets to wetlands along Airport Road to the south and approximately 1,500 feet upstream of both impoundments. Type F Water is defined in WAC 222-16-031(2) and (3) as having either a high or moderate fish, wildlife, or human use and includes water diverted for domestic use by a public accommodation

facility where such diversion is determined by the department to be a valid appropriation of water. Type F waters are also used by fish for spawning, rearing or migration. The micro-drainages that feed the Type F Water upstream of the impoundments in both watersheds are typed as either “N” or “U” Water. N Water is Non-Fish and U Water is Unclassified (not field verified).

## **CRITICAL AREAS**

Critical Areas as defined by RCW 36.70A.030 include wetlands, areas with critical recharging for aquifers for potable water, fish and wildlife conservation areas, frequently flooded areas, and geologically hazardous areas. Since the watersheds are outside of South Bend city limits, they fall under the jurisdiction of Pacific County. Geologically Hazardous Areas in Pacific County are defined as “areas that, because of their susceptibility to erosion, sliding, earthquake or other geologic events, are not suited to the siting of commercial, residential, or industrial development consistent with public health or safety concerns”. The following types of geologic hazards exist in Pacific County: Erosion Hazard Areas, Landslide Hazard Areas (Steep Slopes), Seismic Hazard Areas, and Mine Hazard Areas.

The principal critical area concern within the watersheds that provide South Bend’s source water is from landslide activity due to steep slopes. Pacific County defines landslide hazard areas as including steep slopes of 15 percent or greater that are underlain by weak, fine grained unconsolidated sediments, jointed or bedded bedrock, or landslide deposits, including the top and toe of such areas.

Landslide hazard areas are those areas meeting any of the following criteria:

1. Areas of historic failure, such as areas designated as quaternary slumps, earthflows, mudflows, or landslides on maps published as the United States Geological Survey or Department of Natural Resources Division of Geology and Earth Resources;
2. Those areas mapped by the Washington State Department of Natural Resources (slope stability mapping) as unstable (U or class 3), unstable old slides (UOS or class 4), or unstable recent slides (URS or class 5).
3. Any area with all of the following:
  - a. A slope greater than 15 percent;
  - b. Hillside intersection geologic contacts with a relatively permeable sediment overlying a relatively impermeable sediment or bedrock; and
  - c. Springs or groundwater seepage.

4. Slopes that are parallel or sub-parallel to planes of weakness (such as bedding planes, joint systems, and fault planes) in subsurface materials;
5. Slopes having gradients greater than 80 percent subject to rockfall during seismic shaking;
6. Areas potentially unstable as a result of rapid stream incision and streambank erosion;
7. Areas located in a canyon or on an active alluvial fan, presently or potentially subject to inundation by debris flows or catastrophic flooding; and
8. Any area with a slope of 40 percent or steeper and with a vertical relief of 10 or more feet except areas composed of solid rock. A slope is delineated by establishing its toe and top and measured by averaging the inclination over at least 10 feet of vertical relief.

The specific Pacific County policy that is applicable to the South Bend watersheds states the following:

- Policy R-9.4: To maintain the natural integrity of landslide hazard areas and to protect the environment, and the public health and safety, an adequate buffer of existing vegetation should be maintained around all sides of the landslide hazard areas.

The City of South Bend is an active participant in ensuring adequate buffers exist in areas of high landslide hazard on city owned property and will work with the other property owners that manage forestry land within the watershed to reduce the likelihood of landslides.

### **Electric Light Creek Watershed**

The Electric Light Creek watershed is located on the north side of the Willapa River along Highway 105 approximately 1 mile west of the City of South Bend Water Treatment Plant. Electric Light Creek drains approximately 412 acres. The watershed is managed predominantly for timber production and no residences are located within its boundaries. The City of South Bend owns approximately one-third of the watershed closest to the impoundment. The surrounding upper watershed is owned by Bavarian Timber 2015 LLC. Table 5-3, located in the Land Use and Ownership section of this chapter includes the contact information of the various watershed land owners.

### **Martin Creek Watershed**

The Martin Creek watershed is located on the north side of the Willapa River along Highway 105 approximately 0.2 miles west of the City of South Bend Water Treatment Plant. Martin Creek drains approximately 180 acres. The watershed is managed predominantly for timber production and no residences are located within its boundaries. The City of South Bend owns approximately 40 percent of the watershed closest to the impoundment. The upper watershed is owned predominantly by Bavarian Timber 2015 LLC (approx. 85 percent) and to a lesser extent by Salmon Timberland II LLC (approx. 15 percent). Table 5-3, located in the Land Use and Ownership section of this chapter includes the contact information of the various watershed land owners.

### **Fliess Creek Watershed**

Since the City is pursuing reactivating and providing an emergency backup source to supplement low flows on Electric Light and Martin Creeks, the Watershed Control Program will include discussion of the Fliess Creek watershed as well, even though it is currently not active.

The Fliess Creek watershed is located on the north side of the Willapa River along Highway 105 approximately 2 miles west of the City of South Bend Water Treatment Plant. The Fliess Creek watershed contains both the East and West Branches of Fliess Creek, which intersect approximately 0.5 miles from its convergence with the Willapa River. The Fliess Creek watershed drains approximately 514 acres of active timber production land. Downstream from the intersection of its two branches, Fliess Creek enters a wetland area, which in its southern half is tidally influenced. During tidal cycles, the Willapa River rises and falls, pushing river water into the Fliess Creek wetlands through two large culverts under Highway 105. Due to its close proximity to the Pacific Ocean, the Willapa River in this vicinity experiences saltwater intrusion, in which salt water is pushed into the river/creek during tidal cycling.

The watershed is managed predominantly for timber production and no residences are located within its boundaries. The City of South Bend owns less than 10 percent of this watershed. The city owned parcel is located where the likely raw water intake diversion would be located. The remainder of the watershed is owned by multiple timber organizations including: Ring Family Limited Partnership (approx. 33 percent); Bavarian Timber 2015 LLC (approx. 33 percent); Hope Creek LLC (approx. 10 percent); Bale Farms Inc. (approx. 10 percent); and Weyerhaeuser Company (approx. 5 percent). Table 5-3, located in the Land Use and Ownership section of this chapter includes the contact information of the various watershed land owners.

## **IMPOUNDMENTS**

The impoundment facilities consist of concrete dams located on Electric Light and Martin Creeks, constructed in 1963 and 1964, respectively. Transmission mains from the dams to the Water Treatment Plant flow via gravity. Each dam has a 4-foot-wide slotted spillway located 1.5 feet below the top of the dam for raw water to overflow the impoundment and continue down the respective creek beds. Each impoundment is drained annually. This is accomplished by opening the drain valves at the base of each dam and allowing the impoundment to drain. As the water level drops, a portable pump is connected to a high-pressure hose which is used to spray down the sides of the impoundments, removing accumulated sediment and leaves. The impoundment is allowed to drain completely using this method. Smaller logs and limbs are cut up and removed. Larger logs are removed with the use of a large swing-arm davit and electric winch (powered by a portable gasoline powered generator), which was installed on the rim of each dam. Once initially drained, the drain valves are closed and the impoundment is allowed to fill. Once full a second time, the drain valves are opened and the impoundments are allowed to drain. Finally, the drain valves are closed and the impoundment is filled and ready for service.

### **Electric Light Creek Dam**

The impoundment capacity at Electric Light Creek is reportedly 200,000 gallons. The capacity can become reduced over time due to sedimentation. Beginning in 2018 and subsequently every year thereafter, the impoundment is drained and cleared of sediment and wood and leaf debris, which was estimated to have reduced the impoundment capacity by half. The dam is located in a narrow rock-walled canyon with the access road terminating at the face of the dam. The dam is constructed of concrete and is approximately 31 feet in height and 77 feet in length across the canyon. There are two 12-inch drain valves located at the bottom of the dam and an 8-inch raw waterline located in the face of the dam approximately 16 feet below the top of the dam. The Electric Light Creek transmission main runs from the raw water impoundment to Airport Road and from that intersection flows along Airport Road southeast approximately 4,200 feet to the intersection of the Martin Creek transmission main and Airport Road. At this junction, the transmission mains from both Electric Light and Martin Creeks connect and flow the remaining few hundred feet to the WTP.

### **Martin Creek Dam**

The impoundment capacity at Martin Creek is reportedly 60,000 gallons. This capacity had been reduced over time due to sedimentation within the impoundment. The impoundment was drained and the sediment and debris were removed in 2018. Every year since then the water department personnel drain the reservoir to remove sediment, wood debris, and leaves that have accumulated over the previous year. The dam is located in a rock-walled canyon with the access road running above the along the entire length of the impoundment, which provides access for sediment and debris removal. The

dam is constructed of concrete and is approximately 23 feet in height and 70 feet in length along the floor of the canyon. The Martin Creek transmission main is a 6-inch poly-vinyl chloride (PVC) pipe, which was installed in 2007 to replace the original damaged main from the impoundment to Airport Road. Damage to the water main was caused by a landslide in the watershed due to an exceptionally strong winter storm event in November 2007. The replacement main was installed in the access road in order to make future repairs more accessible. At this junction, the transmission mains from both Electric Light and Martin Creeks intersect and flow the remaining few hundred feet to the WTP.

### **Fliess Creek Impoundments and Transmission**

In the past, the waters of Fliess Creek have been diverted by means of wood-crib dams constructed in each of the branches (East and West Forks). Both dams are now in a state of disrepair and are no longer operable. The Carey and Kramer (1967) report noted at that time that the West Branch line was inoperable and the East Branch wood-stave pipeline was being used during periods of low flow to augment the City's other two sources, but the main was antiquated even at that time. Spot repairs to the pipeline continued until 1989.

A Cipoletti weir (trapezoidal weir with a side slope of 1 horizontal to 4 vertical) was installed by the City of South Bend on Fliess Creek in July 1967 immediately downstream from the confluence of the West and East Branches of Fliess Creek for the purpose of measuring stream flow. However, the structure is no longer functional.

According to the 1994 Water System Comprehensive Plan, the Fliess Creek watershed was last used in 1989 due to the inability to repair the poor condition of the wood-stave transmission main. Since the Fliess Creek impoundment was at a lower elevation than the Electric Light and Martin Creek impoundments (428.5 feet and 460.5 feet, respectively), two pump stations in series were used to pump water from Fliess Creek to the WTP. A 350 gpm low pressure diesel operated pump station (approximately 50 psi discharge) was sited at the diversion structure. Water discharged from the first pump station flowed through 7,500 feet of 10-inch wood-stave pipe before being boosted to approximately 180 psi by a second pump station and entered the 10-inch asbestos-cement transmission main prior to the intersection with the Electric Light Creek raw water transmission main. Only remnants of pump stations remain and the water main is no longer functional.

The water main that is in place, but not in service, consists of 10-inch wood stave piping from the location of the former crib dam and runs along the hillside to the southwest, paralleling the East Branch of Fliess Creek. Prior to the confluence of the West and East Branches of Fliess Creek, the pipeline crosses under the East Branch (approximately 60 feet in ground elevation) changing directions to the southeast. The pipeline gains approximately 60 feet in elevation to 120 feet crossing a low ridge before dropping to 30 feet in elevation and following the north side of Airport Road to its intersection with

the Electric Light Creek transmission main. The length of the transmission main from the location of the crib dam on the East Branch of Fliess Creek to the Electric Light Creek transmission main is approximately 10,500 feet.

## **LOCATION AND SIZE**

Figure 5-1 shows the location and size of each of the three source watersheds: Martin, Electric Light, and Fliess. The watersheds are all adjacent to one another and located immediately north of Airport Road on the north side of the Willapa River. Table 5-1 summarizes the size in acres of each watershed.

## **ROADS AND TRAILS**

Access to the diversionary dams on Electric Light and Martin Creeks are provided via a gravel road along the valley floor. This is the most accessible entry point to each of the City's watersheds and is gated with a heavy-duty swing-arm, locked gate. Keys to this gate are held by the City. Due to the limited sizes of these watersheds, the number of roads is limited and generally follows the ridgeline, which is the watershed boundary, which is the case with the Martin Creek Watershed. Electric Light Creek Watershed is larger and includes logging roads on some of the secondary ridges for past logging operations. These private logging access roads exist above the diversion dams in each watershed, which are accessed from other roads outside the individual watersheds. Gates are located on all roads within and surrounding the City's watersheds at property lines.

The Fliess Creek Watershed has a number of logging roads that are in various conditions from not usable to well utilized. Access is primarily used for timber operations, fire wood cutting, and hunting.

Private timber companies limit access to their holdings with the use of gates and hiring private security agencies to monitor activity. Access is granted for limited hunting through a permit process that is typically managed by a hired third party. Locked gates are located at all property lines.

## **Fire**

Fire is a concern due to the watersheds close proximity to residences and adjacent private forestlands. The location of the watersheds directly upslope from a public roadway (Airport Road) can also subject the area to fire hazards. However, fire is generally a concern during the drier months as the area receives significant rainfall in the spring and winter. The potential for fire is also mitigated by the fact the watersheds and surrounding privately owned timberlands are crisscrossed by logging roads that act as fire breaks and provide quick access to private and state run fire crews, if necessary. The City personnel actively brush existing roadways within the two active watersheds.

## **GEOLOGY AND TOPOGRAPHY**

West of the Cascades, bedrock consists primarily of oceanic crust that was once old Pacific Ocean floor now above sea level. Geologists typically refer to the southwest corner of Washington as the Willapa Hills. Erosion carved the Willapa Hills into a slab of oceanic crust that still lies almost as flat as when it was formed, but about 2 miles above the present elevation of the oceanic crust. The oldest rocks are greenish black pillow basalts, which erupted far offshore, and once formed the bedrock crust beneath the Pacific Ocean. In large areas, a deep cover of oceanic sedimentary rocks still blankets the pillow basalts. The Willapa River Valley is part of this complex.

The Electric Light/Martin/Fliess Creek watersheds range in elevation from approximately 10 feet above Mean Sea Level (MSL) to a maximum of approximately 1,300 feet above MSL. Soils within the watershed consist primarily of two types; Knappton silt loam and Vesta silt loam.

Knappton silt loam can be characterized by slopes of 8 to 90 percent found on side slopes of uplands. This deep, well-drained soil is formed in colluvium derived basalt. Drainages generally are 1,000 to 1,500 feet apart. Elevations range from 100 to 1,800 feet and the average annual precipitation is 80 to 120 inches per year. Typically, the surface is covered with a mat of needles, twigs and moss about 1 inch thick. The surface layer is dark brown and dark reddish brown silt loam about 12 inches thick. The upper 12 inches of the subsoil is reddish brown gravelly silt loam, and the lower part is dark brown and strong brown gravelly silty clay loam up to 21 inches thick. Weathered, fractured basalt is at a depth between 40 to 44 inches. Depth to bedrock ranges from 40 to 60 inches or more.

Permeability of this soil type is moderate and available water capacity is high. Runoff and erosion increase with slope. The lesser slopes exhibit slow runoff where the steepest slopes have rapid runoff. The hazard of water erosion ranges from slight to severe depending on slope. This soil type is used as woodland. Western hemlock is the principal forest species in this soil type. Trees of limited extent include Douglas-fir, red alder, Sitka spruce, and western red cedar.

Vesta silt loam can be characterized by slopes from 8 to 30 percent. The Vesta soil type is found more extensively in the Fliess Creek drainage than the Electric Light and Martin Creek drainages. This soil is very deep, well-drained found on uplands. It formed in material derived from basalt. Drainages generally are more than 1,500 feet apart. Elevations range from 100 to 1,800 feet. Typically, the surface is covered with a mat of needles, twigs, and moss about 1 inch thick. The surface layer is dark reddish brown silt loam about 13-inches thick. The upper 24 inches of the subsoil is dark brown silty clay loam, and the lower part to a depth of 60 inches or more is strong brown silty clay. Permeability of this soil is moderate and available water capacity is high. Runoff is slow, and the hazard of water erosion is slight. This soil type is used as woodland, producing the same species as the Knappton silt loam.

When wet, unsurfaced roads are soft and generally are impassable. Logging roads require suitable surfacing for year-round use. Rock for road construction is readily available in this soil classification, generally at a depth of 3 to 5 feet (5 to 10 feet for Vesta silt loam). Steep cuts and fills erode readily unless a plant cover is established. Slumping and road failures can occur in clear-cut areas with steeper slopes.

**LAND USE AND OWNERSHIP**

All three watersheds above the impoundments are uninhabited by people or domestic animals and are utilized for timber production. Timber above the impoundments is second and third growth forest. Watershed ownership of the two currently active watersheds consists of the City of South Bend and three private timber companies. The approximate percentage of ownership for the active watersheds, Electric Light Creek and Martin Creek, as well as the inactive Fliess Creek watershed, is shown in Table 5-3.

**TABLE 5-3**

**Active Sources (Electric Light and Martin) Watershed Ownership**

Name of Watershed	Percentage of Ownership				
	City of South Bend	Bavarian Timber 2015, LLC	Salmon Timberland II, LLC	Ring Family, LTD	Other
Electric Light Creek	33%	67%	None	None	None
Martin Creek	39%	55%	6%	None	None
Fliess Creek	7%	41%	None	42%	17%

Each landowner has different goals and objectives for managing their forest lands. The primary objectives of timber companies such as Bavarian Timber and Salmon Timberlands are to provide products to consumers and maximize the return to their corporate owners and shareholders. Where feasible, clearcut harvesting practices are used; replanting is completed immediately to allow the next crop to grow; and species composition, stand densities, and rotation lengths are set to optimize economic return and provide the desired product. The protection of public resources (e.g., fish and wildlife) is generally accomplished through compliance with the Washington State Forest Practices Act (WSFPA), or as part of an approved habitat conservation plan. Individual land owners and smaller to medium size companies tend to harvest timber when prices are high or when cash flow is needed. Other than harvesting and the required reforestation, active management of these lands is limited.

Another watershed use is recreational hunting. This use typically occurs in the fall and is subject to potential access restrictions imposed by various land owners. Typically, timber companies are placing increasing restrictions on access to forest lands due to liability and

the cleanup of illegal activities such as garbage disposal and clandestine drug laboratories, as well as the increased susceptibility of wildfires.

Table 5-4 includes the contact information for the various land owners within the three watersheds.

**TABLE 5-4**

**Watershed (Electric Light, Martin, and Fliess) Contact Information**

<b>Company Name</b>	<b>Contact Name</b>	<b>Contact Phone Number</b>	<b>Contact Address</b>	<b>Watershed</b>
Bavarian Timber 2015 LLC	Marissa Bass	(360) 529-6233	--	Electric, Martin, Fliess
Salmon Timberland II LLC	Marissa Bass	(360) 529-6233	--	Martin
Ring Family Limited Partnership	Kalvin Bailey	(406) 531-0830	--	Fliess
Hope Creek	Unknown	Unknown	1301 Fifth Avenue, Ste. 2700 Seattle WA 98101	Fliess
Bale Farms	Unknown	balefarms@gmail.com	--	Fliess
Weyerhaeuser Company	Kyle Williams	(360) 581-3087	Cosmopolis	Fliess

**WATER RIGHTS**

The status of water rights is summarized in Table 1-2. The active water sources include Electric Light Creek, which does not list either an instantaneous or annual water right but includes a storage right of 1.54 acre-feet. The other active source is Martin Creek, which has an instantaneous water right of 2.0 cfs (898 gpm) and an annual water right of 1,450 acre-feet per year and includes a storage right of 2.2 acre-feet per year. The East Branch and West Branch of Fliess Creek is listed as an inactive source; however, the City still maintains water rights for these sources. The East and West Branches of Fliess Creek have instantaneous water rights of 0.84 (377 gpm) and 0.92 cfs (426 gpm), respectively and annual water rights of 608 and 666 acre-feet per year (annual limit if calculated as the instantaneous limit multiplied by a year), respectively. The City water right certificates (active and inactive) are included in Appendix B. There are no other water rights located within these watersheds.

**WATER QUALITY RISK ASSESSMENT**

A detailed analysis of the City’s source water quality can be found in Chapter 3 of this Plan. A detailed analysis of the City’s source water quality can be found in Chapter 3 of this Plan. The City samples each individual source (Electric Light Creek and Martin Creek) at the sample tap prior to the raw water entering the Water Treatment Plant. City personnel typically do not sample at the individual impoundments. In the past, City

personnel on their twice weekly visits to the impoundments noticed the water in the Martin Creek impoundment become green during the hottest days of summer. At that time, the City used water only from Electric Light Creek to supply the system. To remedy the situation, the level of the Martin Creek impoundment was lowered and not allowed to heat up. Water from the feeder creeks ran directly into the transmission main without settling in the impoundment. This alleviated the issue. Since that time, vegetation/trees have increased in size and density and shade the impoundment reducing direct thermal radiation input on the water's surface and the issue has not resurfaced.

The DOH conducted a Sanitary Survey in 2023 and recommended a number of minor operational changes, but did not identify any significant deficiencies. A copy of the Sanitary Survey is included in Appendix A.

## **WATERSHED CONTROL PLAN**

### **MONITOR WATERSHED ACTIVITIES**

The activities of the private timber companies that manage land in the Electric Light/Martin/Fliess Creek watersheds represent the greatest threat to the source water quality for the City. The largest single land use in these watersheds is logging and related activities such as road building, road maintenance, and timber management activities. The City will monitor the activities of these timber companies within the watersheds and maintain contacts through which the City can obtain timber rotation cycles and related activity in the watersheds, which will allow the City to become actively involved in planning and discuss issues related to protecting this valuable potable water resource. The City is registered with the Forest Practices Application Review System (FPARS), which is maintained by the Washington Department of Natural Resources (DNR). Anytime there is an FPARS application submitted for any activity within a 1-mile radius of either of the City's impoundments or within the area of Township 14 North, Range 09 West, Sections 3, 10, 11, 14, and 15; DNR will notify the City of the application.

In order to restrict access to the City's watershed, the City has installed locked gates to the entrance of each of the two drainages. Signage is posted at these locations notifying the public that access is not permitted to the City's drinking water source. The City visits each of these sites a minimum of three times per week. Visits increase during the summer and fall when people are more likely to access the watershed for recreational or other activities. The City has installed two motion-activated cameras at each dam site to monitor any activity. These cameras are checked weekly. This has resulted in photographic evidence of entry into the watershed by unauthorized persons despite the posted notices. These individuals were contacted and informed of that access to the public is not allowed.

## WASHINGTON FOREST PRACTICES ACT

The Washington Forest Practices Act is legislation enacted in 1974 that regulates logging and other forest activities to protect public resources like fish habitats and water quality, while also allowing for a viable timber industry. It is implemented through rules developed by the Forest Practices Board and administered by the Washington Department of Natural Resources (DNR). The Forest Practices Board is an independent state agency, which adopts forest practice rules that establish standards for timber harvesting, pre-commercial thinning, road construction, fertilization, forest chemical application and other forest practices applications. The Act also requires reforestation after logging. The law has been updated over time, most notably by the “Forests and Fish Law,” which introduced stricter rules such as wider buffer zones along streams to improve fish and water quality protection. Title 222 of the Washington Administrative Code includes the Forest Practices Rules. Rules involving water quality protection must be approved by the Department of Ecology before they can be adopted by the Forest Practices Board.

The DNR’s Forest Practices program administers and enforces the Forest Practices Rules through a permitting process, called a Forest Practices Application/Notification (FPA/N). Filing a FPA/N is required when impacts related to forest practices are undertaken on private, county and state forest land and include: harvesting timber, salvaging standing and down wood, construction of forest roads, installing and replacing stream crossings on forest roads, and applying forest chemicals from aircraft.

The Washington State Department of Natural Resources has produced a guide, Forest Practices Illustrated, A Simplified Guide to Forest Practice Rules in Washington State, updated January 2021 that is designed to help forest owners and others to better understand Washington State's Forest Practice Rules. The guide can be found here: [https://dnr.wa.gov/sites/default/files/2025-03/fp\\_fpi\\_complete.pdf](https://dnr.wa.gov/sites/default/files/2025-03/fp_fpi_complete.pdf).

The forestlands where the City of South Bend’s watersheds are located are overseen by the following DNR natural resource professionals that provide assistance to forestland property owners and others engaged in forest management protection.

**TABLE 5-5**

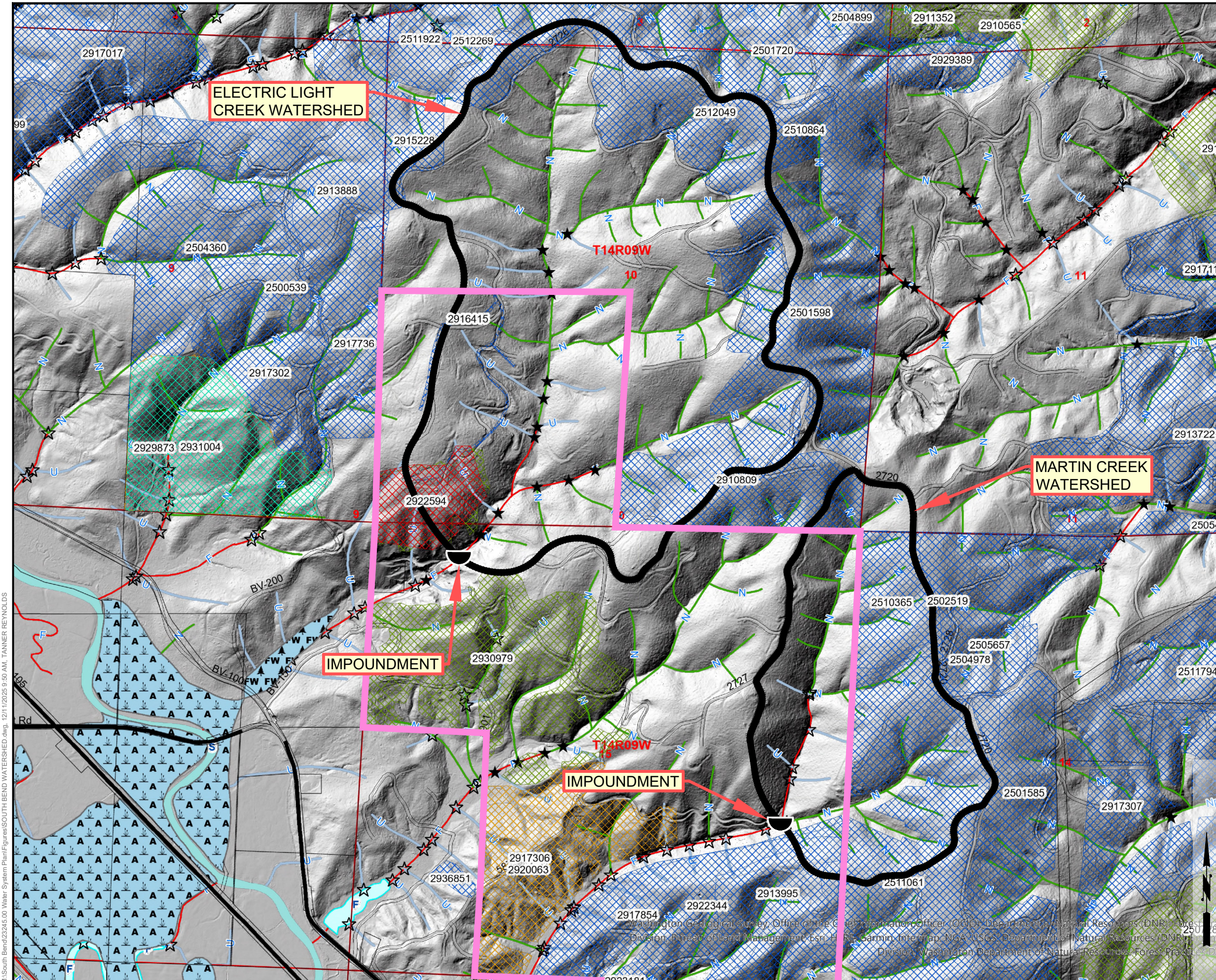
**South Bend DNR Forester(s) Contact Information**

<b>Title</b>	<b>Name</b>	<b>Phone Number</b>	<b>Email</b>
Service Forester	Lisa Kaino	(360) 749-0154	Lisa.kaino@dnr.wa.gov
Stewardship Fish & Wildlife Biologist	Ken Bevis	(360) 489-4802	Ken.bevis@dnr.wa.gov
Regulation Assistance Forester	Tom Chandler	(360) 669-3906	Tom.chandler@dnr.wa.gov
Forest Regulation Fish & Wildlife Biologist	Landon Shaffer	(564) 250-5379	Landon.shaffer@dnr.wa.gov
Community Resilience Coordinator	Marc Titus	(360) 972-4135	Marc.titus@dnr.wa.gov
Forest Practices Forester	Eric Weinke	(360) 520-5801	Eric.weinke@dnr.wa.gov

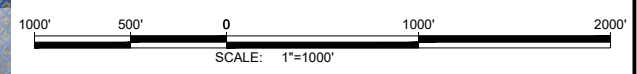
The entirety of both the Electric Light Creek and Martin Creek watersheds are designated as Site Class III forestlands by the Department of Natural Resources. Site Class III stipulates the activities and buffer (Riparian Management Zone) size bordering Type S and F waters. In the case of South Bend’s watersheds, a Class III forestland with a Type F Water requires a buffer measured horizontally from the outer edge of the bankfull width and extend 140 feet.

**REVIEW FOREST PROJECT APPLICATIONS**

The Washington State Department of Natural Resources maintains a Forest Practice Application Mapping Tool (FPAMT) on its website that allows proponents to access information in forestlands pertaining to the following: DNR roads, Water Types, Trails, Water Courses, Wetlands, Fire Shutdown Zones, Tribal Cultural Resource Contacts, Landslides, Soils, and Minimum Canopy Cover, to name a few. In addition, the mapping tool also includes Hydraulic Projects and Forest Practices Applications (active and not active) within forestlands. Each application is ascribed an identification number that is linked to the actual application. In the case of South Bend, the Electric Light Creek and Martin Creek watersheds show the extent of past logging operations/applications. Tables 5-6 and 5-7 and Figure 5-2 and show the past activity within the approximate boundaries of each watershed.



- LEGEND**
- FPA - ALL HARVEST BY DECISION/STATUS
- APPROVED
  - CLOSED
  - COMPLETED
  - RENEWAL
  - WITHDRAWN
- WETLANDS (FP)
- TYPE A WETLAND
  - FORESTED WETLAND
- WATER COURSES (FP)
- TYPE F
  - TYPE N, Np, Ns
  - U, UNKNOWN
- WATER TYPE BREAKS (FP)
- MODELED
  - WTMF
- WATER BODIES
- OPEN FRESHWATER
  - OPEN SALTWATER
- BOUNDARIES
- WATERSHED BOUNDARY
  - CITY OF SOUTH BEND OWNED PROPERTY



**CITY OF SOUTH BEND**  
 WATER SYSTEM PLAN  
**FIGURE 5-2**  
 WATERSHED AREAS

**Gray & Osborne, Inc.**  
 CONSULTING ENGINEERS

M:\South Bend\23245.00 Water System Plan\Figures\SOUTH BEND WATERSHED.dwg, 12/11/2025 9:50 AM, TANNER REYNOLDS

Washington Geological Survey, Office of the Chief Information Officer (OCIO), Department of Natural Resources (DNR), Forest Practices Division, Bureau of Land Management, Esri, HERE, Garmin, Intermap, NGA, USGS, Department of Natural Resources (DNR), Forest Practices Division, Washington Department of Natural Resources, Forest Practices Division

**TABLE 5-6**

**Electric Light Creek Watershed – FPA/N Applications**

<b>DNR ID No.</b>	<b>Application Type</b>	<b>Year of Activity</b>	<b>Approx. Percentage of Watershed<sup>(1)(2)</sup></b>	<b>Status</b>
2922594	Even-Age/Salvage Harvest	06/2011	5%	Withdrawn
2512269	Even-Age Harvest	03/2004	3%	Approved
2512049	Even-Age Harvest	04/2004	8%	Approved
2501598	Not Available	02/1997	7%	Approved
2910809	Even-Age Harvest	01/2005	8%	Approved

- (1) The Approximate Percentage of the Watershed refers to the amount of the activity that occurs within South Bend’s watershed and not the overall size of the logging activity, which in many cases is much larger but occurs outside of the City’s watershed.
- (2) All logging activity occurred at the perimeter of the watershed.

As can be seen from the activity in the Electric Light Creek Watershed, the areas were logged in years 2004/2005 and would likely have been replanted the following year. According to the Forester hired by South Bend, timber in this area is recommended for harvest at age 40 to 60 years, making possible harvest again in 2044-2064; however, the timber rotation is not known for the private landowners. The City of South Bend will reach out to the private landowners as part of their pilot project with the U.S. Environmental Protection Agency (EPA), Rural Community Assistance Corporation (RCAC), and Sustainable Northwest to potentially purchase private timber holdings within the South Bend watersheds.

**TABLE 5-7**

**Martin Creek Watershed – FPA/N Applications**

<b>DNR ID No.</b>	<b>Application Type</b>	<b>Year of Activity</b>	<b>Approx. Percentage of Watershed<sup>(1)</sup></b>	<b>Status</b>
2910809	Even-Age Harvest	01/2005	5%	Approved
2510365	Even-Age Harvest	01/2003	18%	Approved
2504978	Salvage	04/1999	18%	Approved
2511061	Even-Age Harvest	07/2003	18%	Approved
2922344	Even-Age/Salvage Harvest	05/2011	5%	Approved

- (1) The Approximate Percentage of the Watershed refers to the amount of the activity that occurs within South Bend’s watershed and not the overall size of the logging activity, which in many cases is much larger but occurs outside of the City’s watershed.

The Forest Practices Act is the governing regulation which has the most effect on the City’s watersheds. This Act exerts control over the timber harvesting and road building activities with respect to riparian buffers and overall water quality. The City will review

Forest Practices Applications submitted to the Washington State Department of Natural Resources (DNR) for projects in the Electric Light/Martin/Fliess Creek watersheds. The landowner will be provided telephone numbers to contact key City personnel in case of an emergency.

The City of South Bend is registered with the Department of Natural Resources to ensure they are contacted when any application is submitted within their watersheds. In the past, the City would have to either be contacted by the landowner of an impending action or the City would have to access the DNR mapping program. Additionally, timber owners operating within any of South Bend’s active watersheds will be notified they will be operating within a drinking water watershed, which are listed on DNR’s internal mapping database.

**EDUCATION PROGRAM**

The City will actively educate the public concerning the importance of their source drinking water watersheds. Signage has been posted at each entrance/access to the watershed. The signs have emergency telephone numbers and also a brief message concerning the importance of the watershed as the City’s drinking water supply.

**EMERGENCY CONTACTS**

In the event of an emergency concerning water quality, such as a contaminant spill, forest fire, or landslide within one of the watersheds, the following individuals or organizations should be contacted.

**TABLE 5-8**

**Watershed Emergency Contacts**

<b>Organization Contact</b>	<b>Phone Number</b>
Emergency Service	911
Raymond Police Department	(360) 942-4120
Dennis Houk (City Supervisor)	(360) 875-5571
Chris Orkney (Lead Water Operator)	(360) 942-0072
WA State Ecology SW Region Office	(360) 407-6300
WA State DOH General Number	(360) 236-3100 or (800) 521-0323
WA State DOH Engineer – Scott Pollock	(564) 669-0854
WA State DOH Planner – Meredith Jones	(564) 233-1394
WA State DOH Source Monitoring – Sophia Petro	(564) 669-0856
WA State DOH Surface Water Support – Pi Kosarot	(564) 669-3862
WA State DOH – Scott Kellogg - Mapping	Scott.kellogg@doh.wa.gov
WA State DOH Drinking Water Emergency Hotline	(877) 481-4901
WA State DNR Report a Forest Fire Hotline	(800) 562-6010
WA State DNR FPARS Help Desk	(360) 902-1420

## **RECOMMENDATIONS**

### **5-YEAR WATERSHED EVALUATION**

The City will conduct an evaluation of each active watershed every 5 years (twice within the 10-year Water System Plan update period) to ascertain and record changes that could affect the quantity and quality of source water. Changes to the Watershed Control Plan will be adopted at that time to adjust to changing watershed conditions.

Items to be evaluated will include reviewing the Pacific County Assessor mapping tool for any changes in property ownership, reviewing the FPARS mapping tool to verify activity within the City's watersheds, and to check-in with the City's forester for any updates to their Forest Plan.

### **WATERSHED OWNERSHIP BY THE CITY**

The City will actively pursue funding programs through various state and federal programs that will allow the City to potentially purchase property from willing property owners within their drinking water watersheds. The City owned parcels will then be managed to ensure long-term water quality and quantity. The City of South Bend will contact the private landowners as part of their pilot project with the U.S. Environmental Protection Agency (EPA), Rural Community Assistance Corporation (RCAC), and Sustainable Northwest to discuss possible purchase of private timber holdings within the South Bend watersheds.

The City sponsored a Source Water Protection Workshop focused on protection of drinking water watersheds for communities with surface water sources in Pacific County. The focus included discussion of stages of land conservation including: Pre-planning, Planning, Implementation, and Maintenance. The discussion included the steps required to secure the City's watershed whether that included: (1) Land ownership; (2) Conservation easements; (3) Deed restrictions; and (4) Conservation ownership.

This workshop resulting in a list of steps, with the first contracting with a forester to develop a sustainable plan for the City owned timberlands. The City contracted with a forester and developed a Forest Stewardship Timber Management Plan that assesses the resource and makes recommendations for management with the knowledge that the watersheds supply the City's drinking water. This was completed and presented to the City in 2025.

The next steps consist of the following:

- City to determine their preferred strategy for protecting watershed(s) by writing project goals, conducting community outreach, and identification of areas to be protected.
- The City would then contact a Land Trust organization or a Forest Program Manager such as Daniel Wear (206) 317-4614 that would assist with logistics associated with determining property ownership/contacts within the City's watershed. This organization would make initial contacts with property owners to see if they are willing participants to acquisition, conservation easements, or deed restrictions and discuss with them the goals of the City to protect drinking water.
- City would work with EPA/DOH and Ecology to complete applications that could fund property acquisition, conservation easements, or deed restrictions. Initial funding would pay for survey of the watershed(s), stand survey(s), appraisals. This information (depending on the conservation strategy) would be used to develop and Forestry Management Action Plan for each watershed. This Plan would then be the basis of the Ecology CCWF application for the type of strategy that best maintains the City's watershed(s).
- The City's preference (at this time) would be to own each watershed and maintain it with the assistance of a professional Forester for long-term watershed/water quality protection.
- Depending on the type of conservation strategy adopted, the City would develop (with the assistance of a Land Trust/Forest Program Manager/Forester) a long-term Post Acquisition Watershed Management/Maintenance Plan.

The City has earmarked in their Capital Improvement Program \$130,000 to use as a potential match to the pilot project for future property purchases. Typically, timber property owners are more likely to sell property after it has been recently logged, which is the case in South Bend's active watersheds.

## **CONTACT WASHINGTON DEPARTMENT OF NATURAL RESOURCES**

The City has registered the location of their impoundments and watersheds with the Washington State Department of Natural Resources (DNR) by contacting the FPARS Help Desk at (360) 902-1420. Registration ensures that any activity (harvesting, road building, chemical application) that generates a Forest Practice Application within a

1-mile radius of either impoundment or within the area of Township 14 North, Range 09 West, Sections 3, 10, 11, 14, and 15, will result in review by a DNR Forester and notification to the City of South Bend City Supervisor of the proposed activity and application.

# CHAPTER 6

## OPERATION AND MAINTENANCE PROGRAM

### INTRODUCTION

An Operations and Maintenance Program is a required element of a Water System Plan pursuant to WAC 246-290-100. The requirements for content of an Operation and Maintenance Program are contained in WAC 246-290-415. The objective of the Operations and Maintenance Program is to provide an evaluation of the City’s operation and maintenance (O&M) program and guidance to maintain or improve its ability to assure satisfactory management of the water system operations. This Chapter summarizes the operation and maintenance programs maintained by the City of South Bend.

### WATER SYSTEM MANAGEMENT AND PERSONNEL

The City is a Code City operated under a Mayor-Council form of government, as described in Chapter 1. The City’s water treatment plant is staffed by certified operators, and the water system is maintained by the Public Works Department. The Public Works Department is headed by the City Supervisor and is responsible for the water system, wastewater collection and treatment, and all other City facilities deemed Public Works.

Waterworks Operator Certification, specified in WAC 246-292, requires larger public water systems in Washington State to retain in their employ individuals who are certified, by examinations, as competent in water supply and operation and/or management. The Washington State Department of Health (DOH) determines the required level and number of certified positions based on the population and complexity of the water system. Minimum education and experience requirements for the various certification levels are detailed in the Water Works Operators Certification Regulations, published by DOH.

A summary of the main water system personnel and certifications is provided in Table 6-1 below.

**TABLE 6-1**

**Water System Personnel and Certifications**

<b>Name</b>	<b>Position</b>	<b>Certifications</b>
Dennis Houk	City Supervisor/Public Works Head	-
Chris Orkney	Water Treatment Plant Lead	WDM IV, WTPO III, WTPO-IT IV
Kelly Spoor	Water Treatment Plant Assistant	WDM II, WTPO II

## **Positions and Duties**

As the WTP Lead, Chris Orkney is responsible for the day-to-day operation of the water system, including operation and maintenance of the Water Treatment Plant (WTP). The WTP Lead troubleshoots water system problems and deficiencies, and makes recommendations to the City Supervisor. The WTP Lead or his designee also collects water samples for analysis. A WTP Assistant provides support to the WTP Lead.

Water system repairs and maintenance outside of the WTP are directed by the City Supervisor. The Public Works Department of South Bend is responsible for those repairs. Typical repairs include distribution main leaks, water meter repair/installation, and booster pump repair. Typical water system maintenance performed by the Public Works Department includes valve/hydrant exercising, distribution leak testing and flushing, and minor reservoir/impoundment maintenance.”

## **Professional Growth Requirements**

In order to promote and maintain expertise for the various grades of operator certification, Washington State requires that all certified operators complete not less than three Continuing Education Units (CEU) within each 3-year period. Programs sponsored by both the Washington Environmental Training Resources Center (WETRC) and the American Waterworks Association (AWWA) Pacific Northwest Subsection are the most popular sources of CEUs for certified operators in Washington State.

Besides providing CEUs, operator training is an important component in maintaining a safe and reliable water system. At a minimum, all personnel performing water system related duties will receive training in the following areas.

- Confined space
- Trenching and shoring
- First Aid
- Traffic Flagging
- Asbestos cement pipe safety
- Cross-Connection Control

The City’s certified staff completes CEUs on a regular basis.

## **SYSTEM OPERATION AND CONTROL**

### **Identification of Major System Components**

Figure 1-2 shows all of the major system components associated with the City’s water system.

## **Normal Operation of System Components**

Effective operation and control is an essential component of managing a water system. The operational capability of the City's water system must be flexible to allow for control of the system during unanticipated conditions or events as well as the typical day-to-day operation and control.

A description of the normal operation of each facility is given in the following sections. In addition, the City has a separate comprehensive set of Operation and Maintenance Manuals for the Water Treatment Plant, which received a significant upgrade and expansion to its capacity, treatment (filtration), and disinfection in 2022.

### **Source**

The City's current sources of supply are Electric Light and Martin Creeks. Raw water is captured behind concrete dams then piped to the Water Treatment Plant.

### **Treatment Plant**

The City's Water Treatment Plant consists of three 300-gpm microfiltration units. Gravity flow from the Electric Light and Martin Creeks to the WTP is controlled by a sleeve valve upstream of the WTP. Three 300-gpm pumps (two duty and one spare) are then utilized to supply the necessary hydraulic conditions for treatment through the three microfiltration trains. The filtered water from the microfiltration units is then disinfected with sodium hypochlorite prior to entry to a 39,000-gallon clearwell.

Turbidity is measured continuously from each membrane skid (3) with Hach 1720D's. The combined filter effluent is measured continuously after the clearwell with a Hach 1720E. To comply with the indirect integrity monitoring requirements in the Long-Term Enhanced Surface Water Treatment Rule (LT2ESWTR), the existing filtered water turbidimeters were replaced with new Hach TU5400sc laser turbidimeters. The Water Treatment Plant automatically shuts down when the raw water turbidity exceeds 60 NTUs.

The Water Treatment Plant can be operated manually (if necessary) or via telemetry by reservoir levels (pressure). Currently, the system is operated by the water level (pressure) in the newer Rixon Road Reservoir.

The WTP expansion in 2022 upgraded the chemical clean-in-place backwash system by improving automation and increasing the reliability of the valves used to control the CIP backwashes. This was done by equipping the valves with pneumatic actuators. In addition, new limit switches were integrated with the new pneumatic operators allowing the valves to report the same status signals to the control panel. The PLC programming was modified to include new control signals to control the sequenced opening and closing of the valves during backwash operations.

## **Storage**

The City operates four storage reservoirs located on two sites, with a total gross capacity of approximately 3,028,000 gallons. The two larger reservoirs (Main Reservoirs) are located together in the hills above the South Bend schools. The two smaller reservoirs (Rixon Road Reservoirs) are located together in the hills above the Willapa Harbor Hospital. Three of these reservoirs were constructed after 2007 in order to eliminate a finished water impoundment that was highly susceptible to contamination and leakage. All four reservoirs have identical overflow elevations.

There is an altitude valve at the Main Reservoir site. When the Main Reservoir(s) is full, the altitude valve closes while the WTP pumps continue pumping. This forces water to the Rixon Road Reservoir(s), which are located closer to the end of the water system, to enable them to be filled. A water level sensor is located at both reservoir sites to enable detailed monitoring and recording of reservoir levels. The reservoir level information is transmitted to the WTP control center, and a programmable logic controller there controls the operation of the WTP finished water pumps based on the reservoir level information. The reservoir that is currently set up to call on the WTP is Rixon Road Reservoir 2. This controlling lead reservoir is configured to turn on the WTP pumps when the water elevation in the reservoir reaches 260.09 feet and turn off the WTP when the level reaches 260.59 feet.

Three of the four reservoirs are glass-lined bolted steel and are virtually maintenance free. The fourth reservoir is painted welded-steel, and was recoated in 2007. Typically, recoating is completed approximately every 15 to 20 years depending on the condition and quality of the previous coating.

## **Booster Stations**

The City has three booster pump stations within the service area: B Street Booster Pump Station, the Main Reservoir Pump Station, and the Rixon Road Reservoir Booster Pump Station. The B Street Booster Pump Station serves 14 residences and is maintained and operated by the City. The Main Reservoir Booster Pump Station serves two residences. The City constructed this booster pump station to replace the Wolfe Booster Pump Station that was operated privately and did not meet City or DOH standards. In the future, the City may construct a larger booster pump station to serve this area. This proposed station, the Smith-Greenhouse Booster Pump Station, would serve the two existing homes on the Main Reservoir Booster Pump as well as other existing homes in the vicinity that are currently served by individual wells. The Rixon Road Reservoir Booster Pump Station serves two residences in the vicinity of the reservoirs. Fire flow pumps are not proposed for these residences since the City does not provide fire flow protection outside city limits.

## **Alternative Operation Modes and Circumstances**

In an extreme emergency case of a Water Treatment Plant failure or significant degradation to the watershed(s) such as a landslide that blocks or diverts or impedes raw water from entering the WTP, the City would rely on the emergency intertie with the City of Raymond. This intertie has been upgraded to deliver up to 600 gpm. The intertie can also supply the City of Raymond water from the South Bend WTP, if needed.

## **System Control**

The City's four reservoir's water levels are monitored remotely via telemetry and displayed both at the WTP and at City Hall.

The telemetry system allows the finished water pumps at the WTP to be called on by either of the two reservoir sites. The telemetry system is a spread spectrum radio system with sites at the WTP, the Main Reservoir site, the Rixon Road site, and City Hall. Water levels in all four reservoirs are transmitted to a programmable logic controller (PLC) located at the WTP. The PLC calls one or two of the three pumps depending on the level in the lead (controlling) reservoir. The operator can designate either of the two reservoir sites as the controlling site. Most of the time the controlling reservoir is the Rixon Road Reservoir 2, located on the far end of the system. The Rixon Road and Main Reservoir are powered by electricity under normal operation. Both sites are also equipped with emergency backup batteries, which typically last one to three days without power.

## **Meter Reading**

Individual service meter readings are conducted every month, while the source meter at the WTP is read daily. The master meter at the intertie with the City of Raymond is read monthly whenever it has been in service.

## **PREVENTATIVE MAINTENANCE PROGRAM**

The most cost-effective method for maintaining a water system is to provide a planned preventive maintenance (PM) program. A planned PM program can provide the optimum level of maintenance activities for the least total maintenance cost. The routine maintenance procedures for each system component follow.

Normal daily operations consist of routine and preventative maintenance of the water system, inspecting the distribution system for any visible leaks, and addressing customer questions and concerns. During the drier summer months, undersized, older, and/or asbestos cement distribution pipe is replaced within the system as time and funding allows.

## **PREVENTATIVE MAINTENANCE AND INSPECTION ACTIVITIES**

### **Sources**

The Electric Light and Martin Creek diversion structures are routinely checked. The City's Water Treatment Plant (WTP) is located less than 1 mile from the dam on Martin Creek behind a locked gate. The Electric Light Creek dam is approximately 1.5 miles from the WTP, also behind a locked gate. Measurements are recorded daily at the WTP and include turbidity, water temperature, outside temperature, and precipitation. Routine checks are also made for any evidence of unauthorized entry or vandalism, although the entrance to the diversion structure is gated and locked. Weekly checks are also made for any evidence of unauthorized entry or vandalism without going the entire distance to the dams by checking to see the gated entrances are locked. In 2018 and every year thereafter, the Martin Creek Impoundment has been drained and dredged to increase capacity.

### **Storage**

Improperly maintained reservoirs can cause contamination in public water systems. This is a result of contaminants entering the reservoir through cracks or openings at the vent, overflow or drain screens. Deteriorating hatch covers and vandalism can also compromise reservoir water quality. Poorly designed and maintained reservoirs can hamper the emergency operation of a water system. If reservoir drains are not functioning properly, it may be impossible to purge a contaminant from the system. Written documentation of reservoir maintenance must be completed with each inspection and repair, and a copy of the report retained on file.

The City reservoir sites are checked weekly to assure that no vandalism or unauthorized intrusion has occurred. The City currently cleans their reservoirs on an as-needed basis, and the interior and exterior of Rixon Road Reservoir 1, which requires recoating (due to welded steel construction), is painted approximately every 15 to 20 years and was last recoated in 2007, depending on the results of an annual visual inspection. The interior and exterior of all four tanks are in excellent condition.

### **Booster Stations**

The City of South Bend currently operates three booster pumps within its water system. These booster pump stations are inspected weekly to ensure that no vandalism or unauthorized intrusion has occurred. All three are secured in structures with a pad-locked door, but no alarm system.

## **Distribution System Valve Maintenance**

Good preventative maintenance dictates that all valves be exercised regularly. The City exercises distribution system valves in the system every year in the spring/summer season. DOH typically recommends that valves be exercised on a regular (annual or semi-annual) basis to keep them in good working condition and to extend their service life. Records are kept of valve maintenance. On average, it is estimated that a two-man crew can exercise about 30 valves daily or repair or replace approximately 1.5 valves per day, depending on size and location. For planning purposes, approximately 5 percent of all valves scheduled for testing should be assumed to be in need of repair or replacement. Valves that do not close tightly are removed, repaired or replaced. An important aspect of distribution system valve maintenance and recordkeeping is to ensure distribution valves are completely open. A partially closed valve can significantly reduce peak day operation and fire flow supply. The City has a valve map with all valves numbered and located with global positioning system (GPS).

## **Hydrant Maintenance**

The City currently flushes hydrants annually in the spring/summer season. Hydrants are inspected regularly and repaired if necessary. On average, a two man crew can flow test and check about eight hydrants daily. It is important to maintain good records of hydrant maintenance. The City has a hydrant map with all hydrants numbered and located with GPS that is utilized when performing hydrant maintenance or flushing.

## **Water Main Flushing**

The City of South Bend systematically flushes its entire distribution system annually. Approximately half of the water system is flushed at a time and flushing of each half of the system may occur during different months. Notices are posted throughout the City and appear in the local newspaper to inform residents and businesses of water distribution main flushing.

## **Dead-End Waterlines**

The City has a minimal number of dead-end mains in the system and currently flushes them on an as-needed basis. Dead-end waterlines are susceptible to water quality problems and will be flushed regularly to remove stagnant water and debris, which may have been deposited. The City currently flushes dead-end waterlines twice annually in April and October.

## **Meters**

Accurate water metering is an essential financial and conservation oriented component of water system infrastructure. A substantial amount of revenue may be lost through inaccurate metering. Without accurate master or source meter readings, the water utility cannot determine lost and unaccounted for water volumes.

The AWWA recommends the replacement of residential meters on a 10-year basis. The City currently replaces meters that are known to be broken or that are known to provide inaccurate readings. The City will continue to look for funding opportunities to repair and/or replace a greater proportion of meters on an annual schedule. Larger meters may be bench tested periodically.

## **EQUIPMENT, SUPPLIES AND CHEMICAL LISTING**

The City maintains an inventory of parts and supplies including the appurtenances needed to repair leaks for every size and type of pipe in the system.

Manufacturer's Technical Specifications are included in a separate comprehensive set of Operations and Maintenance Manuals that are kept at the WTP. Material Specification Data Sheets (MSDS) are also kept at WTP for reference on chemicals used in the treatment processes.

## **COMPREHENSIVE MONITORING PLAN AND REGULATORY COMPLIANCE**

### **Comprehensive Monitoring Plan Elements**

The Washington Department of Health annually issues a Water Quality Monitoring Report (WQMR) to every water purveyor in the state.

### **Water Quality Monitoring**

The City receives an annual report from DOH that indicates what water quality tests are required and when they are required. The monitoring requirements for 2023 are provided in Appendix E. An analysis of the City's most current water quality test results can be found in Chapter 3. The City is also required to publish a Consumer Confidence Report (CCR) every year to provide customers with water quality data and to explain to its customers any deficiencies the water system may have. A copy of the 2023 CCR can be found in Appendix E.

Water quality monitoring is conducted by either one of the City's two operators. Water System Lead Operator, Mr. Chris Orkney is responsible for scheduling and collecting samples based upon DOH requirements. Measurements are recorded daily at the WTP and include chlorine residual, raw and finished water turbidity, raw and finished water

pH and alkalinity, raw water temperature, outside temperature, and precipitation. Additionally, filters are backwashed daily and the source meter (raw and finished) is read and recorded. The City is also required to sample the distribution system for chlorine residual and have a detectable amount of chlorine in at least 95 percent of the samples taken each month.

Bacteriological samples are required to be taken in accordance with the Coliform Monitoring Plan in Appendix D. Samples are processed by Grays Harbor County Water Lab. Results are sent to both the City and DOH. The City stores a copy of the results in the water quality file located at the WTP.

For nitrate/nitrite testing, the City uses Grays Harbor County Water Lab. For other chemical and DBP testing, the City uses ALS Environmental in Kelso, Washington. Bottles for testing are usually requested by the City 2 to 3 days in advance and are delivered by mail to the City. Samples are sent back to the lab via the mail. The City stores a copy of the results in the water quality file located at the WTP.

**Operation and Maintenance Schedule**

Table 6-2 is a listing and schedule of normal maintenance and operations activities and the frequency that they occur.

**TABLE 6-2**

**Maintenance Schedule**

<b>Operation and Maintenance</b>	<b>Frequency</b>
Drain and Clean Reservoirs	Every 5 years
Monitoring Reservoir Levels	Continuously via Telemetry
Recoating of Rixon Road 1 Reservoir	Every 15-20 years
Distribution System Valve Exercising	Every 2 years
Hydrant Exercising	Annually
Service Meter Calibration	See discussion under the above heading, Meters
Flushing dead-end Water Mains	Twice annually
Source Meter Readings	Daily
Commercial, Industrial, Institutional Meter Readings	Monthly
Residential Meter Readings	Monthly
Water Treatment Plant Operation	Daily <sup>(1)</sup>

(1) Water Treatment Plant tasks are described in the system’s Operation and Maintenance Manual.

## **EMERGENCY RESPONSE PROGRAM**

Water utilities have the responsibility to provide an adequate quantity and quality of water in a reliable manner at all times. To do this, utilities must reduce or eliminate the effects of natural disasters, accidents, and intentional acts. Most utilities routinely deal with small-scale emergency situations. Large-scale emergency situations occur far less frequently, but may manifest themselves in the same way as the routine emergencies. If a utility is well prepared to handle routine emergencies, they will also be better prepared to handle more disastrous ones.

Although it is not possible to anticipate all potential disasters affecting the City's water system, formulating procedures to manage and remedy several common emergencies is appropriate. The City water system has formulated an Emergency Response Program that is included in this Water System Plan.

### **Emergency Procedures**

In the event of emergency, the City Supervisor, Mr. Dennis Houk or his designated assign will be in direct charge. The telephone number for the City is (360) 875-5571. During non-office hours calls to the City Hall are answered by an answering machine, which provides instructions for contacting City personnel in the event of an emergency. For routine problems callers are advised to call back during normal business hours. The first person responding determines if additional responders are needed and takes all necessary steps to isolate the problem from the rest of the water system.

If property is being damaged or life-threatening, decisions are made by the responder to minimize the immediate damage or danger and assist the property owner in minimizing further damage or danger.

If City facilities have been damaged, the next order of work for City personnel is directed toward restoring the water facilities to an operating condition.

### **Emergency Contacts**

Table 6-3 is the emergency phone list for water system issues. A copy of this list is kept updated and visible at the City Hall, the Water Treatment Plant (WTP), and the Fire Department.

**TABLE 6-3****Emergency Phone List**

<b>Agency/Group</b>	<b>Contact</b>	<b>Phone Number</b>
Fire/Police	--	911
Lead Operator	Chris Orkney	(360) 942-0072
Operator	Kelly Spoor	(360) 208-4710
City of South Bend	City Supervisor Dennis Houk	(360) 875-5571
Chemical Supplies	Cascade Columbia (Citric & phosphoric acid, SBS, Salt)	(206) 282-6334
Chemical Supplies	City of Raymond (Fluoride)	(360) 942-4100
Chemical Supplies	Northstar (Caustic Soda)	(503) 625-3770
Chemical Supplies	Univar	(855) 888-8648
Chemical Supplies	Siemens (MemcleanC)	(719) 622-5341
Pipe/Fitting Suppliers	H.D. Fowler	(800) 927-5699
Pipe/Fitting Suppliers	HD Supply Waterworks	(800) 772-6004
Low Rents West (Generator Rental)	Rental Support	(360) 357-3314
Herc Rentals	Rental Support	(360) 644-1298
Testing Laboratory	Grays Harbor County Water Testing	(360) 249-4222
	ALS Environmental - Kelso	(360) 577-7222
	Pacific County Health Department	(360) 875-9356
City of Raymond	Public Works Office	(360) 942-4108
	Public Works Director Eric Weiberg	(360) 942-4107
Willapa Valley Water District	Superintendent Shawn Aust	(360) 942-3357
Pacific County Emergency Management	Director Scott McDougall	(360) 875-9338
Pacific County Public Works	Director Jennifer Oatfield	(360) 875-9368
Washington State Department of Health	SW Regional Office	(360) 236-3030

**TABLE 6-3 – (continued)**

**Emergency Phone List**

<b>Agency/Group</b>	<b>Contact</b>	<b>Phone Number</b>
Washington State Department of Health – Office of Drinking Water	Emergency Hotline Number	(877) 481-4901
Washington State Department of Transportation	Bridges and Structures Office	(360) 705-7200
Washington State Department of Ecology	Emergency Spill Response	(360) 407-6300
State Wide One-Call	Utility Locate	(800) 424-5555
Gray & Osborne, Inc. (City Engineer)	Seattle Number Olympia Number	(206) 284-0860 (360) 292-7481

**Public Notification Procedures**

In the event that public notification is required during an emergency, the City maintains a list of television and radio resources that can be provided with news releases regarding the situation. Public notification is mandated by WAC 246-290-71001 in accordance with 40 CFR 141.201 through 208 when the system violates a National Primary Drinking Water Regulation. Public notice content is specified in WAC 246-290-71002. Public notification distribution is specified in WAC 246-290-71003. Public notification mandatory language is specified in WAC 246-290-71004. Special public notification requirements are specified in WAC 246-290-71005. Consumer information is specified in WAC 246-290-71006. Public notification special provisions are specified in WAC 246-290-71007.

Further guidance regarding public notification can be obtained from the EPA Public Notification Handbook, available at the following website:

[https://www.epa.gov/system/files/documents/2023-05/CWS\\_NTNC%20PN%20Handbook\\_508\\_March%202023.pdf](https://www.epa.gov/system/files/documents/2023-05/CWS_NTNC%20PN%20Handbook_508_March%202023.pdf)

**Vulnerability Assessment and Response Plan**

The effect of potential hazards on each major water system component, and on water quality and quantity must be assessed. The purpose in preparing such an assessment is to establish the strengths and weaknesses of each system component. Based upon the assessment of vulnerability, the utility can establish performance goals and acceptable levels of service for the system, given various disaster scenarios.

The effect of the most likely potential hazards on critical water system components were developed for the City. The results of this analysis are presented in the following sections.

### Loss of Source

The most serious risk to the City water system is the long-term loss of one of the primary sources of supply, Electric Light Creek or Martin Creeks. In the case of a water shortage emergency, the City has outlined a Water Shortage Response Plan in Article II of the City's Water Standards, which are included in Appendix C. The City Supervisor has the authority to declare an emergency and implement measures based on the severity of the emergency, including distributing public notification to customers and departments providing public services, such as the Fire Department.

Landslides in the watersheds have occurred in the past, which can increase the water turbidity to a point that requires the WTP to be shut down. This is somewhat mitigated by the fact that the City has two individual raw water sources in separate watersheds. Short term loss of source from high turbidity or power outages are somewhat mitigated by use of water stored in the City's reservoirs. Longer term loss of source, should a landslide occur that causes one or in the unlikely event that both sources fail, could exceed the capacity of the reservoirs to provide mitigation. The emergency intertie with the City of Raymond water system could help sustain the City in the event of such an extended loss of source. Immediate action would be necessary to restore the source to a usable condition as soon as possible. In an emergency it may be necessary to act prior to the securing of required permits. The City will contact the affected regulatory agencies, such as DOH or Ecology, and secure verbal approvals as soon as possible and follow-up with written requests when time allows.

Nearby infrastructure such as dams should also be inspected following a landside, where applicable.

### Bacteriological Presence Detection Procedure

Procedures for notifying system customers, the local health department, and DOH of water quality emergencies are an important component of an emergency response program. Many public water systems will occasionally detect positive coliform samples, mainly as a result of minor contamination in distribution mains or sample taps, or improper bacteriological sampling procedures. However, the persistent detection of coliforms in the water supply, particularly *E. coli* or fecal bacteria, may require issuing a public boil water notice to ensure the health and safety of the water customers. Emergencies such as floods, earthquakes, and other disasters can affect water quality as a result of damage to water system facilities, thereby warranting a boil water order in advance of supply. DOH guidance for bacterial detection, including a suggested Boil Water Notice, is included in Appendix H. WAC 246-290-320 requires water utilities to follow specific procedures in the event coliform bacteria are detected in the water system.

The most up-to-date procedures are outlined on the DOH website at <https://doh.wa.gov/community-and-environment/drinking-water/drinking-water-emergencies/coliform-advisory-packet>.

#### VOC/SOC and Inorganic Chemical/Physical Characteristics Detection Procedures

If routine VOC or SOC samples detect one or more chemicals above the MCL, the City shall contact the appropriate DOH Pacific County contact to coordinate follow-up testing and any additional actions. Follow-up samples may be taken specifically for the problem chemicals or possibly for a surrogate such as Total Organic Carbon. If practical, the source of supply from which the VOCs or SOCs have been detected should be taken out of service until the cause of the problem is identified and corrected. The City will perform any additional follow-up procedures as specified in WAC 246-290-320.

Additional public notification forms for chemical contaminants can be found on the DOH website at <https://doh.wa.gov/community-and-environment/drinking-water/publications-and-forms/forms>.

#### Power Failure

Various types of weather such as wind, lightning, freezing rain, and snowstorms have disrupted power to the WTP in the past, and will occur in the future. Emergency generators would be obtained from the City of Raymond or rented from an available vendor in the Olympia and Tacoma areas and would be needed to operate the Raymond Intertie if a power failure should last longer than 36 to 48 hours depending on system demand. Two possible providers in Olympia are Low Rents West and Herc Rentals. The contact numbers for these shops are included in Table 6-3. Pacific County Emergency Management personnel could arrange for emergency generators from Joint Base Lewis-McChord if no other sources are available. No specific arrangements exist for securing an emergency generator, but daily, weekly, and monthly rentals are available. The Pacific County Public Utility District provides the electric power to the City and attempts to limit power loss to public water supply facilities. In order to remedy the potential loss of power for extended periods, the City intends on purchasing and installing an emergency generator at the WTP when funding is secured. Plans and specifications for the emergency generator were included in the WTP upgrade and expansion project; however, bids came in higher than available funding and the generator was removed from the project. Other water facility components that are affected by power failures include the City's three booster pump stations. Both of these facilities are not wired for generator hookup, so water service is not available until power is restored to these booster pump stations.

If appropriate, Water Shortage Response measures may be implemented. This may be necessary if the outage is prolonged and/or supply from Raymond is compromised.

Severe Earthquake

A severe earthquake could cause damage to the distribution system and water system facilities. In addition, communication and transportation systems may be interrupted.

If it is found that the earthquake has disrupted source flow, such as by damaging transmission lines or treatment facilities, the Raymond intertie will be activated. If supply from the intertie is also compromised, water shortage measures may be implemented, including notification of customers and public services.

**TABLE 6-4**  
**Earthquake Protocol**

System Component	Action
Distribution System: Distribution and transmission mains may be broken.	<ul style="list-style-type: none"> <li>• Check water system thoroughly for unexplained drops in pressure or reduction in flow rate.</li> <li>• Isolate broken sections and repair.</li> </ul>
Reservoirs: Reservoirs may be leaking or structurally damaged.	<ul style="list-style-type: none"> <li>• Check reservoirs for structural damage and drain if in danger of catastrophic failure.</li> <li>• Check reservoirs for cracks and leaks, and seal or drain as required.</li> </ul>
Water Treatment Plant: WTP may sustain damage.	<ul style="list-style-type: none"> <li>• Check WTP for structural damage.</li> <li>• Check disinfection and filtration system for obvious signs of damage and repair as necessary.</li> </ul>
Dams: Dams may be leaking or structurally damaged.	<ul style="list-style-type: none"> <li>• Check dams for structural damage.</li> <li>• Check reservoirs for cracks and leaks and repair as required.</li> </ul>

Severe Snowstorm

Heavy snowfall may impede motor vehicle traffic and City personnel may not be able to reach problem areas. Severe snowstorms will require the City’s personnel to clear driveway access to the WTP. Clearing of snow may also be required for access to the raw water dams, raw water transmission mains, and finished water reservoirs should access be necessary. However, severe snowstorms should not otherwise affect the operation of the water system.

**TABLE 6-5**

**Snowstorm Protocol**

<b>System Component</b>	<b>Action</b>
Distribution System: Transportation to monitor system and make repairs will be limited.	<ul style="list-style-type: none"> <li>• Plow streets if necessary and if equipment is available.</li> <li>• Have chains and other snow gear ready for maintenance equipment and vehicles.</li> <li>• Valve locations will be kept current and made available for maintenance personnel.</li> </ul>
Raw Water Dams and Transmission Mains: No immediate effect. Snow may limit access.	<ul style="list-style-type: none"> <li>• Plow for vehicle access, if required.</li> </ul>
Reservoirs: No immediate effect. Snow may limit access.	<ul style="list-style-type: none"> <li>• Plow for vehicle access, if required.</li> </ul>
Water Treatment Plant: No immediate effect. Snow may limit access.	<ul style="list-style-type: none"> <li>• Plow for vehicle access, if required.</li> </ul>

Temperatures Below Freezing

Temperatures at or below freezing can seriously jeopardize the entire water system. During extended freezing periods, if higher water velocities are not maintained, freezing can occur in pipes. This condition can lead to reduced flow and pipe bursting. In the past, prolonged freezing temperatures have led to inaccurate reservoir levels being transmitted to the WTP. This condition was the result of water freezing within the pressure sensor. This was corrected by insulating the sensor in the meter box adjacent to the reservoir.

**TABLE 6-6**

**Freezing Temperature Protocol**

<b>System Component</b>	<b>Action</b>
Distribution System: Ductile iron and PVC pipes may freeze and burst.	<ul style="list-style-type: none"> <li>• Maintain adequate flow to deter freezing in water mains.</li> </ul>

Fire

An extensive prolonged fire in the City may result in low distribution system pressures for the system and drawdown of the City’s reservoirs.

**TABLE 6-7**

**Fire Protocol**

<b>System Component</b>	<b>Action</b>
Transmission and Distribution System: Low pressure may result in the extremities of the distribution system experiencing low pressures depending on the extent of the fire demand. Potential for backflow events is increased.	<ul style="list-style-type: none"> <li>Generally, no action necessary. If fire is extreme, eliminating other water uses may be appropriate. After fire event take distribution coliform samples to assure contamination has not occurred due to backflows.</li> </ul>
Reservoirs (finished water)	<ul style="list-style-type: none"> <li>Check water levels to ensure adequate levels are being maintained.</li> </ul>

High Water and Flooding

Heavy snowmelt and/or rains cause the water level to rise and reach a flood level. High water and flooding should not affect the water system as all facilities are above the Willapa River floodplain except for portions of the distribution system. High water or flooding on Electric Light and Martin Creeks may require the Water Treatment Plant to shut down due to high turbidity.

**TABLE 6-8**

**Flooding Protocol**

<b>System Component</b>	<b>Action</b>
Distribution System	<ul style="list-style-type: none"> <li>Check routine coliform levels throughout distribution system.</li> <li>Check water mains which cross flooded streams.</li> </ul>
Source Water	<ul style="list-style-type: none"> <li>Excessive high turbidity may require the Water Treatment Plant to temporarily shut down, possible use of City of Raymond intertie.</li> </ul>
Reservoirs (finished water): No effect. Reservoirs are above flood level.	<ul style="list-style-type: none"> <li>No action is necessary.</li> </ul>

Contamination of Water Supply

Contamination of a water supply may result from main breaks or pollution from an isolated source. The City of South Bend reports to the Office of Drinking Water (ODW) if more than ten customers are out of water or if positive pressure was not maintained when the break occurred. Depending on the severity of the event and the threat to human health, a determination will be made whether a Health Advisory will be issued.

Additionally, contamination of the water supply could occur through an event in one or both of the City’s watersheds. Continuous chlorination and an adequate detention time are the best protection should a bacteriological contamination occur. A chemical spill, should one occur, presents a less likely, but much more serious problem. The best available method of protecting the water supply is through education of the property owners and by limiting access to the greatest extent possible. The City will discuss these potential problems with the landholders within the Electric Light and Martin Creek watersheds and pursue a Memorandum of Understanding (MOU) regarding restricting access and activities. Access is already restricted with a locking gate at each watershed entrance. Both watershed boundaries are posted with signs, which identify them as public water supply watersheds. Video surveillance has been added at each watershed.

**TABLE 6-9**

**Contamination Protocol**

<b>System Component</b>	<b>Action</b>
Distribution System	<ul style="list-style-type: none"> <li>• Close valves if possible to isolate source.</li> <li>• Repair and or remove source of pollution.</li> <li>• Flush previously contaminated section and test until free of contamination prior to resumption of use.</li> </ul>
Reservoirs (finished water)	<ul style="list-style-type: none"> <li>• Resample to confirm contamination.</li> <li>• Check distribution system for presence of contamination.</li> <li>• Isolate reservoir from system.</li> <li>• Inspect vent screens, hatches, and piping to identify source of contamination.</li> </ul>
	<ul style="list-style-type: none"> <li>• If reservoir water is contaminated and therefore considered unsuitable for consumption, drain and clean reservoir.</li> <li>• Consider disinfecting reservoir if bacteriological standards are exceeded. Follow AWWA Standards.</li> </ul>

## **SAFETY PROCEDURES**

An important consideration of any successful operation and maintenance program is the safety of the employees. The City's safety program is in compliance with the Occupational Safety and Health Administration (OSHA) and the Washington State Department of Labor and Industries (L&I). The safety program addresses the situations that employees may encounter during the performance of operation and maintenance tasks.

Safety training is mandated by the City for all of its employees. Emergency training includes CPR and First Aid. In addition, since multiple major system components are either located in a vault below grade or are reservoirs, Confined Space Entry procedures are followed whenever these system components are entered. Trench safety procedures are followed during any water distribution main repair or replacement.

### **Potential Work Place Hazards**

Potential work place hazards include confined space entry for reservoir maintenance and construction related activity.

#### Confined Spaces

The principal hazards associated with confined spaces, including valve vaults and reservoirs, are oxygen deficiency, explosions, and toxic gases. Oxygen deficiency occurs whenever air is displaced by some other gas, which may or may not be toxic. The Washington State Department of Labor and Industries (L&I) has established regulations governing entrance into confined spaces in WAC 296-809. The regulations include the completion of a Confined Space Entry Permit, the establishment of Safe Operating Procedures, and the completion of a Confined Space Pre-Entry Checklist.

Construction activities such as water main replacement need to address the following issues.

- Standard excavation safety procedures
- Standard operating procedures for working in street rights-of-way
- Excavation, trenching, and shoring
- Head protection
- Foot protection
- Flagger clothing, equipment, signals, rules of conduct
- Sign placement
- Channelization

## **Safety and First Aid Equipment**

Employee and public safety is of paramount importance to the City. All employees of the City are trained in CPR and First Aid. All City vehicles are equipped with standard First Aid kits. The City maintenance shop and Water Treatment Plant is equipped with First Aid equipment.

Other important safety equipment includes signage that alerts the public of construction taking place along roadsides.

## **CROSS-CONNECTION CONTROL (CCC) PROGRAM**

### **Cross-Connection Control**

Water utility purveyors have the responsibility to protect customers from water contamination due to cross-connections, as required by WAC 246-290-490. A cross-connection is any physical arrangement where the potable water supply is connected, directly or indirectly, to any liquid, gas, or solid of unknown or unsafe quality that may contaminate the public water supply through backflow. The regulation also requires utilities to develop and implement a comprehensive program to control cross-connections within the system. An acceptable cross-connection control program addresses the following elements:

- Adoption of an appropriate ordinance, code or rule-of-service for the purveyor to establish the legal authority to implement the cross-connection control program.
- Written procedures for implementing the cross-connection control program.
- Identification of a staff position responsible for the organization and implementation of the cross-connection control program.
- Establishment of the qualifications necessary for the personnel working in the cross-connection control program. Detailed procedures for conducting surveys of new and existing facilities to identify all existing and potential cross-connections that could result in contamination of the distribution system.
- Requirements that only approved backflow assemblies shall be installed at locations where cross-connection protection is required.
- A procedure or system requiring testing of all backflow prevention assemblies upon installation, annually, and when moved or repaired.

- An adequate recordkeeping system.
- Customer information and public education regarding the cross-connection control program.

#### Water System Cross-Connection Control Program

The City adopted Ordinance No. 1312 on April 12, 2004, which protects the health of the water consumer and the potability of the water in the distribution system. In addition, it allows for the inspection and regulation of all actual or potential cross-connections between potable and non-potable systems in order to minimize the danger of contamination or pollution of the public potable water supply. No water service connection to any premises shall be installed or continued in use and no water service shall be provided by the City unless the City's water supply is protected by backflow prevention devices as may be required by Washington Administrative Code 246-290. Ordinance No. 1312 is included in Appendix I.

The City's Cross-Connection Control Program establishes minimum standards for the City to protect the public potable water supply from possible contamination due to cross connections. The Program addresses authority, responsibility, requirements, administrative procedures, minimum requirements, record keeping, and standard forms and letters.

The City's Cross-Connection Control Specialist, Mr. Chris Orkney conducts plan reviews, surveys existing and new customers, and interacts with customers to educate and deal with compliance issues. In addition, the Cross-Connection Control Specialist is in charge of record management, investigates backflow incidents, and manages backflow testing and repair. Typically, Ms. Ashley Orkney performs the backflow testing and repair for the City. The City keeps a database of cross-connection control devices on file in their computer network. The following records are included in these files:

- Date of inspection
- Results of inspection
- Recommended protection
- List of approved assemblies
- Test and maintenance reports
- List of certified testers
- Customer account number, billing address, service address, phone numbers, device history, and maintenance records

The City's cross-connection control program was implemented by identifying a priority list of services considered potentially hazardous to the water system in the event of back siphonage within the distribution system. An inspection of the premises was conducted by City staff to evaluate the existing hazard. The inspection established the level of potential hazard and the protection required. Recommendations were then prepared by

the City as to what type of cross-connection control devices, if any, were required. A copy of the letter, together with a time frame for compliance, was sent to the customer. A City staff member resurveyed the premises at the end of the scheduled time period to verify compliance.

New and existing cross-connection control devices are catalogued and checked initially by City staff. An identification tag is attached to the device. It is the responsibility of the customer to ensure proper testing of the devices annually thereafter. Annual testing results for the devices are recorded and included in the City's database. A condition for new service includes an evaluation by City staff of the need for a backflow device. In the event of a backflow incident, the City will check the status of the backflow preventer and conduct repairs if necessary. The type of backflow will be identified to determine if bacteriological or chemical sampling is necessary.

The City utilizes the software, Master Cross Connection Control Program, which is produced by Water Resources Management, Inc. The software allows the City to maintain a record of all necessary information on each backflow assembly, track the test schedule for each location, generate testing requirement letters to customers, generate violation notices, maintain records of facility surveys, and generate reports on the status of the program.

## **CUSTOMER COMPLAINT RESPONSE PROGRAM**

### **Complaint and Response Recordkeeping**

The City has adopted a form that customers can use to make formal complaints. This form is available at the City Hall. The City has developed a written procedure for handling complaints. The procedure involves all billing complaints being handled by the City staff. The complaint is addressed and a note of response is made on the complaint form. All forms are kept on file at City Hall and the Water Treatment Plant. Similarly for water quantity, pressures and quality complaints, the complaint form is passed on to the Lead Water System Operator for response. If the customer is not satisfied with the response, the complaint is taken to the Clerk-Treasurer at City Hall. If the resolution is not acceptable to the parties involved, the complaint is taken to the City Council at the next regularly scheduled meeting.

## **RECORDKEEPING AND REPORTING**

### **Recordkeeping Procedures**

The City keeps water system records for water quantity purchased and sold, water quality, and cross-connection data at City Hall and the Water Treatment Plant. Bacterial analysis results are kept for a minimum of 10 years. Chemical analysis results are kept for as long as the system is in operation. Records of customer use and water quality records are maintained for a minimum of 10 years. Construction documents, project

reports, and any DOH approvals are maintained for the life of the system. Reporting to DOH shall be in accordance with WAC 246-290-480. This requires reporting of:

- Monthly reports before the 10th of the following month
- MCL violation within 48 hours
- Updated WFI on an annual basis
- Bacteriological presence in accordance with WAC 246-290-480 (2)(f)
- Disinfection byproducts in accordance with WAC 246-290-300 (7) as specified in 40 CFR 141.134
- Copy of all water quality testing results required by the WAC

## **OPERATION & MAINTENANCE IMPROVEMENTS**

### **O&M Improvements Recommendations**

As noted in the beginning of this chapter, the City has qualified personnel to operate and maintain the water system. The City will need to support staff in maintaining their certifications through continual training programs, as required by the certifying organization.

Routine and preventive maintenance requires substantial labor. Items such as valve exercising and meter testing and replacement are typically activities that are neglected in the course of operating a water system. The City allocates sufficient time and effort for routine and preventative maintenance, which allows the staff the opportunity to foresee and address problems before they become emergencies.

The single most vulnerable component of the City water system is its sources/watersheds. The most significant operation and maintenance improvement that could be made to the system is to improve the system reliability. This will be accomplished by:

1. Remove debris and silt from behind Electric Light Creek raw water dam. In order to improve access for future cleaning, the drain lines/valves at the base of the dam should be routinely exercised and drained of sediment.
2. Remove debris and silt from behind Martin Creek raw water dam.
3. If one of the existing raw water sources becomes unusable due to an unforeseen catastrophic event, the City has explored the following option:
  - Developing an additional water source. This would include the additional surface water source, Fliess Creek. The City has existing water rights on the East and West Branches of Fliess Creek. In 2009, the City completed the Fliess Creek Feasibility Study that recommended options and the costs associated with reactivation of this source for City use.

4. The City will install an emergency generator at the Water Treatment Plant, which is necessary to keep the WTP operational during power outages. The City has approved plans and specifications for the emergency generator and is seeking funding to purchase and install the generator.

### **Financial Impact of recommended improvements**

The financial impact of the above-recommended improvements is addressed in Chapters 8 and 9 of this document. Chapter 8 discusses the costs and alternatives and Chapter 9 addresses the methods available to finance the improvements and makes recommendations of which financing program is best suited for the customers of the City water system.

## CHAPTER 7

# DISTRIBUTION FACILITIES DESIGN AND CONSTRUCTION STANDARDS

### OBJECTIVE

The objective of this chapter is to document the City's design and construction standards to allow the City to obtain DOH approval to utilize the alternative review process for construction of new and replaced water distribution facilities. Through this process, a purveyor needs no further approval from DOH for distribution project reports, construction documents, or installation of distribution mains, pipe linings, and tank coatings.

This chapter includes the following elements:

- System Standards, Policies and Procedures
- Project Review Procedures
- Design and Construction Standards
- Construction Certification and Follow-up Procedures

The City's *Water System Standards* are located in Appendix C.

### SYSTEM STANDARDS, POLICIES AND PROCEDURES

The City has developed a *Water System Standards* document to govern any improvements within the public right-of-way and/or public easements, all improvements required within the proposed right-of-way of new subdivisions, and all improvements intended for maintenance by the City.

### PROJECT REVIEW PROCEDURES

Project review procedures vary with the level of complexity of the anticipated project. In general, distribution projects identified in a Water System Plan do not require DOH review. Any distribution projects beyond those identified will require DOH review and approval.

The City and the City's consulting engineer review all distribution improvements and replacements during the design phase. This review will ensure the project is in compliance with the City's *Water System Standards*. During construction, the City's personnel or designee will make site visits to ensure the project is constructed in accordance with the plans and specifications. Any changes from the City's *Water System Standards* will require written approval from the City Supervisor. A Construction Report

for Public Water System Project form shall be submitted to the City Supervisor within 60 days of completion and prior to use of the installation. The report shall state that the project was constructed in accordance with the plans and specifications.

Connection of additional water customers will be requested on an on-going basis as the City grows. Reviews for new customers will be done through the City's water service application process. The City Supervisor, Lead Water Operator, Public Works Lead, and Cross-Connection Control Specialist will be involved in the review process. The City Supervisor's review will ensure it is consistent with the planning goals of the City and County, as necessary. The Lead Water Operator will review the application for water availability according to the system's Operating Permit, the water main extension requirement, if any, and to ensure anticipated water use is consistent with water system guidelines. The City's Cross-Connection Control Specialist will review the application for water use and its cross-connection potential. Prior to the construction of the service connection, the Specialist will review the backflow prevention assembly, if one is required, for compliance with Cross-Connection requirements.

## **DESIGN AND CONSTRUCTION STANDARDS**

Design and construction of water facilities are to be in accordance with the design standards in Chapter 3 of this Water System Plan and the City *Water System Standards* that are included in Appendix C. These standards are to be followed for any water facility design and construction project.

## **CONSTRUCTION CERTIFICATION AND FOLLOW-UP PROCEDURES**

During the construction of any water facility, the City will have a representative conduct periodic site visits. The representative will report progress and any variance from the construction documents to the consulting engineer responsible for construction management. Additionally, the representative will be present for all pressure tests, disinfection procedures and water quality sampling, as defined in the Standards. In the future, the City may want to consider requiring the developer to hire an on-site representative to be present a minimum of four hours per day in addition to the testing and disinfection procedures.

Upon completion of the project, the engineer responsible for construction management will complete a Construction Report for Public Water System Projects form and submit it to DOH. This form is the Engineer's certification that the project was completed in conformance with the plans, specifications and City Standards. Additionally, the construction manager shall prepare record drawings and submit to the City for their project files.

## **CHAPTER 8**

### **CAPITAL IMPROVEMENT PROGRAM**

#### **OBJECTIVE**

The objective of this chapter is to present the City of South Bend’s Capital Improvement Program, which is composed of projects to address deficiencies identified in the previous chapters. These improvements are assessed and prioritized for implementation over the 10- and 20-year planning periods. The Capital Improvement Program has been developed in conjunction with the financial capabilities and recommendations presented in Chapter 9, Financial Program.

This chapter includes capital improvement projects for source of supply, storage, distribution, and other identified capital and non-capital improvements. The chapter provides an assessment of alternatives including a cost analysis, identifies the preferred alternatives for each project, recommends a schedule for the improvements, and identifies available funding sources.

#### **CAPITAL IMPROVEMENT PROGRAM**

Table 8-1 summarizes the proposed capital improvement projects for the 10-year planning period. All cost estimates discussed in this chapter are in January 2024 dollars.

#### **SOURCE OF SUPPLY**

As described in Chapters 1, 2, and 3, the City currently has sufficient water rights to meet water system demands for the 20-year planning period. However, the City’s Electric Light and Martin Creek surface water sources, in times of drought or in the event of watershed degradation, may be unsuitable to supply the needs of residents and businesses of the City. The combinations of flows from both creeks have, in the past, lacked sufficient flows to support the peak water demands during prolonged dry periods.

Additional source capacity should be added to the system to provide needed redundancy and reliability. The City completed the Fliess Creek Feasibility Study in 2009 that analyzed various options to reactivate water sources that have not been utilized due to costly infrastructure repairs. The Study’s recommended alternative is to construct a diversion structure at the confluence of the West and East Branches of Fliess Creek and utilize existing rights-of-way to construct a new buried pipeline to the Water Treatment Plant (WTP) along Airport Road. This alternative utilizes a Tyrolean weir or a modified Ranney well as the method of diversion or intake.

It should be noted that funding for drinking water projects by agencies that typically finance Public Works projects defer to the Washington State Department of Health (DOH) for their concurrence. DOH has stated in the past that adding another source will increase system reliability but does not address the South Bend water system's significant distribution system leakage (DSL). The water system's DSL has consistently averaged around 50 percent for over 35 years.

The following projects have been identified to improve the City's source reliability and redundancy. Locations of individual projects are indicated in Figure 8-1.

### **SO-1: Point of Diversion of Water Rights Change (2026)**

The City plans to submit a Point of Diversion of Water Rights Change application to change the point of diversion to the confluence of the West and East Branches of Fliess Creek. The Department of Ecology will have to approve the diversion at the confluence of the West and East Branches of Fliess Creek because the water right specifically identifies each Branch separately. The advantage of siting the diversion at the confluence allows the City to have access to the flow of both stream branches at the same location, which is a significant advantage during times of high demand, emergencies, or significant degradation of either watershed.

The submittal of the *Application for Change of Point of Diversion* to Ecology is \$50. In recent years, two approaches have been added to provide applicants with timelier water right changes than Ecology would otherwise be able to provide, given staffing limitations. These approaches include:

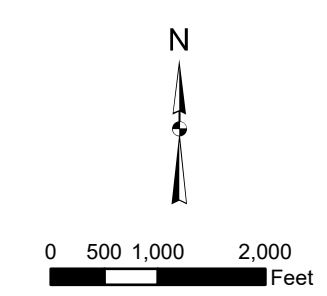
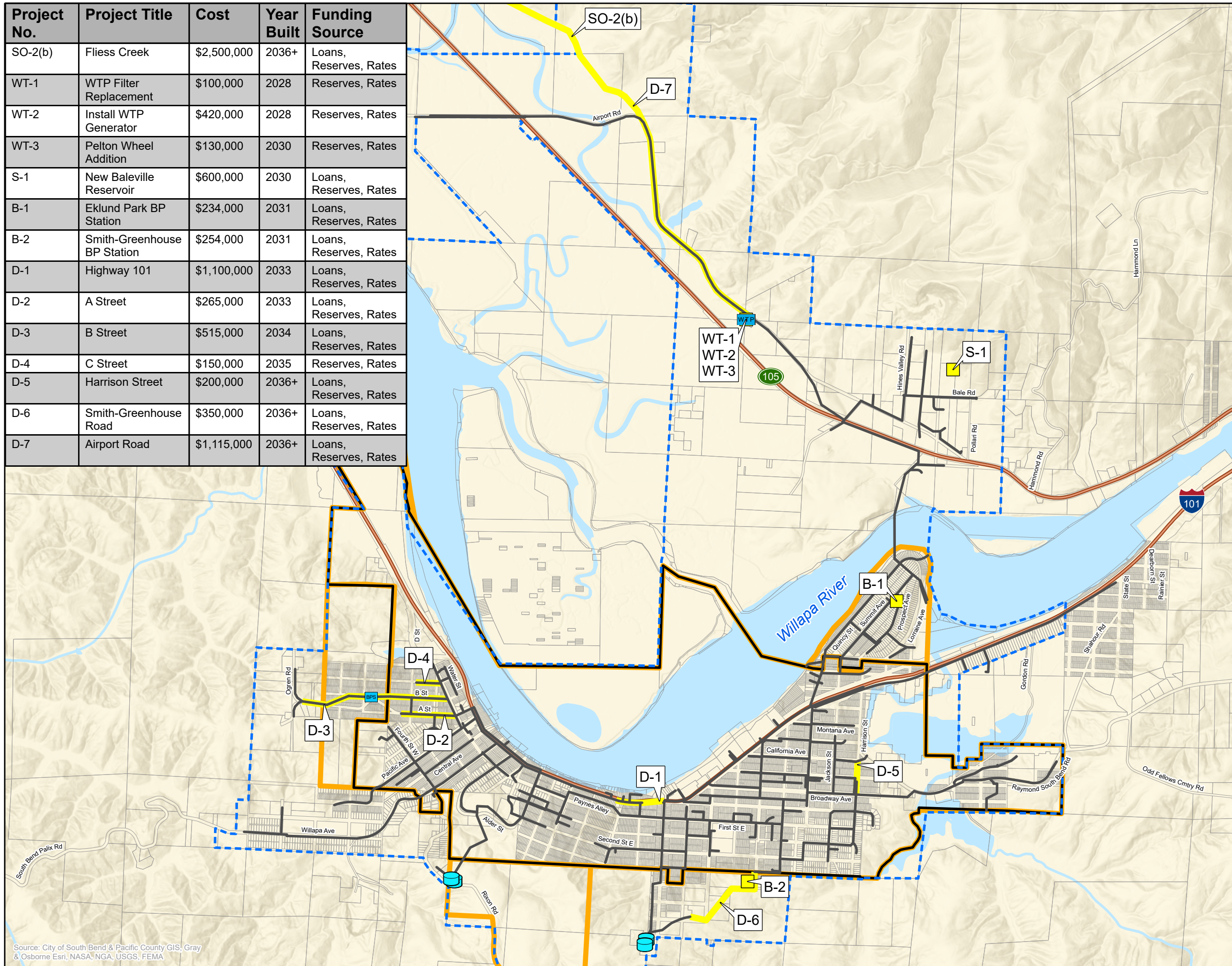
- **Water Conservancy Boards** that can process water right transfer and change applications, including generating the Report of Examination (ROE), at the local level. Board-generated ROEs are submitted to Ecology for final review within an accelerated timeframe. There are currently 21 Boards operating throughout the state. Currently however, there is not a Water Conservancy Board in Pacific County.
- **Cost Reimbursement Contracting** which allows you to pay for the cost of processing the application yourself, and any senior applications ahead of yours in the processing line, in order to allow Ecology to get to your application. Currently, in Water Resource Inventory Area (WRIA) 24 there are a total of 15 current water right change applications pending with Ecology.

Depending on the number of applications that would need to be processed prior to the change application for the City, the cost of this project could vary significantly.

**Estimated Project Cost: \$30,000**

Project No.	Project Title	Cost	Year Built	Funding Source
SO-2(b)	Fliess Creek	\$2,500,000	2036+	Loans, Reserves, Rates
WT-1	WTP Filter Replacement	\$100,000	2028	Reserves, Rates
WT-2	Install WTP Generator	\$420,000	2028	Reserves, Rates
WT-3	Pelton Wheel Addition	\$130,000	2030	Reserves, Rates
S-1	New Baleville Reservoir	\$600,000	2030	Loans, Reserves, Rates
B-1	Eklund Park BP Station	\$234,000	2031	Loans, Reserves, Rates
B-2	Smith-Greenhouse BP Station	\$254,000	2031	Loans, Reserves, Rates
D-1	Highway 101	\$1,100,000	2033	Loans, Reserves, Rates
D-2	A Street	\$265,000	2033	Loans, Reserves, Rates
D-3	B Street	\$515,000	2034	Loans, Reserves, Rates
D-4	C Street	\$150,000	2035	Reserves, Rates
D-5	Harrison Street	\$200,000	2036+	Loans, Reserves, Rates
D-6	Smith-Greenhouse Road	\$350,000	2036+	Loans, Reserves, Rates
D-7	Airport Road	\$1,115,000	2036+	Loans, Reserves, Rates

- Capital Improvement Project**
- Facility Project
  - Distribution Project
- Water System**
- Pump Station
  - Reservoir
  - Water Treatment Plant
  - Existing Water Main
- Reference**
- Highway
  - Retail Service Area
  - Urban Growth Area
  - City Limits
  - Parcel
  - Surface Water



**CITY OF SOUTH BEND**  
 WATER SYSTEM PLAN  
**FIGURE 8-1**  
**CAPITAL IMPROVEMENT PLAN**

**Gray & Osborne, Inc.**  
CONSULTING ENGINEERS

Source: City of South Bend & Pacific County GIS; Gray & Osborne Esri, NASA, NGA, USGS, FEMA

**SO-2(a): Fliess Creek Alternative Source Project Report (2027)**

Assuming the *Application for Change* is successful; the City will submit a Project Report, as required by DOH, detailing the intake structure at the confluence of the West and East Branches of Fliess Creek as well as the design of the transmission main to the WTP. In addition, this Report will include a siting study for the intake and a water quality study of the raw water source to ensure compatibility with the treatment processes currently available at the WTP. The Project Report will fulfill all the DOH requirements under WAC 246-290-110.

**Estimated Project Cost: \$50,000**

**SO-2(b): Fliess Creek Alternative Source Project (2036+)**

Following approval of the Project Report and the required permitting, the City will proceed with design and construction of the intake structure at the confluence of the West and East Branches of Fliess Creek and the raw water transmission main from the diversion structure to intersection of the Electric Light Creek raw water main. The raw water transmission main is estimated to be approximately 2,000 linear feet (lf) and will require a booster pump station downstream from the diversion. The booster pump station will require an extension of electrical power to the site and a telemetry system to activate the pump(s).

**Estimated Project Cost: \$2,500,000**

**SO-3: Watershed Land Acquisition (2026)**

The City may have the opportunity to acquire grant funds through an EPA Water Source Protection Grant, which would be used to purchase the land in the watershed. Ownership of a watershed can make it easier for a water system to protect and monitor source water quality. The City estimates that purchasing a total area of up to 650 acres in the watershed will provide a significant benefit to the source water protection program. The land would be purchased over time as funding is acquired. The land is currently owned as timber resource land by private timber companies. Estimated cost is based on Washington's 2025 Forest Land Values.

**Estimated Project Cost: \$130,000**

**WATER TREATMENT IMPROVEMENTS**

**WT-1: WTP Filter Replacement (2028)**

The WTP has three microfiltration banks of filters that are on a rotating schedule for replacement. The manufacturer's recommendation is filter replacement every 6 years. Filters were replaced on two banks and the third bank was installed with a new filter skid,

all in 2022. Replacement of the filter banks will be staggered. The first filters are due for replacement in 2028, then in 2030 and 2032.

**Estimated Project Cost: \$100,000 from 2028 to 2032**

**WT-2: Install WTP Generator (2028)**

The City plans to install a 45-kW diesel generator to supply power to the WTP when the normal power supply is interrupted.

**Estimated Project Cost: \$420,000**

**WT-3: Pelton Wheel Addition (2030)**

The City plans to install a second Pelton wheel at the WTP that will extract energy from the impulse of moving water from the City's raw water sources entering the WTP from their respective impoundments. The energy generated will be used as a power source for the WTP and/or be sold to Pacific County Public Utility District.

**Estimated Project Cost: \$130,000**

**WATER STORAGE IMPROVEMENTS**

Table 3-13 indicates that the City will have a storage surplus through the 20-year planning period.

The four storage facilities are in excellent condition. The Rixon Road welded steel reservoir had both its interior and exterior recoated in 2008. A thorough inspection of the recoated tank is scheduled to be conducted in 2025. The glass-fused coatings of the other three reservoirs, only visual inspections will be conducted at a frequency of once every 2 years. If during those visual inspections, a defect or potential reason for concern is discovered, a more thorough inspection will be scheduled.

**S-1: Construct New Reservoir in Baleville (2030)**

The City has discussed the possibility of constructing a reservoir on the north side of the Willapa River in the area referred to as Baleville. As described in Chapter 1, the WTP is separated from the majority of the system's customers by the Willapa River. In addition, all existing reservoirs are located on the south side of the Willapa River. The City has some concern that residents on the north side of the Willapa River could be impacted if the potable water transmission main crossing under the Willapa River was damaged. By constructing a reservoir on the north side of the river, residents in that area would be assured service if the transmission main crossing the Willapa River were compromised. The WTP could still easily supply the water demand for Baleville and maintain system

pressure; however, with so few services and the limited distribution system on the north side of the Willapa River, it would be difficult to regulate WTP operation.

To improve system reliability, the City plans to construct a new 200,000-gallon reservoir on the north side of the Willapa River in the Baleville area. The final size and construction material of the reservoir will be determined in a Predesign Report, which is planned for 2027.

**Estimated Project Cost: \$600,000**

## **BOOSTER PUMP STATION IMPROVEMENTS**

Booster pump station deficiencies were identified and improvements were recommended in Chapter 3. The proposed booster pump stations are meant to improve service and maintain adequate pressures to current and new customers in Eklund Park and in the Smith-Greenhouse Road areas. These projects were originally developed in 2008 but have not yet been implemented.

### **B-1: Eklund Park Booster Pump Station (2031)**

The booster pump station will be placed on an 8-foot by 8-foot by 6-inch reinforced slab and have a prefabricated fiberglass enclosure with heating and ventilation. The pump station will be equipped with a low suction cut out switch (proposed to be 20 psi), a discharge pressure switch, flow meter, suction and discharge header pressure gages, a hydropneumatic tank, electrical controls, alarm, and two 2-hp pumps each capable of 70 gpm at 60 feet TDH. The footprint of the booster pump station is small in size and will be located within the public right-of-way.

**Estimated Project Cost: \$234,000**

### **B-2: Smith-Greenhouse Booster Pump Station (2031)**

The booster pump station will be placed on an 8-foot by 8-foot by 6-inch reinforced slab and have a prefabricated fiberglass enclosure with heating and ventilation. The pump station will be equipped with a low suction cut out switch (proposed to be 20 psi), a discharge pressure switch, flow meter, suction and discharge header pressure gages, a hydropneumatic tank, electrical controls, alarm, and two 5-hp pumps each capable of 60 gpm at 180 feet TDH. The footprint of the booster pump station is small in size and will be located within the public right-of-way.

**Estimated Project Cost: \$254,000**

## **WATER DISTRIBUTION SYSTEM IMPROVEMENTS**

Distribution system deficiencies were identified and improvements were recommended in Chapter 3 based on hydraulic modeling. Distribution improvements are generally classified into three major categories: Repair/Replacement, Hydraulic Improvements, and Water Main Extensions. All distribution system improvements consist of Hydraulic Improvement projects. Since the City typically experiences multiple distribution system line breaks each year, a fund will be maintained for annual repairs and/or replacement of distribution lines.

Lengths of water mains to be replaced were estimated from the water system base map. Actual lengths required may vary when design surveys are performed. Following are the recommended distribution system improvements:

### **D-1: Highway 101 Between Kendrick and Weir Streets (2033)**

The City plans to replace the major transmission water main that separates the east and west sides of the City in Highway 101. The existing 10-inch steel water main is shallow-bury and has been a source of leaks that are very difficult to repair in the busy Highway 101 roadway. In 2010, this water transmission main experienced a major break and the City installed an emergency secondary water main of smaller diameter (8 inch) in the alley immediately adjacent and south of Highway 101 in the only other road that connects the City's two halves. This alternate water main is too small to serve either side of the City independently but is critical in maintaining two water transmission routes, which is essential to supplying potable water to both sides of the City. The proposed project will replace the 10-inch steel water main with approximately 1,100 lineal feet new 12-inch PVC water main.

**Estimated Project Cost: \$1,100,000**

### **D-2: A Street (2033)**

The City plans to replace approximately 800 linear feet of 4-inch water main and 200 linear feet of 3-inch water main with new 8-inch PVC water main along A Street from First Street to its terminal end. The existing 4- and 3-inch water main is undersized for providing fire flows in the area. It is possible that the City could undertake this project themselves and realize a significant cost savings. However, for planning purposes the estimated cost is what could be expected from a competitive bidding process.

**Estimated Project Cost: \$265,000**

**D-3: B Street (2034)**

The City plans to replace approximately 2,000 linear feet of 6-inch water main with new 8-inch PVC water main along B Street from First Street to its terminal end. The existing 6-inch water main is undersized for providing fire flows in the area. It is possible that the City could undertake this project themselves and realize a significant cost savings. However, for planning purposes the estimated cost is what could be expected from a competitive bidding process.

**Estimated Project Cost: \$515,000**

**D-4: C Street (2035)**

The City plans to replace approximately 450 linear feet of 3-inch water main with new 8-inch PVC water main along C Street from First Street to its terminal end. The existing 3-inch water main is undersized for providing fire flows in the area. It is possible that the City could undertake this project themselves and realize a significant cost savings. However, for planning purposes the estimated cost is what could be expected from a competitive bidding process.

**Estimated Project Cost: \$150,000**

**D-5: Harrison Street (2036+)**

The City plans to replace approximately 500 linear feet of 3-inch water main with new 8-inch PVC water main north along Harrison Street from its intersection with Broadway Avenue to California Avenue. The existing 3-inch water main is undersized for providing fire flows in the area. It is possible that the City could undertake this project themselves and realize a significant cost savings. However, for planning purposes the estimated cost is what could be expected from a competitive bidding process.

**Estimated Project Cost: \$200,000**

**D-6: Smith-Greenhouse Road (2036+)**

The City plans to install approximately 1,500 linear feet of 6-inch PVC water main to service the homes within the Smith-Greenhouse Booster Pump Station area. Included are valves, service connections, and a blowoff at the line termination.

**Estimated Project Cost: \$350,000**

**D-7: Airport Road – Raw Water Main (2036+)**

The City plans to replace approximately 5,000 linear feet of 10-inch asbestos cement (AC) raw water main with 10-inch PVC raw water main between the Electric Light Creek dam at the intersection of Airport Road and the Water Treatment Plant. Included are valves, fittings, and a blowoff assembly.

**Estimated Project Cost: \$1,115,000**

**MISCELLANEOUS PROJECTS**

**M-1: Leak Detection and Repair Program**

The City will continue to identify and replace older or defective water mains and service lines within the system through its ongoing leak detection – repair/replacement program. This is an annual ongoing program.

The City will continue to improve on record keeping of unmetered water uses, and replacement of older, under-registering water meters. The City will pursue either a water meter calibration and/or replacement program.

**Estimated Project Cost: \$10,000 annually**

**M-2: Consumer Confidence Report**

Production of the annually required Consumer Confidence Report (CCR). The report includes information on the system’s water quality, water system assessment, and contact information for the public. This is an annual ongoing program.

**Estimated Project Cost: \$1,500 annually**

**M-3: Water System Plan Update (2035)**

Water System Plans are required to be updated every 10 years.

**Estimated Project Cost: \$80,000**

**WATER USE EFFICIENCY PROJECTS**

**WUE-1: Program Promotion**

The City will perform public outreach including mailers of bill inserts as well as other forms of informing the public of water use efficiency. The City will review and evaluate the purchase and distribution of water conservation kits to meet its conservation goals in the future. Conservation kits vary with the quantity purchased but typically can be

purchased for approximately \$10 each. In addition, the City will further review adopting an inclining block rate structure instead of its current uniform block rate structure to assist in meeting its conservation goals. The estimated cost for program promotion includes printing, handling, postage costs, and the purchase of limited conservation kits.

**Estimated Project Cost: \$2,500 annually**

**CAPITAL IMPROVEMENT SCHEDULE**

The total estimated cost of the 10-year recommended capital improvements combined into respective project categories is summarized in Table 8-1 and totals \$8,233,000.

**TABLE 8-1**

**Summary of Capital Improvements**

<b>Project Category</b>	<b>Cumulative Cost</b>
Source of Supply	\$2,710,000
Water Treatment Plant	\$650,000
Booster Station Improvements	\$488,000
Water Storage Improvements	\$600,000
Distribution System Improvements	\$3,695,000
Miscellaneous	\$200,000
Water Use Efficiency	\$25,000
<b>Total</b>	<b>\$8,363,000</b>

The 20-year capital improvement plan includes projects to be completed within the next 20 years, but beyond the 10-year planning period. Capital improvements identified for the 20-year planning period are shown in Table 8-2, Capital Improvement Schedule.

**TABLE 8-2**

**Improvement Schedule**

No.	Project Title	Description	Cost Estimate <sup>(1)</sup>	Financing Source <sup>(2)</sup>	Year <sup>(3)</sup>
SO-1	Point of Diversion of Water Rights Change	Submit Point of Diversion of Water Rights Change Application to Ecology	\$30,000	Reserves, Rates	2026
SO-2(a)	Fliess Creek Alternative Source Project Report	Engineering project report for new diversion structure and transmission main from Fliess Creek(s) to the WTP	\$50,000	Reserves, Rates	2027
SO-2(b)	Fliess Creek Alternative Source Project	Design/construct the Fliess Creek diversion/transmission main to the WTP	\$2,500,000	Loan, Reserves, Rates	2036+
SO-3	Watershed Land Acquisition	Work with EPA on a Water Source Protection Grant, as recommended by EPA	\$130,000	EPA Grant	2026
WT-1	WTP Filter Replacement	Replace microfiltration banks of filters on a five year rotation cycle	\$100,000	Reserves, Rates	2028
WT-2	Install WTP Generator	Install a 45-kW generator at the WTP for reliability	\$420,000	Reserves, Rates	2028
WT-3	Pelton Wheel Addition	Install a second Pelton Wheel at the WTP to generate electricity	\$130,000	Reserves, Rates	2030
S-1	Construct a New Reservoir in Baleville	Construct a new reservoir 200,000-gallon reservoir to increase reliability	\$600,000	Loan, Reserves, Rates	2030
B-1	Eklund Park Booster Pump Station	Construct a two (2 hp each) booster pump station to increase local pressures	\$234,000	Loan, Reserves, Rates	2031
B-2	Smith-Greenhouse Booster Pump Station	Construct a two (5 hp each) booster pump station to increase local pressures	\$254,000	Loan, Reserves, Rates	2031
D-1	Highway 101 between Kendrick and Weir Streets	Replace 1,100 LF of 10-inch steel water main - Install 1,100 LF of 12-inch PVC water main	\$1,100,000	Loan, Reserves, Rates	2033
D-2	A Street	Replace 1,000 LF of 3 and 4-inch water main Install 1,000 LF of 8-inch PVC water main	\$265,000	Loan, Reserves, Rates	2033

**TABLE 8-2 – (continued)**

**Improvement Schedule**

<b>No.</b>	<b>Project Title</b>	<b>Description</b>	<b>Cost Estimate<sup>(1)</sup></b>	<b>Financing Source<sup>(2)</sup></b>	<b>Year<sup>(3)</sup></b>
D-3	B Street	Replace 2,000 LF of 6-inch water main Install 2,000 LF of 8-inch PVC water main	\$515,000	Loan, Reserves, Rates	2034
D-4	C Street	Replace 450 LF of 3-inch water main Install 450 LF of 8-inch PVC water main	\$150,000	Reserves, Rates	2035
D-5	Harrison Street	Replace 500 LF of 10-inch water main Install 500 LF of 8-inch PVC water main	\$200,000	Reserves, Rates	2036+
D-6	Smith-Greenhouse Road	Install 1,500 LF of 6-inch PVC water main	\$350,000	Loan, Reserves, Rates	2036+
D-7	Airport Road – Raw Water Main	Replace 5,000 LF of 10-inch AC raw water main - Install 5,000 LF of 10-inch PVC raw water main	\$1,115,000	Loan, Reserves, Rates	2036+
M-1	Leak Detection and Repair Program	Leak Detection leading to water main repair or replacement	\$10,000	Reserves, Rates	annually
M-2	Consumer Confidence Report	Annual CCR detailing the system’s water quality, water system assessment and contact information	\$1,500	Reserves, Rates	annually
M-3	Water System Plan Update	Required Update every 10 years	\$80,000	Reserves, Rates	2036+
WUE-1	Program Promotion	Public outreach, conservation kits, brochure mailers	\$2,500	Reserves, Rates	annually

(1) In 2024 dollars.

(2) Financing is anticipated to be completed by a combination of reserves, loans and rate increases necessary to make debt service on loans while retaining adequate reserves for emergencies. Grants will be pursued in all cases in conjunction with loans.

(3) Years are specified for projects to be financed by the City of South Bend.

# CHAPTER 9

## FINANCIAL PROGRAM

### OBJECTIVE

This chapter discusses the City of South Bend’s existing rate and fee structure as well as historical revenue and expenditure for the City’s water funds. The objective of this chapter is to analyze the City’s total costs of providing water service, review the current rate structure to ensure that the current or proposed adjusted rates are adequate to cover the costs of operation and maintenance, and ascertain the City’s financial capability to implement the 10-Year Capital Improvement Plan outlined in Chapter 8.

### FINANCIAL STATUS OF EXISTING WATER UTILITY

#### CURRENT WATER RATES

The City’s current water service rates became effective in March 2022 per the City of South Bend Municipal Code Chapter 13.05.010. The City has the right to adjust rates based on inflation each year on January 1<sup>st</sup>, though historically the City often keeps the same rates for several years. The City charges for water service on a monthly basis and charges a base service fee for all customers. Water use is charged based on the use of an equivalent residential unit (ERU). The City has defined one ERU as 4,500 gallons per monthly billing period. For surcharge purposes, ERUs are rounded to the nearest one-tenth. Water use is billed at a flat rate per 1,000 gallons, with the ERU surcharge beginning after the first 4,500 gallons. Note that this definition of an ERU is for billing purposes only and is separate from the definition of an ERU used elsewhere in this Plan. Table 9-1 summarizes the water rates for 2024.

**TABLE 9-1**

#### **2024 Water Rates**

<b>Description</b>	<b>Amount</b>
Service charge for all customers	\$40 per month
Surcharge per excess ERU <sup>(1)</sup>	\$12 per additional ERU
Commodity charge	\$4.89 per 1,000 gallons
Inactive connection charge	\$22.25 per month for inactive accounts

(1) For billing purposes, the City has established one ERU as 4,500 gallons per month.

The City does not differentiate by customer class or meter size; these rates are applied to all customers within the service area. The City provides support for eligible low-income customers in single-family housing by applying a 16 percent discount to the normal rates. At the average usage rate of 112 gpd per residential connection, the monthly bill for the average residential water account is \$54.67. The City does not increase water rates on a consistent basis. This is largely because the overall cost of utilities (including sewer) are already high, and the rate payers are largely low- to moderate-income. Therefore, it is difficult to pass rate increases on an annual or consistent basis.

Other fees related to water service are summarized in Table 9-2. These fees are meant to cover a variety of activities within the water system, such as connecting new service lines or maintaining infrastructure. In addition to the connection fee, all direct costs for all labor, materials, and equipment rental used in connecting the new service from the City main to the customer’s property line and restoring City right-of-way to its original condition are also the responsibility of the customer. These fees are established in the City of South Bend Municipal Code 13.05.005, -020, and -030.

**TABLE 9-2**

**2024 Water System Facility Charges**

Description	Charge
New service connection charge	\$1,600 inside City limits \$2,400 outside City limits
Rural service charge	\$5 per month for all customers outside of City limits
Booster pump systems charge	\$5 per month for all rural accounts served by high elevation booster pump systems

**HISTORICAL REVENUES AND EXPENSES**

The City maintains a Water Fund, which funds all water utility operations, maintenance, and capital improvements. The historical revenues and expenses from 2019-2023 are summarized in Table 9-3. Due to differences in year-to-year data presentation, some line items from the raw data have been consolidated. For example, “Intergovernmental” revenues include state excise tax revenues and grants. Expenditures under “Utilities” are related to the upkeep of the water system, including staff salaries, supplies, professional services, etc.

TABLE 9-3

## Summary of Historical Water Operating Fund Revenues and Expenses

	2019	2020	2021	2022 <sup>(1)</sup>	2023
Beginning	\$1,303,249	\$1,308,737	\$1,477,486	\$1,358,466	\$1,175,109
<b>Revenues</b>					
Water Sales	\$900,921	\$885,020	\$700,944	\$707,335	\$714,996
Grants and Loans	\$54,695	\$745,569	\$1,770,130	\$3,417,503 <sup>(2)</sup>	\$181,267
State Excise Tax	\$43,906	\$43,699	\$34,708	\$39,253	\$34,698
Misc	\$28,614	\$28,756	\$83,294	\$34,640	\$234,925
Total	\$1,028,136	\$1,703,044	\$2,589,076	\$4,198,731	\$1,165,886
<b>Expenditures</b>					
Salaries and Wages	\$237,023	\$247,477	\$278,939	\$231,566	\$294,386
Benefits	\$93,663	\$107,293	\$119,101	\$102,345	\$127,889
State Excise Tax	\$45,150	\$45,280	\$35,113	\$35,453	\$35,792
Materials and Supplies	\$62,278	\$68,530	\$117,933	\$100,607	\$29,669
Chemicals	\$9,407	\$7,580	\$7,002	\$7,996	\$21,650
Power	\$46,453	\$43,485	\$28,180	\$39,794	\$41,058
Professional Services	\$13,730	\$10,579	\$32,136	\$32,564	\$32,991
Repairs and Maintenance	\$24,039	\$31,335	\$56,474	\$30,145	\$15,357
Purchase from Raymond	\$13,713	\$3,047	\$0	\$0	\$235
Fuel	\$5,855	\$4,742	\$4,347	\$12,869	\$10,117
Communications	\$12,023	\$10,141	\$9,982	\$10,107	\$7,240
Insurance	\$25,413	\$25,200	\$35,238	\$37,823	\$40,408
Other <sup>(3)</sup>	\$13,766	\$7,464	\$18,563	\$16,178	\$12,462
Capital Expenses	\$224,949	\$810,468	\$1,837,322	\$986,415	\$186,225
Debt Service	\$195,215	\$146,448	\$145,238	\$2,680,344 <sup>(2)</sup>	\$252,137
Total	\$1,022,677	\$1,569,069	\$2,725,568	\$4,324,205	\$1,107,616
Ending	\$1,308,737	\$1,442,712	\$1,340,994	\$1,232,992	\$1,233,379

- (1) There was conflict between different financial records for 2022. Some line items have been estimated or modified to reconcile these issues.
- (2) City took on a new USDA loan to cover significant WTP improvements.
- (3) Consists of expenditures for boot allowance, sample testing, training and travel, subscriptions, certifications and permits, and any other miscellaneous expenses.

Note that some of the ending balances do not match the starting balance of the following year. Attempts were made to find the cause of these discrepancies based on the City's financial documentation, but it remains unclear. Due to the lack of information, we have chosen to present the raw data rather than attempt to reconcile these discrepancies. It seems likely that some corrections were made to financial records early in the following fiscal year.

The City holds one loan each from the Public Works Trust Fund, the Drinking Water State Revolving Fund, and the USDA Rural Development Water & Environmental Program. The payment schedules for 2024 to 2034 are summarized in Table 9-4.

**TABLE 9-4**

**10-Year Loan Schedule**

<b>Year</b>	<b>DWSRF Loan</b>	<b>PWTF Loan</b>	<b>USDA RD Loan</b>
2024	\$118,073.29	\$23,578.95	\$124,343.77
2025	\$117,494.50	\$22,947.38	\$124,343.77
2026	\$116,915.70	\$22,315.79	\$124,343.78
2027	\$116,336.91	\$21,684.22	\$124,343.78
2028	-	-	\$124,343.78
2029	-	-	\$124,343.77
2030	-	-	\$124,343.77
2031	-	-	\$124,343.77
2032	-	-	\$124,343.78
2033	-	-	\$124,343.78
2034	-	-	\$124,343.78
Remaining Principal	-	-	<b>\$2,384,548.55</b>

**FORECASTED FINANCIAL ANALYSIS**

The City is committed to maintaining balanced water and water reserve funds that can adequately support operations, maintenance, and capital improvements. This section includes forecast factors used for the financial projects, a summary of the 10-year capital improvement schedule, and 10-year revenue and expenditure forecasts for both the Water Fund and the Water Reserve Fund.

**PROJECTED REVENUES AND EXPENDITURES**

Future revenues have been projected based on a review of the historical financial data. Water sales have been projected to increase at the projected growth rate of the City, 0.2 percent. Water rates have been assumed to increase by 3 percent every other year to partially account for inflation, though the City has not historically increased rates on a consistent or year-to-year basis.

Expenditures are generally assumed to increase with inflation at a rate of 2 to 3 percent per year.

**TABLE 9-5**

**Projected Revenues and Expenditures (Without Capital Improvements)**

	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
Beginning	\$1,274,060	\$1,139,588	\$989,002	\$844,080	\$680,625	\$659,239	\$616,864	\$578,085	\$516,995	\$458,996	\$377,282	\$298,100
<b>Revenues</b>												
Rate Increase	-	-	3.0%	-	3.0%	-	3.0%	-	3.0%	-	3.0%	-
Water Sales	\$748,560	\$750,009	\$774,006	\$775,504	\$800,316	\$801,866	\$827,522	\$829,125	\$855,653	\$857,310	\$884,740	\$886,454
State Excise Tax	\$34,682	\$36,000	\$37,152	\$37,224	\$38,415	\$38,490	\$39,721	\$39,798	\$41,071	\$41,151	\$42,468	\$42,550
Misc <sup>(1)</sup>	\$18,000	\$18,000	\$18,000	\$18,000	\$18,000	\$18,000	\$18,000	\$18,000	\$18,000	\$18,000	\$18,000	\$18,000
<b>Total</b>	<b>\$801,242</b>	<b>\$804,010</b>	<b>\$829,158</b>	<b>\$830,729</b>	<b>\$856,732</b>	<b>\$858,356</b>	<b>\$885,243</b>	<b>\$886,923</b>	<b>\$914,724</b>	<b>\$916,461</b>	<b>\$945,207</b>	<b>\$947,003</b>
<b>Expenditures</b>												
Salaries and Wages	\$295,898	\$304,775	\$313,918	\$323,335	\$333,035	\$343,027	\$353,317	\$363,917	\$374,834	\$386,079	\$397,662	\$409,592
Benefits	\$126,813	\$130,618	\$134,536	\$138,572	\$142,729	\$147,011	\$151,422	\$155,964	\$160,643	\$165,463	\$170,426	\$175,539
State Excise Tax	\$41,168	\$42,403	\$43,675	\$44,985	\$46,335	\$47,725	\$49,157	\$50,631	\$52,150	\$53,715	\$55,326	\$56,986
Materials and Supplies	\$32,043	\$33,004	\$33,994	\$35,014	\$36,064	\$37,146	\$38,260	\$39,408	\$40,591	\$41,808	\$43,062	\$44,354
Chemicals	\$8,236	\$8,483	\$8,738	\$9,000	\$9,270	\$9,548	\$9,834	\$10,130	\$10,433	\$10,746	\$11,069	\$11,401
Power	\$42,290	\$43,558	\$44,865	\$46,211	\$47,597	\$49,025	\$50,496	\$52,011	\$53,571	\$55,179	\$56,834	\$58,539
Professional Services	\$33,981	\$35,000	\$36,050	\$37,132	\$38,246	\$39,393	\$40,575	\$41,792	\$43,046	\$44,337	\$45,667	\$47,037
Repairs and Maintenance	\$16,739	\$17,241	\$17,759	\$18,291	\$18,840	\$19,405	\$19,987	\$20,587	\$21,205	\$21,841	\$22,496	\$23,171
Fuel	\$10,421	\$10,733	\$11,055	\$11,387	\$11,728	\$12,080	\$12,443	\$12,816	\$13,200	\$13,596	\$14,004	\$14,424
Communications	\$7,674	\$7,905	\$8,142	\$8,386	\$8,638	\$8,897	\$9,164	\$9,439	\$9,722	\$10,013	\$10,314	\$10,623
Insurance	\$41,620	\$42,869	\$44,155	\$45,480	\$46,844	\$48,249	\$49,697	\$51,188	\$52,723	\$54,305	\$55,934	\$57,612
Other <sup>(2)</sup>	\$12,836	\$13,221	\$13,618	\$14,026	\$14,447	\$14,880	\$15,327	\$15,786	\$16,260	\$16,748	\$17,250	\$17,768
Debt Service	\$265,996	\$264,786	\$263,575	\$262,365	\$124,344	\$124,344	\$124,344	\$124,344	\$124,344	\$124,344	\$124,344	\$124,344
<b>Total</b>	<b>\$935,714</b>	<b>\$954,595</b>	<b>\$974,079</b>	<b>\$994,184</b>	<b>\$878,118</b>	<b>\$900,731</b>	<b>\$924,022</b>	<b>\$948,013</b>	<b>\$972,723</b>	<b>\$998,174</b>	<b>\$1,024,389</b>	<b>\$1,051,390</b>
<b>Ending</b>	<b>\$1,139,588</b>	<b>\$989,002</b>	<b>\$844,080</b>	<b>\$680,625</b>	<b>\$659,239</b>	<b>\$616,864</b>	<b>\$578,085</b>	<b>\$516,995</b>	<b>\$458,996</b>	<b>\$377,282</b>	<b>\$298,100</b>	<b>\$193,713</b>

(1) 2024 value based on the minimum budgeted (most conservative) value from 2019-2023. The actual value is typically higher but varies greatly from year to year, as shown in Table 9-3.

(2) Consists of expenditures for boot allowance, sample testing, training and travel, subscriptions, certifications and permits, and any other miscellaneous expenses.

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From Table 9-5, it appears that the City does not maintain positive net revenues under the current assumptions. This means that either a reduction in expenses or additional rate increases will likely be necessary to continue funding the water system in the long term, especially if the City takes on additional loans. Although the City has noted that rate increases are not ideal, they may be required to continue funding essential water system activities. Possible rate increases to fund CIPs are assessed in the "Financing Plan" section.

## **FUNDING OPTIONS FOR CAPITAL IMPROVEMENTS**

Funding for capital improvement projects can come from a variety of sources. Most commonly, projects are funded through a combination of City funds, loans, and grants. There are several federal and state grants available to fund projects related to water treatment and infrastructure. These options are discussed later in this chapter.

## **ESTIMATED FINANCING COSTS**

While there is no guarantee that low interest loans can be obtained for the recommended water system improvements, it is reasonable to assume that conventional loans will be available. To estimate annual debt service that would be necessary to finance the recommended capital improvements, it will be estimated that the costliest improvements will be financed at 6 percent for 20 years with conventional loans through private lenders. For example, assuming that reserves would be used for 10 percent up front for project WT-2 Install WTP Generator, the City would pay an estimated \$42,000 and finance the remaining \$378,000. This would require a maximum annual financing cost of approximately \$32,500. Improvements can be phased so that the total annual financing costs will not be realized for several years, but net income will need to be increased to prevent decline in future capital reserves. This means that rates will need to be increased regularly to keep pace with rising costs as capital projects are completed.

The City may also apply for grant funding to cover project costs. There is no guarantee that applicable grants are available, but some possibilities are discussed further in this Chapter.

## **FINANCING PLAN**

Table 9-6 presents the City's capital improvements schedule and financing plan for completing the planned City of South Bend financed water system improvements. Developer-financed improvements will be paid for by developers when they are ready to proceed with development, and are not included in this table. Improvements have been distributed over the 10-year planning period to allow for coordination with the City's funding capacity and to improve project manageability. All projects except those under a total of \$60,000 are projected to be funded with 10 percent from Capital Reserves and the remaining 90 percent financed at 6 percent annual interest rate over 20 years. It is highly

likely the City will be able to secure loan packages with more favorable interest rates and longer loan terms, if the City desires.

By financing the larger projects over 20 years, the capital expenditures for projects over the 10-year period is reduced to \$1,626,499 from \$4,002,000.

**TABLE 9-6**  
**Capital Improvements<sup>(1)</sup>**

Project Number	Year	Cost Estimate <sup>(2)</sup>	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
SO-1	2026	\$30,000		\$30,000									
SO-2(a)	2027	\$50,000			\$50,000								
SO-2(b)	2036+	\$2,500,000											
SO-3	2026	\$130,000 <sup>(3)</sup>		(3)									
WT-1	2028	\$100,000				\$33,333		\$33,333		\$33,333			
WT-2	2028	\$420,000				\$42,000	\$33,000	\$33,000	\$33,000	\$33,000	\$33,000	\$33,000	\$33,000
WT-3	2030	\$130,000						\$13,000	\$10,200	\$10,200	\$10,200	\$10,200	\$10,200
S-1	2030	\$600,000						\$60,000	\$47,100	\$47,100	\$47,100	\$47,100	\$47,100
B-1	2031	\$234,000							\$23,400	\$18,400	\$18,400	\$18,400	\$18,400
B-2	2031	\$254,000							\$25,400	\$20,000	\$20,000	\$20,000	\$20,000
D-1	2033	\$1,100,000									\$110,000	\$86,300	\$86,300
D-2	2033	\$265,000									\$26,500	\$20,800	\$20,800
D-3	2034	\$515,000										\$51,500	\$40,400
D-4	2035	\$150,000											\$15,000
D-5	2036+	\$200,000											
D-6	2036+	\$350,000											
D-7	2036+	\$1,115,000											
M-1	annually	\$110,000	\$10,000	\$10,000	\$10,000	\$10,000	\$10,000	\$10,000	\$10,000	\$10,000	\$10,000	\$10,000	\$10,000
M-2	annually	\$16,500	\$1,500	\$1,500	\$1,500	\$1,500	\$1,500	\$1,500	\$1,500	\$1,500	\$1,500	\$1,500	\$1,500
M-3	2036+	\$80,000											
WUE-1	annually	\$27,500	\$2,500	\$2,500	\$2,500	\$2,500	\$2,500	\$2,500	\$2,500	\$2,500	\$2,500	\$2,500	\$2,500
<b>Total</b>			<b>\$14,000</b>	<b>\$44,000</b>	<b>\$64,000</b>	<b>\$89,333</b>	<b>\$47,000</b>	<b>\$153,333</b>	<b>\$153,100</b>	<b>\$176,033</b>	<b>\$279,200</b>	<b>\$301,300</b>	<b>\$305,200</b>

- (1) Only City financed projects are shown in this table. Developer-financed projects need not be accounted-for in the City's budget and will completed on the Developer's schedule.
- (2) Cost Estimates are in 2024 dollars.
- (3) Assumed to be funded by an EPA grant; see Chapter 8.

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Table 9-7 presents the City’s balance sheet following financing for capital improvements, with the same assumptions as Table 9-5.

**TABLE 9-7**  
**Capital Improvement Balance Sheet<sup>(1)</sup>**

	<b>2025<sup>(2)</sup></b>	<b>2026</b>	<b>2027</b>	<b>2028</b>	<b>2029</b>	<b>2030</b>	<b>2031</b>	<b>2032</b>	<b>2033</b>	<b>2034</b>	<b>2035</b>
Beginning Balance	\$1,139,588	\$975,002	\$786,080	\$558,625	\$447,906	\$358,531	\$166,419	(\$47,771)	(\$281,803)	(\$642,717)	(\$1,023,199)
Net Revenue	(\$150,586)	(\$144,922)	(\$163,456)	(\$21,386)	(\$42,375)	(\$38,779)	(\$61,090)	(\$57,999)	(\$81,713)	(\$79,182)	(\$104,387)
Capital Improvements	\$14,000	\$44,000	\$64,000	\$89,333	\$47,000	\$153,333	\$153,100	\$176,033	\$279,200	\$301,300	\$305,200
Rate Increase	-	3.0%		3.0%		3.0%		3.0%		3.0%	
Ending Capital Balance	\$975,002	\$786,080	\$558,625	\$447,906	\$358,531	\$166,419	(\$47,771)	(\$281,803)	(\$642,717)	(\$1,023,199)	(\$1,432,786)

- (1) Only City financed projects are shown in this table. Developer financed projects need not be accounted-for in the City’s budget and will completed on the Developer’s schedule.
- (2) Beginning Balance is the Beginning Balance from Table 9-5 for year 2025, which equates to Projected Revenues minus Projected Expenses plus the beginning balance for the year. Each subsequent year’s Beginning Balance is the Ending Capital Balance from the preceding year.

As previously mentioned, additional revenues will need to be generated somehow in order to fund capital improvement projects in the long term and at the planned schedule. It is also possible that some projects may be eligible for funding under grants rather than loans, which would lift some of the financial burden.

In Table 9-8, an annual rate increase of 3 percent has been simulated with an additional 5 percent increase (for a total raise of 8 percent) every three years, starting in 2028. This rate increase was applied to all water use charges (base service charge, commodity charge, and ERU surcharge). Excise tax revenues were also proportionally increased. This appears to be the minimum annual rate increase required to fund the capital improvement expenditures as projected in Table 9-6 while maintaining a positive balance in the Water Fund.

**TABLE 9-8**

**Capital Improvement Expense Forecast**

	<b>2025<sup>(2)</sup></b>	<b>2026</b>	<b>2027</b>	<b>2028</b>	<b>2029</b>	<b>2030</b>	<b>2031</b>	<b>2032</b>	<b>2033</b>	<b>2034</b>	<b>2035</b>
Beginning Balance	\$1,139,588	\$975,002	\$786,080	\$583,007	\$539,386	\$544,467	\$449,833	\$410,637	\$357,198	\$209,610	\$104,975
Net Revenue	(\$150,586)	(\$144,922)	(\$139,074)	\$45,713	\$52,081	\$58,699	\$113,904	\$122,594	\$131,612	\$196,665	\$208,156
Capital Improvements	\$14,000	\$44,000	\$64,000	\$89,333	\$47,000	\$153,333	\$153,100	\$176,033	\$279,200	\$301,300	\$305,200
Rate Increase	-	3.0%	3.0%	8.0%	3.0%	3.0%	8.0%	3.0%	3.0%	8.0%	3.0%
Ending Capital Balance	\$975,002	\$786,080	\$583,007	\$539,386	\$544,467	\$449,833	\$410,637	\$357,198	\$209,610	\$104,975	\$7,931

Table 9-8 assumes all projects are financed through market-rate loans. In reality, the City will also pursue grant funding to lower the financial burden on the water system. If grants are awarded, the City may be able to move projects up on the timeline or avoid increasing rates as often as projected.

## **CONCLUSIONS AND RECOMMENDATIONS**

Based on this analysis of the City's water utility finances and planned capital improvements, the current rates are not sufficient to fund operations and planned capital improvements over the 10-year planning period, assuming inflation continues at the expected rates. The City will consider adjusting their rate structure to increase revenue in the future while having the least impact to ratepayers. Changes to the rate structure will have to be carefully vetted for residential and business customers. Rate structures will need to be developed that will ensure continued operation for businesses that utilize large quantities of water, specifically, businesses such as fish processing facilities that are an integral part of the City and Pacific County and are the major employer in the area. To fund CIPs, an attempt should be made to acquire low interest funding for the larger water distribution projects, but if low interest loans are not possible, then conventional financing is recommended for the larger water distribution improvement projects.

## **AVAILABLE CAPITAL IMPROVEMENT FUNDING SOURCES**

This next section describes alternative funding sources the City may pursue for building capital projects. The following are potential funding sources available for public water utility improvements. However, additional funding sources exist, and are not limited to the sources listed below.

### **COMMUNITY DEVELOPMENT BLOCK GRANT (CDBG)**

The Community Development Block Grant program is a competitive source of federal funding for a broad range of community development projects. A primary requirement of the CDBG program is that the project must principally benefit at least 51 percent of the low-to-moderate income residents of the project area/CDBG has two main programs: General Purpose, and Planning Only, The General Purpose program provides grant funds for the design, construction, or reconstruction of water and sewer systems to a maximum of \$2,000,000 per project. The Planning Only program includes projects such as comprehensive plans, community development plans, capital improvement plans, and other plans such as land use and urban environmental design, economic development, floodplain and wetlands management, transportation, and utilities.

Eligible applicants for the CDBG programs include non-entitlement cities and towns with less than 50,000 people or counties with populations less than 200,000. Though port districts and economic development districts are not eligible to apply directly, a city or county can submit a joint application and include these entities as partners.

### **PUBLIC WORKS TRUST FUND (PWTF)**

The Public Works Trust Fund is a revolving loan fund designed to help local governments finance public works projects through low-interest loans and technical assistance. The PWTF, established in 1985 by legislative action, offers loans

substantially below market rates, payable over periods ranging up to 20 years. To be eligible for the PWTF programs, an applicant must be a local government such as a city, county, or a special purpose utility district.

PWTF has four loan programs including Construction, Preconstruction, Planning, and Emergency.

Interest rates typically range from 0.5 percent to 2 percent, with the lower interest rates providing an incentive for a higher financial share. The useful life of the project determines the loan term, with a maximum term of 20 years.

To be eligible, an applicant must be a local government such as a city, town, county, or special purpose utility district, and have a long-term plan for financing its public work needs. If the applicant is a city, town, or county it must adopt 1/4-percent real estate excise tax dedicated to capital purposes. Eligible public works systems include streets and roads, bridges, storm sewers, sanitary sewers, and domestic water. Loans are presently offered only for purposes of repair, replacement, rehabilitation, reconstruction or improvement of existing service users. A recent change has now made projects intended to meet reasonable growth (as detailed in a 20-year growth management plan) eligible for PWTF funding.

### **COMMUNITY ECONOMIC REVITALIZATION BOARD (CERB)**

The Community Economic Revitalization Board's prime mission is to partner with business and industry and local governments to maintain and create jobs. Established by the Legislature in 1982, CERB provides low-interest loans or, in unique circumstances, grants to help finance local public infrastructure necessary to develop or retain stable business and industrial activities. Projects eligible for funding include roads, domestic and industrial waters systems, sanitary and storm sewers, port facilities, and general purpose industrial buildings.

Typically, CERB provides loans up to \$1 million and, where applicable, grants in the amount of \$300,000. The interest rate is 3 percent for non-distressed counties and 2.5 percent for distressed counties and a local match of 10 percent is required.

Eligible applicants include Washington State subdivisions in partnership with private enterprise. If there is no economic partner, a local government can produce a feasibility study that documents realistic job retention or creation. Applications must be submitted 45 days prior to a regularly scheduled CERB Meeting, which typically meet in January, March, July, and November.

### **DRINKING WATER STATE REVOLVING FUND (DWSRF)**

In 1996, Congress established the Drinking Water State Revolving Fund through the reauthorization of the federal Safe Drinking Water Act. The program is managed by both

the Washington State Department of Health and the Washington State Public Works Board. The purpose of the program is to provide low-interest loans to assist publicly- and privately-owned water systems improve drinking water and protect public health.

Eligible publicly-owned water systems include city and county governments, public utility districts, and special purpose districts. Privately-owned systems are eligible as long as they are a Group A system.

Eligible projects include the following:

- Water systems that exceed health standards;
- Replacement of aging infrastructure;
- Acquisition of real property;
- Planning and design costs;
- Water conservation projects;
- Reservoirs (clear wells) that are part of a treatment process;
- Distribution reservoirs (finished water);
- Existing systems who chose to connect to a municipal system;
- Upgrade to or creation of a Group A system.

### **USDA RURAL DEVELOPMENT, RURAL UTILITY SERVICES (RUS)**

The RD Rural Utility Service administers water and wastewater loan and grant programs to improve the quality of life and promote economic development in rural areas.

### **US ECONOMIC DEVELOPMENT ADMINISTRATION (US EDA)**

US EDA offers competitive grants up to \$1 million for projects within Region 10. Projects are selected locally by an economic development district and submitted to Congress for competitive selection among other regions in the United States. Similar to CERB, applicants must have an industrial partner ready to proceed or a feasibility study that establishes realistic job creation.

### **REVENUE BONDS**

The most common source of funds for construction of major utility improvements is the sale of revenue bonds. These are tax-free bonds are issued by a city or town. The major source of funds for debt service on revenue bonds is from monthly water or sewer service charges. In order to qualify to sell revenue bonds marketable to investors, the bonds typically have contractual provisions for the city or town to meet debt coverage requirements. The city or town must show that its annual net operating income (gross income less operation and maintenance expenses) must be equal to or greater than a factor, typically 1.2 to 1.4 times the annual debt service on all par debt. If a coverage factor has not been specified it will be determined at the time of any future bond issues.