CITY OF ILWACO

PACIFIC COUNTY **WASHINGTON**

WATER SYSTEM PLAN UPDATE

G&O #24460
SEPTEMBER 2025

Gray & Osborne, Inc.
CONSULTING ENGINEERS

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CHAPTER 1

WATER SYSTEM DESCRIPTION

INTRODUCTION

In accordance with Washington Administrative Code (WAC) 246-290-100 and the Washington State Department of Health (DOH), Water System Plans need to be updated every 10 years, or more frequently, if necessary, to reflect the current conditions of the water system. This Water System Plan (Plan) has been prepared to update the *2011 City of Ilwaco Water System Plan*, using the *DOH Water System Design Manual* (June 2020) and the *DOH Water System Planning Guidebook* (August 2020). Copies of the Washington State DOH Project Approval Application and Submittal Forms are included in Appendix A.

SYSTEM OWNERSHIP AND MANAGEMENT

The City of Ilwaco (City) owns and operates its water system. The City's DOH water system identification number is 355002. A copy of the 2024 Water Facilities Inventory Report (WFI) is included in Appendix A. The source of supply, water treatment facilities, storage reservoirs, and distribution lines are all owned by the City and maintained by the City's public works staff.

SYSTEM BACKGROUND

WATER SYSTEM HISTORY

Until 1989, the primary water supply for the City was Black Lake. A water rights claim was filed in 1911 for the use of Black Lake as a municipal supply. At that time, neither the claim nor the actual amount of water continuously used by the appropriator was recorded. This situation was rectified in 1917 by a law that established a permit and certification process. Unfortunately, claims made prior to the 1917 law were not addressed. Legislation passed in 1967 and 1969 attempted to correct this deficiency, and a surface water right certificate to Black Lake was issued to Ilwaco in November 1966 for domestic and municipal supplies. Cranberry growers in the area had claimed prior water rights to Black Lake, and in 1973 an adjudication process led to the quantification of water rights for Black Lake and its natural outlet, Tarlatt Slough. The result of this adjudication was that Ilwaco was placed 36th in priority to withdraw water from the lake, and was limited to a withdrawal rate of 0.78 cfs (350 gpm) and a total yearly withdrawal of 222 acre-feet (72.3 million gallons).

The adjudicated water right was not sufficient to meet the City's needs. Ilwaco exceeded its permitted withdrawal rates from Black Lake. During summer periods of low inflow, the level of Black Lake was lowered to the point that flows in Tarlatt Slough were affected. The Washington State Department of Ecology ordered Ilwaco to pump water from Black Lake into the slough to satisfy prior water rights without regard to Ilwaco's rate of withdrawal. The only way for the City to be relieved of this pumping obligation was to stop all withdrawals from Black Lake.

The City of Long Beach agreed in 1977 to make 0.25 million gallons per day (mgd) of treated water available to the City to supplement their supply and in 1979 Ilwaco completed an intertie between these water systems. The intertie is owned by the City of Ilwaco. Studies at that time indicated that Long Beach would have sufficient treatment capacity at least through the year 1990 to provide for its own peak use as well as continue to supply 0.25 mgd to the City. However, it was not certain whether Long Beach's surface water supply sources would be capable of delivering this amount of water during periods of drought. The availability of water remained a major concern for the City.

Water quality problems emerged as a second major concern in the 1970s. Total Trihalomethane (TTHM) data collected in 1974 showed that the City's treated water from the Black Lake source contained 250 ppb of TTHMs. Because of TTHM formation of the Black Lake supply and the inadequacy of the available quantity, the City applied and was approved for water rights on Indian Creek located approximately 6 miles east of the City. In 1988, a dam and a treatment facility were completed on Indian Creek. The Black Lake source has been abandoned for drinking water use but is available for emergency purposes.

Table 1-1 provides a summary of the water system facilities and their first service date.

TABLE 1-1

City of Ilwaco Water History

Water System Facility	First Service Date
160,000-Gallon Concrete Reservoir(1)	1940s
Impoundment Dam	1988
159,000-Gallon Concrete Reservoir (Indian Creek Reservoir 1)	1988
Water Treatment Plant	1989
500,000-Gallon Steel Reservoir (City Center Reservoir 1)	1996
New Treatment Plant Filter	1998
Intertie with Long Beach	1979
400,000-Gallon Glass Fused Steel Reservoir (Discovery Heights)	2003
Discovery Heights Booster Station	2003
Lakeview Estates Booster Station	2004

TABLE 1-1 – (continued)

City of Ilwaco Water History

Water System Facility	First Service Date
159,000-Gallon Concrete Reservoir (Indian Creek Reservoir 2)	2014
500,000-Gallon Glass Fused Steel Reservoir (City Center Reservoir 2)	2014
City Center Booster Pump Station	2023

(1) Currently abandoned.

RECENT CAPITAL IMPROVEMENTS

Since the writing of the previous 2011 Ilwaco Water System Plan the City has undertaken several capital improvement projects including the construction of two new reservoirs, a booster pump station, seismic valve vault, the recoating of an existing reservoir, and improvements to the Water Treatment Plant (WTP). These projects are described in more detail below.

City Center Water System Improvements

In 2014, the 500,000-gallon glass fused reservoir (City Center Reservoir 2) was constructed at the City Center site. This reservoir was intended to address the City's storage capacity deficiencies and replace the existing 260,000 City Center Wood Stave Reservoir which had been constructed in the 1970s. The wood reservoir was estimated to be leaking at a rate of 115,000 gallons per day (5.5 MG annually) and had reached the end of its useful life. The glass fused reservoir project included perimeter security fencing and a control panel that housed a PLC capable of communicating with the future City Center Booster Pump Station (BPS) and seismic valve vault.

In 2023, a large water system improvement project was completed at the City Center site that included reservoir recoating, construction of a new seismic valve vault and BPS, and replacement of 800 LF of large diameter asbestos concrete (AC) water main with ductile iron (DI) pipe.

The existing 0.5 MG steel city center reservoir (City Center Reservoir 1) was seal welded, sand blasted and recoated on the interior and exterior. As part of the project, the roof vent, hatch lid, and chase were replaced and the roof platform was repaired.

The new seismic valve included a motor operated valve and flow meter. When a seismic sensor is tripped in the control panel adjacent to the nearby (City Center Reservoir 2) and the flow meter registers abnormally high flow, the motor operated valve shuts, preserving the water in both the steel and glass-fused city center reservoirs.

The City Center BPS was installed to provide improved service pressure to the nine houses surrounding the City Center Reservoirs. The BPS is equipped with two 30-gpm Goulds pumps which operates in lead-lag mode and are each equipped with a Variable Frequency Drive (VFD).

The City Center BPS pressurizes the system to an HGL of roughly 230 feet, creating the Upper City Center Zone. Roughly 1,000 LF of 2-inch HDPE water main was installed to provide water to this new zone.

Water Treatment Plant Improvements

The Water Treatment Plant (WTP) underwent a major series of improvements in 2015. The original two 350-gpm Mircofloc, sedimentation, and mixed media filter units were removed. A 700-gpm Tridian TR-420A clarifier and filter unit was added in parallel to the existing upflow clarifier, increasing plant production from 1.5 mgd to 2 mgd. The project also included extensive improvements and upgrades to plant piping, electrical, and controls.

Indian Creek Reservoir 2 Improvements

A second 159,000-gallon concrete reservoir was constructed at the Indian Creek Reservoir site in 2014. This reservoir was constructed to address the storage capacity limitations identified in the 2011 WSP and to provide chlorine contact time. This reservoir is identical to the existing 159,000-gallon concrete reservoir at the same site. The project also included a manually read flow meter vault to quantify flow leaving the Indian Creek Reservoirs and new perimeter fencing.

In 2023, power and communication was extended to the flow meter vault and the flow meter was incorporated into the City's SCADA system. Although, this meter is currently not functional with the City's outdated SCADA but will be once the SCADA system is fully updated.

Sahalee Water System Improvements

The City completed a project in the Sahalee neighborhood in 2018 that replaced approximately 2,600 lf of the original AC water main pipe that was still in service. A pressure reducing valve (PRV) was installed at a new connection of the Sahalee water system to the existing water main in Robert Gray Drive at Klahanee Drive which created a looped system.

Sahalee Reservoir

The Sahalee Reservoir was abandoned in 2011 and the Sahalee water system was connected to the Discovery Heights water system.

SCADA Improvements

In 2023, the City began an effort to upgrade its existing SCADA system by installing new antennas and radios at all of the City's sites. This allowed the City to maintain reliable communication even during severe weather conditions. This improvement ensured that the water system operations could continue effectively, safeguarding the community's water supply and enhancing overall response times during emergencies. The City is currently looking to bring the new SCADA system to be fully operational and this project can be found later in this Plan as part of the Capital Improvement Plan.

LOCATION

The City of Ilwaco is located in Pacific County on the southern end of the Long Beach Peninsula. The City is near the mouth of the Columbia River, adjacent to Baker Bay. A vicinity map is shown in Figure 1-1. Ilwaco is approximately 60 miles from the county seat of South Bend, and is approximately 200 and 120 miles from the urban centers of Seattle and Portland, respectively.

EXISTING SERVICE AREA

The City provides water service to all residents within the City limits and to some customers outside of the City limits. Figure 1-2 presents the City's service area. The Long Beach Peninsula Coordinated Water System Plan (Economic and Engineering Services, 1985) set the Water Service Area Boundary for the future service area limits for the City of Ilwaco. This plan was never adopted by the County. The current water service area closely approximates the area shown in the Coordinated Water service area, with additional area east of the City. This area is along the City's transmission main to the Indian Creek WTP, both of which were built after the assignment of service areas in the proposed Coordinated Water System Plan.

The City also provides water to the water systems operated by the Washington State Parks and Recreation Commission Cape Disappointment State Park and the U.S. Coast Guard Cape Disappointment Station.

CAPE DISAPPOINTMENT STATE PARK AND USCG

The supply serves park visitors and staff throughout the year. Cape Disappointment State Park purchases approximately 3 million gallons of water per year from the City. The Cape Disappointment Coast Guard Station is also served from the City's water system and purchases approximately 1 million gallons per year. An agreement between the City of Ilwaco, State Park, and Coast Guard was created in 2002 that granted the City to install and maintain the water lines leading to the Coast Guard and State Park. The City owns and operates the water lines up to the meter.

The Park and the U.S. Coast Guard station are served by an 8-inch HDPE water main from the Discovery Heights reservoir. Areas of the Park with potable water service, such as the North Head area and Main Gate area have separate meters off of the 8-inch water main. The Coast Guard station is metered on a separate 6-inch meter and has a 50,000-gallon reservoir onsite.

ADJACENT PURVEYORS

The Ilwaco water system service area is bordered by the Long Beach Water System to the north and the Chinook Water District to the east. The following paragraphs are brief descriptions of each purveyor. The current service area boundaries are shown in Figure 1-2.

The City has a mutual aid agreement with the City of Long Beach. If there is a piece of construction equipment or water system component that the City needs, they can reach out to Long Beach and potentially obtain such item and vice versa.

CITY OF LONG BEACH

The Long Beach water system borders the Ilwaco service area to the north. The City of Long Beach provides water service to the City of Long Beach and Seaview area of unincorporated Pacific County, serving a permanent population of approximately 3,000. The Long Beach Water System is supplied by three surface water sources, Baker Creek, Dohman Creek and Maddicks Creek. Long Beach has water rights to an additional source, Rikkola Creek, which Long Beach may develop as a future source of supply. The City of Ilwaco owns an intertie between the Ilwaco and Long Beach water systems. The intertie includes 6-inch meters measuring flow in both directions between the two systems. The intertie is currently being used for an interruptible supply between the two Cities, and an interruptible supply agreement has been negotiated. A copy of the agreement and a copy of a memorandum of understanding sent to the City of Long Beach and City of Ilwaco outlining communication and operation procedures for the intertie are included in Appendix B.

CHINOOK WATER DISTRICT

The Chinook Water District serves customers east of the Ilwaco water service area on the north shore of Baker Bay, serving a permanent population of approximately 495. The District obtains water from Freshwater Creek and two small, unnamed creeks. The Chinook Water District has included a future intertie with the City's system in its 1995 Water System Plan. This intertie would be used to supplement Chinook Water District's source capacity. At present there is no intertie connecting Chinook Water District to the Ilwaco water system; however, there is a 12" x 12" x 12" tee along the transmission line from the Ilwaco WTP to the City of Ilwaco for possible future connection.





CITY OF ILWACO

WATER SYSTEM PLAN UPDATE

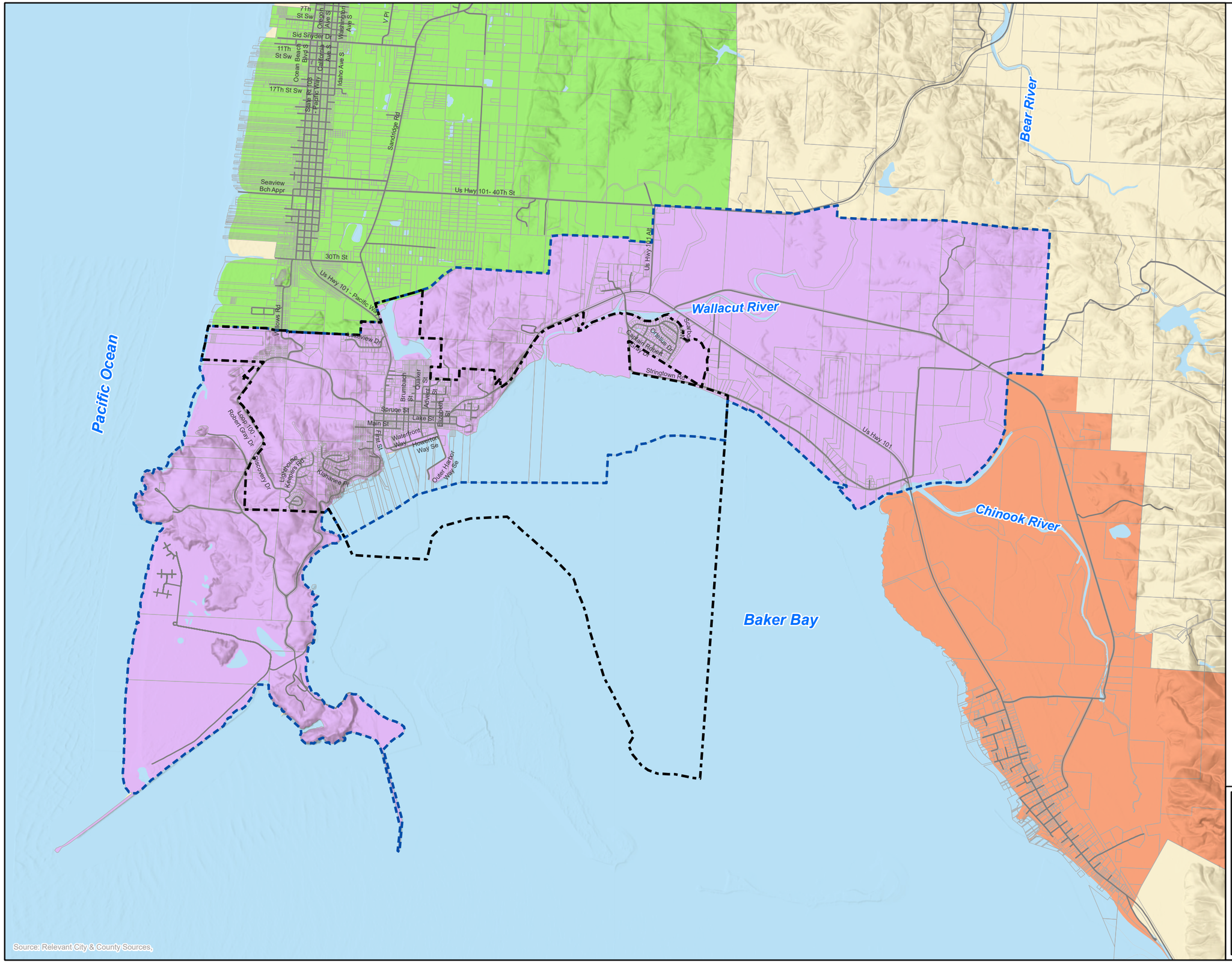
FIGURE 1-1

VICINITY MAP

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Export Date: 2/21/2025

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Chinook Water Service Area
Ilwaco Water Service Area
Long Beach Water Service Area
Ilwaco City Limit
Retail Service Area
Parcels
Surface Water
Roads

N

0 1,000 2,000 4,000
Feet

CITY OF ILWACO

WATER SYSTEM PLAN UPDATE

FIGURE 1-2

SERVICE AREAS MAP

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Export Date: 2/21/2025

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PHYSICAL CHARACTERISTICS OF THE WATER SERVICE AREA

Planning and design of water system facilities can be influenced by physical characteristics such as geography, topography, geology, climate, ground and surface water availability, water quality, and terrestrial/aquatic environmental characteristics. The following sections provide an overview of the physical characteristics of the City of Ilwaco water service area.

TOPOGRAPHY

The topography of the central portion of the City of Ilwaco is generally flat with a mean elevation of 11 feet above sea level. The outlying area of the City encompasses some very hilly terrain with elevations ranging up to 125 feet in the eastern portion of the City and above 300 feet in the western portion. A topographical map of the Ilwaco area is shown in Figure 1-3.

SURFACE WATER

The surface water resources of the Ilwaco area consist of the Columbia River, specifically Baker Bay, Black Lake, Holman Lake, the Wallacut River, and the Pacific Ocean. The western portion of the City borders the Pacific Ocean and Baker Bay lies to the south, at the mouth of the Columbia River. The main channel of the river is approximately three miles south of the City. Another water body within the vicinity is Black Lake, which is situated north of the downtown core and is approximately 32 acres. This lake is categorized as a bog lake, a body of water overlying a layer of peat, that once served as Ilwaco's primary source of water. Holman Lake, an open water wetland, is found on the west side of downtown and collects drainage from the steeper terrain found within the city limits. The Wallacut River is located in the vicinity of the airport and originates east of the City. This river is sometimes known to flood homes located directly on the river's edge in the Vandalia neighborhood.

Indian Creek, a tributary of Bear River, acts as the surface water source for the impoundment. The Bear River discharges into the southern end of Willapa Bay.

CLIMATE

The Ilwaco area has a mild, maritime climate, which is typical of Washington's Pacific coast. The area's climate is classified as the Marine West Coast type, which is characterized by cool, dry summers and moderate winters with considerable rainfall. Table 1-2 lists climatological data, such as temperature, and precipitation for a 30-year average. Data from the Long Beach Experimental Station was utilized as the City of Ilwaco lies within the same climate zone as Long Beach.

TABLE 1-2

City of Ilwaco Climatological Data, 1991 – 2020
(Long Beach Experimental Station)

Month	Average Temperature (F°)	Average Precipitation (Inches)
January	42.4	12.04
February	42.9	7.76
March	44.9	8.71
April	47.6	6.79
May	52.0	3.55
June	55.4	2.59
July	58.5	1.01
August	59.0	1.63
September	56.9	2.66
October	51.0	8.20
November	45.4	11.43
December	42.0	12.15
Average	**49.8**	**78.51**

Source: U.S. Department of Commerce, National Environmental Satellite, Data, and Information Service

The average annual rainfall within the region for a 30-year period is 78.51 inches.

GEOLOGIC HAZARD AREAS AND CRITICAL AREAS

Geologically hazardous areas are unsuitable for commercial, residential, or industrial development due to their vulnerability to erosion, landslides, earthquakes, or other geological events that present risks to public health and safety. Typically, landslide hazards in Pacific County are associated with acts of road construction. Landslides are frequent during times of heavy inundation when steep slopes are undercut for roadways. Landslides have been documented along Robert Gray Drive. The hilly portions of the City of Ilwaco contain steep slopes, which may be prone to erosion and landslides.

FLOOD HAZARD AREAS

The 100-year floodplain is shown in Figure 1-4. These boundaries are in accordance with the Federal Emergency Management Agency (FEMA). The boundaries of the 100-year floodplain exist at an elevation of approximately 13 feet (NAVD 1988 datum). Areas within the 100-year floodplain include the entire Port region, much of the southern portion of the City, as well as areas directly adjacent to Baker Bay. Although FEMA highly recommends against the placement of any structure in the 100-year floodplain, any structure built within the floodplain's boundaries must provide for adequate protection

Elevation (Ft.)
785'
Sea Level
100'
20'
Ilwaco City Limits
Retail Service Area
Surface Water
Roads

Pacific Ocean
Baker Bay
Wallacut River
Bear River
Chinook River
Us Hwy 101- 40Th St
Us Hwy 101 Alt
Us Hwy 101
Pacific Way
Sandridge Rd
Lakeview Dr
Loop 100
Robert Gray Dr
Spruce St
Main St
Lake St
Waterfront Way
Stringtown Rd
Captain Robert Rd
Seaview Bch Appr
30Th St
17Th St Sw
11Th St Sw
Sid Snyder Dr
Ocean Beach Blvd S
Oregon Ave S
Washington Ave S
California Ave S
Idaho Ave S
State Rt 103
Willows Rd
Brambach St
Quaker St
Adams St
Elizabeth St
First St
Otallie Dr
Cranberries Rd
Sandridge Rd

N

0 1,000 2,000 4,000
Feet

CITY OF ILWACO

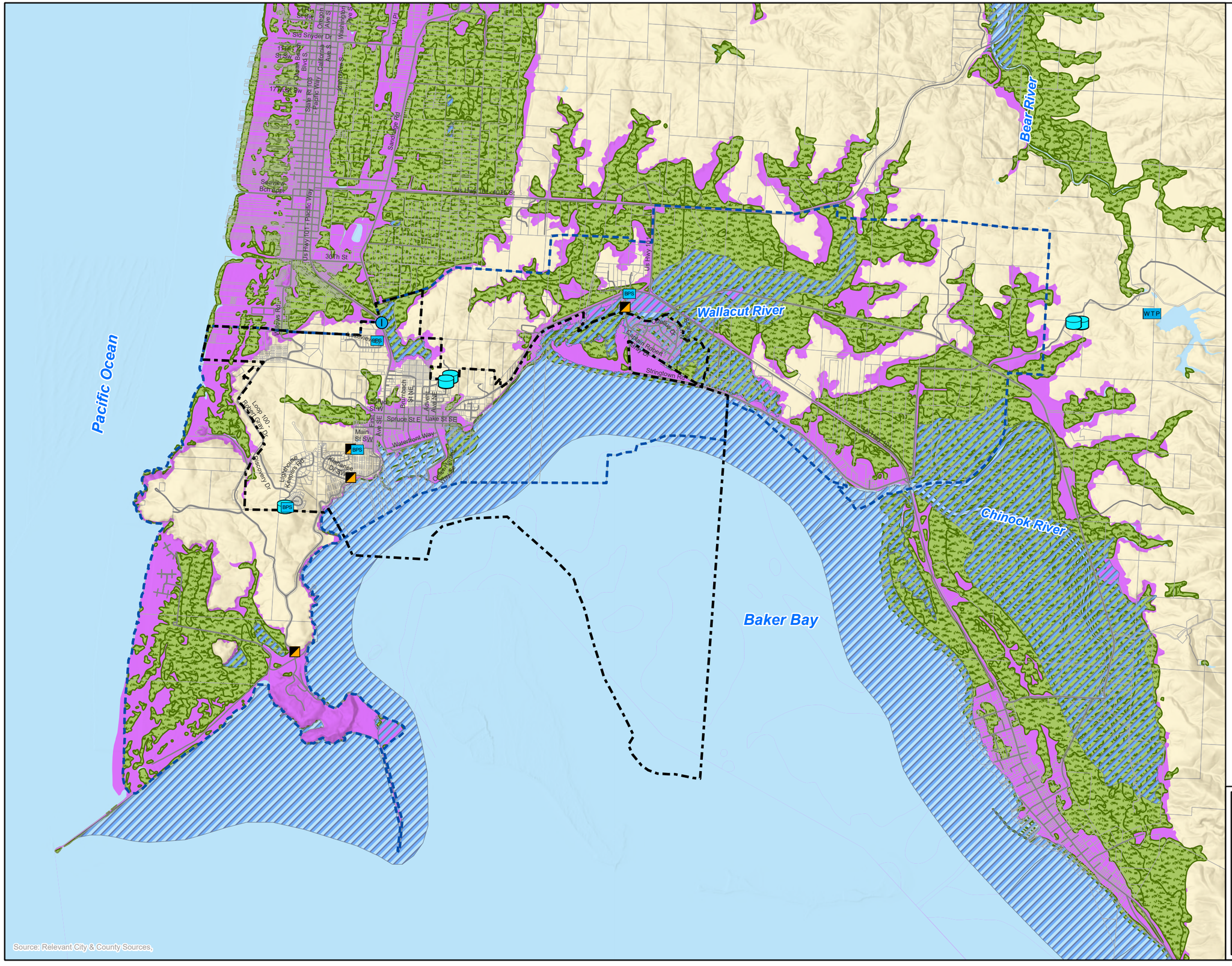
WATER SYSTEM PLAN UPDATE

FIGURE 1-3

TOPOGRAPHICAL MAP

Gray & Osborne, Inc.
CONSULTING ENGINEERS

Source: Relevant City & County Sources,



Tsunami Hazard Areas
100-Year Floodplain
Wetlands
Ilwaco City Limits
Retail Service Area
Parcels
Surface Water
Roads

reservoirs_prv

type
- Reservoir
- Booster Pump Station
- Pressure Release Valve

Ilwaco_Water_System_Points

Type
- Water Treatment Plant
- Intertie

N

0 1,000 2,000 4,000
Feet

CITY OF ILWACO

WATER SYSTEM PLAN UPDATE

FIGURE 1-4

CRITICAL AREAS MAP

Gray & Osborne, Inc.
CONSULTING ENGINEERS

against the 100-year flood (i.e., structures within the floodplain are constructed at a minimum of 1 foot above the floodplain elevation).

WETLANDS

Wetlands are defined as those areas that are inundated or saturated by surface water or groundwater at a frequency and duration sufficient to support, and under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and are often considered critical areas.

The National Wetlands Inventory documents numerous wetlands areas in and around the Ilwaco area. Figure 1-4 illustrates the wetlands identified by the National Wetlands Inventory. Baker Bay is characterized by large tracts of tidal-salt marsh wetlands. The area directly north of Ilwaco is predominantly cranberry wetlands. Areas of forested and scrub-shrub wetlands are found both east of the City and in the west part of the City.

Pacific County has adopted a rating system, which attempts to rate each wetland type by specific function. Specific functions may include wildlife habitat, hydrologic features, commercial value, and aesthetic qualities. Local wetland functions are associated with their relative value to both human and natural land-use activities. Wetland value reflects the worth, utility, or importance of the wetland to provide a public or private service. The suitability rating determines the value of each wetland type to support a particular function. Wetlands are prioritized from Rating 1 to Rating 4, with Rating 1 wetlands considered the most suited for a particular function.

Rating 1 – Extremely suited to the specific function or wetland characteristic. Contains high quality, native plant, and animal communities, which are generally only found in these wetland areas. Considered to be of exceptional local significance and may contain kelp, eelgrass beds, shellfish beds, sole source aquifer recharge areas. Possesses the most significant and locally outstanding function for this type of wetland. Existing environmental conditions may be considered rare.

Rating 2 – Well-suited for most wetland functions. Contains an important number of wetland characteristics and functions based on diversity and size. Contains fewer functions than in Rating 1.

Rating 3 – Contains a limited number of functions. Wetland functions may occur on a temporary or seasonal nature. Plant types are considered common with fair to marginal habitat value. These wetlands may have been altered or been previously disturbed. Functions can be reproduced by other means.

Rating 4 – Wetlands with little value or function. Plant species are common with minimal wildlife habitat. Not within jurisdiction of the Shoreline Management Act or other federal agencies. May not be of use to passive or active land-use and environmental activities. Includes wetlands that are considered isolated and are less than one acre in size.

Pacific County has developed a wetlands mitigation policy to offset losses of wetland areas. Wetland mitigation should consider the function and value of the wetland in addition to overall area of disturbance. Specific acre-for-acre mitigation measures were not developed by the County. Rather, innovative mitigation techniques should be used to provide both public and private benefit. Mitigation techniques may include providing shoreline access through easements or establishing educational trust accounts for school field trips to educate children about the value and function of local wetlands.

EXISTING WATER SYSTEM COMPONENTS

The following sections provide a description of the water system facilities currently owned and operated by the City of Ilwaco. Figure 1-5 shows the existing facilities within the water system.

WATER SUPPLY AND RAW WATER STORAGE

The City collects its water from Indian Creek, a tributary of the Bear River. Water is impounded by a dam and treated at an on-site water treatment facility. The dam design impound data is shown in Table 1-3.

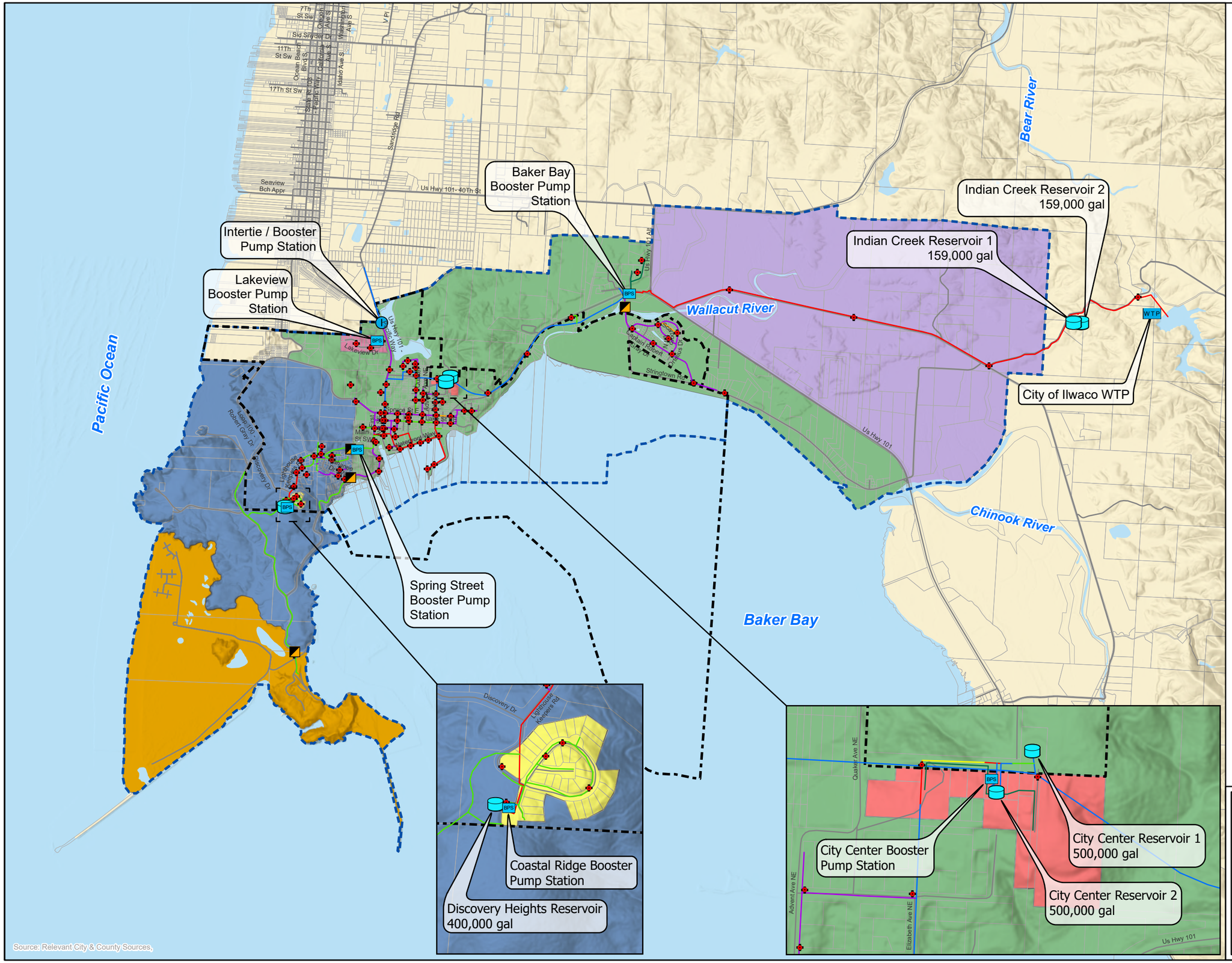
TABLE 1-3

Dam Design Data

Design	Low Pool	Normal Pool	Max Pool
Volume (acre-feet)	29.5	847	1,022
Surface Area (acres)	5.07	35.19	48.39

The pumping and transmission facilities are designed to handle the maximum projected flow rate of 1.5 mgd.

The water diverted for the City of Ilwaco would otherwise flow into Indian Creek. The Bear River empties into the southern end of Willapa Bay. Water diverted to the City, however, is treated and discharged into Baker Bay. The Bear River is a minor source of water for Willapa Bay, which is supplied primarily by the North River, Naselle River, and Willapa River. Willapa Bay is an estuary significant for its fishing, oyster farming, wildlife refuge, and recreational opportunities. The City is required by its water right to bypass a minimum flow into Indian Creek for fish habitat.



Facilities

- Water Treatment Plant
- Intertie
- Hydrants
- Reservoir
- Booster Pump Station
- Pressure Release Valve

Waterlines (Diameter)

- 2-inch
- 4-inch
- 6-inch
- 8-inch
- 10-inch
- 12-inch
- 16-inch

Pressure Zones

- City Center (157 ft)
- Indian Creek (160 ft)
- Upper City Center (230 ft)
- Lakeview Estates (300 ft)
- Discovery Heights (339 ft)
- Coastal Ridge (574 ft)
- Cape Dissapointment & Coast Guard (269 ft)

Reference

- Retail Service Area
- Ilwaco City Limits
- Parcels
- Surface Water
- Roads

N

0 1,000 2,000 4,000 Feet

CITY OF ILWACO

WATER SYSTEM PLAN UPDATE

FIGURE 1-5

WATER SYSTEM FACILITIES MAP

Gray & Osborne, Inc.
CONSULTING ENGINEERS

In order to mitigate any adverse effects to aquatic spawning and rearing habitat, reservoir filling is limited to December, January, and February, with filling evenly distributed over these months. Stream water is not allowed to be diverted to the reservoir for filling during the salmon migration periods of October/November and March/April/May.

The reservoir has been designed so that 97 percent of the storage capacity can be released by gravity. An 18-inch steel pipe, encased in 10 inches of reinforced concrete, is located at an invert elevation of 22 feet (approximately 15 feet below the dam base). This pipe can remove 97 percent of the storage in a 10- to 20-day time period depending on inflow to the dam. The intake has two inlets that are screened and gated with inclined, hydraulically operated sluice gates. The pipe inlets are located at elevations of 43 and 38 feet MSL. It was determined early in the operation of the WTP that the water in the lower portion of the impoundment was difficult to treat due to excess iron and manganese.

In 1988, a 24-inch-diameter flexible pipe and aluminum cover was added to the upper intake structure to allow the operator to selectively withdraw water from a higher water elevation. This "floating" intake is designed to remain 10 feet below the water surface elevation. The intake is held in place by a buoy and is anchored to the upstream embankment in two places by cables attached to concrete blocks. The original floating intake has been replaced several times. The floating intake currently consists of a two pipe manifold mounted to the lower dam intake structure. Two pipes of different heights are mounted to the manifold. The City currently uses the upper pipe to draw water into the WTP. The upper dam intake structure is currently inoperable. See Chapter 9 for a discussion of proposed water system improvements.

WATER RIGHTS

The City's maximum instantaneous withdrawal and the maximum annual withdrawal water rights are summarized below. An instantaneous water right represents the maximum pumping capacity of a well or maximum diversion rate for a spring or surface water source. The total instantaneous withdrawal from Indian Creek allowed under these water rights certificates is 2.33 cubic feet per second, which is equal to 1,505,814 gallons per day (gpd). Therefore, the City's production is limited to 1.5 mgd. An annual water right certificate represents the total quantity of water that may be withdrawn or diverted during the entire year. The total annual withdrawal allowed by these water rights is 732 acre ft/year.

The City also has active applications, permits, and certificates for water sources they have either used historically or could potentially use in the future that are not currently being used. This includes a certificate and permit for withdrawal out of Black Lake.

The City's water right certificates and permits are shown in Table 1-4. Copies of the water rights are included in Appendix C.

TABLE 1-4

Water Rights and Reservoir Permit Summary

Date	Source Name	Type	Number	Maximum Permitted Instantaneous Withdrawal (cfs)	Maximum Permitted Annual Withdrawal (acre-ft/year)	Maximum Permitted Storage (acre-ft/year)
Indian Creek Permits and Rights						
04/24/1995	Indian Creek	Permit	S2-29218	0.77	22	N/A
04/27/1981	Indian Creek	Water Right Certificate	S2-25880	1.56	710	N/A
02/04/1985	Indian Creek	Reservoir Permit	R2-26649	N/A	N/A	1,022
Other Water Permits and Rights						
11/01/1966	Black Lake	Certificate	S2-00770	1.22	222	N/A
01/01/1911	Black Lake	Adjudicated Certificate	S2-65007	0.78	222	N/A

The City's Reservoir Permit provisions require summer and fall stream flows below the dam to be maintained at no less than 2.0 cfs and limits reservoir filling to the months of December, January, and February.

TREATMENT

Water is conveyed to the Ilwaco WTP by approximately 1,000 feet of 18-inch and 12-inch raw water transmission line. The treatment plant was built with an initial capacity of 1.0 mgd provided by two 0.5-mgd filters. An additional 1.0 mgd filter was commissioned in 1998. This expansion allowed the City to supply approximately 1.5 mgd with one 500,000-gpd filter unit out of service. Their latest WTP upgrade occurred in 2014, which included the removal of the original two 0.5-mgd filters in exchange for a second 1.0-mgd filter. The capacity of the WTP expanded to approximately 2.0 mgd with both filters operating.

When the raw water enters the treatment facility, a flow-through turbidimeter measures the raw water turbidity. The City adds sodium hypochlorite, potassium permanganate, polymer, and aluminum chlorohydrate to ensure the removal of turbidity, iron, and manganese required to provide a high quality finished water and meet regulatory standards. Soda ash is added post treatment to control pH levels. The amounts of water treatment chemicals vary, depending on the varying raw water quality.

After chemical addition, the water flows to the treatment units, Filters 1 and 2 which are each 300-gpm WesTech trident clarifier/mixed media filter units. The upflow clarifiers provide in-bed coagulation, flocculation, and initial solids removal. The adsorption clarifier is an upflow process, with 4 feet of buoyant clarification media held by a retaining screen. Chemicals added to the raw water create floc that adsorbs to the chemically inert clarifier media. The water enters the tank through an influent flow control valve. The valve is throttled to maintain a constant flow into the clarifier section. The chemically treated water is distributed by the influent header, flows upward through the adsorption media and the media retainer, and then flows over the trough weir and onto a mixed media filter.

In both treatment units, the filtration system is comprised of a mixed media filter bed. This filter bed is made up of anthracite coal, silica sand, and garnite. The layers in the filter bed have different densities so that the low density media remains on the top, and the high density media remains on the bottom of the filter after backwashing. The headloss across the media is low, about 1-1.2 feet at design flow.

The filter bed is supported by gravel of several sizes, which covers the header-lateral underdrain system. The filtered water is uniformly collected by the underdrain and flows to the clearwell, which is located under the treatment plant floor. Finished water is pumped out of the water treatment plant and goes to the finished water reservoirs.

The operation and maintenance of the treatment system are discussed in detail in Chapter 7.

INTERTIES

The City has one intertie with the City of Long Beach. The intertie which is owned by the City of Ilwaco and is located west of Black Lake where a 6-inch PVC waterline owned by the City connects to a 10-inch PVC waterline owned by the City of Long Beach. The Cities of Long Beach and Ilwaco have entered into an agreement dated August 15, 2000, regarding the use of this intertie. The hydraulic gradeline of the Long Beach and Ilwaco water systems at the intertie are 143 and 157 feet, respectively. Water transferred from Long Beach into the City's system must therefore be pumped through the Intertie Booster Station, which is owned by the City.

STORAGE

The City owns five active storage reservoirs that are used to meet peak demands, provide fire flow storage, and create adequate system pressures. A sixth 160,000-gallon concrete reservoir exists in the City Center zone though it was permanently abandoned over 20 years ago. The second concrete Indian Creek Reservoir and the City Center glass-fused reservoir were both constructed in 2014 while the City Center Steel Reservoir was rehabilitated and recoated in 2023. Both of the City's old wooden reservoirs have been

demolished since the writing of the previous WSP. A summary of the storage facilities is shown in Table 1-5. All reservoirs serve open zones meaning they set the hydraulic grade (HGL) of the pressure zones they are in. The reservoirs' corresponding pressure zones are listed in Table 1-5.

TABLE 1-5

Storage Facilities

Name	Type	Zone	Capacity (gallons)	Year Constructed	Height (ft.)	Diameter (ft)	Overflow Elevation (ft)
City Center 1	Steel	157	500,000	1996	28	60	157
City Center 2	Glass Fused	157	500,000	2014	23	72	157
Indian Creek 1	Concrete	160	159,000	1988	32	30	160.5
Indian Creek 2	Concrete	160	159,000	2014	32	30	160.5
Discovery Heights	Glass-Fused Steel	339	400,000	2003	28	50	339

Between the five reservoirs listed above the City has a total nominal capacity of 1.7 MG.

PRESSURE ZONES

The City's service area is comprised of six pressure zones, which are shown in Figure 1-5.

The Indian Creek Zone (HGL = 160 feet) serves customers in the Water Service Area east of the Baker Bay Booster Pump Station. Storage in this zone is provided by the Indian Creek Concrete Reservoirs, which is fed directly by the City's WTP.

The City Center Zone (HGL = 157 feet) serves the City's core. Storage for this zone is provided by the City Center reservoirs. Supply for this zone is provided by the Baker Bay Booster Pump Station, which is an in-line booster station on the transmission line from the City's WTP in the Indian Creek zone.

Upper City Center Zone (HGL = 230 feet) is a small closed zone that is fed by the City Center BPS and provides pressure to 9 homes near base of the two City Center Reservoirs.

The Lakeview Estates Zone (HGL = 317 feet) is a small closed zone that is fed by the City Center Zone via the Lakeview Estates Booster Pump Station.

The Discovery Heights Zone (HGL = 339 feet) serves the Discovery Heights development and the Sahalee development. Storage for the zone is provided by the Discovery Heights Reservoir. Supply for the zone is provided by the Spring Street Booster Station. This zone is also looped with the City Center Zone through a PRV at the intersection of Klahanee and Robert Gray Drive.

The Coastal Ridge Zone (HGL = 547 feet) serves the Coastal Ridge Townhouse Village near the discovery Heights Reservoir. This zone is a small closed zone that is fed by the Discovery Heights Zone via the Coastal Ridge Booster Pump Station.

The Cape Disappointment and Coast Guard Zone (HGL = 269 feet) serves the area south of the Discovery Heights Zone and is fed from the Discovery Heights Reservoir and/or the Coast Guard's 50,000-gallon reservoir. This zone is a small closed zone after the PRV on Highway 100. After 2002, the city has owned and maintained the lines in this zone up to the meters, which are located just downstream of the PRV.

The area in the northwest portion of the City's Water Service Area is currently undeveloped. Because of the elevations throughout this area, a new pressure zone or extension of the Discovery Heights zone would be needed to serve the area.

BOOSTER STATIONS

The City's system contains six booster pump stations: the Baker Bay Booster Pump Station, the City Center Booster Station, Coastal Ridge Booster Pump Station, the Spring Street Booster Pump Station, the Lakeview Estates Booster Pump Station, and the Intertie Booster Pump Station. A summary of the City's booster pumps is shown in Table 1-6.

The Baker Bay Booster Pump Station is located along Highway 101 at Stringtown Road. The station contains three centrifugal pumps providing a total capacity of 950 gpm. Pump 1 is a 10-hp pump with a capacity of 190 gpm. Pumps 2 and 3 are 20-hp pumps, each with a capacity of 380 gpm. This booster pump station also monitors chlorine residual. The booster pumps are controlled by a pressure transducer in the City Center reservoirs. The signal is sent to a PLC at the booster pump station that activates the pumps when certain water levels are reached. Currently, emergency power to operate these pumps in case of a power outage can be provided by the City's portable generator. However, it is not currently operational due to a part that cannot be obtained for the control board. The City can gravity feed from the Indian Creek reservoirs to the distribution system in the springtown area in the event of a power outage.

The City Center Booster Pump Station is located north of the City Center Reservoir 1. The pump station provides pressure to 9 homes located near the base of the City Center Reservoirs via 2-inch HDPE distribution lines. This package booster pump station is equipped with two 30 gpm pumps with 104 feet of total dynamic head (TDH) with 1.5-hp motors, a flow meter, and a pressure relief valve. There is also a bypass line should the

BPS need to be taken offline for maintenance. This bypass line will only be able to provide 13 psi to the highest service meter.

The Spring Street Booster Pump Station provides water from the City Center zone to the Discovery Heights zone. This booster station pumps into an open zone and provides domestic flows only. The station is equipped with two 500-gpm booster pumps and a monitor to measure chlorine residual.

The Coastal Ridge Booster Pump Station provides water from the Discovery Heights zone to the Coastal Ridge Townhouse Village. This booster station pumps into a closed zone and provides domestic and fire flows. The station is equipped with two 60-gpm domestic booster pumps that pump to a hydraulic gradeline of 510 feet, one 1,000-gpm fire flow pump and a monitor to measure chlorine residual. The station capacity with both domestic pumps running is 108 gpm.

The Lakeview Estates Booster Pump Station serves the Lakeview Estates zone, which is a closed zone with no storage. This station is equipped with a 500-gpm fire pump, a 45-gpm domestic pump and a monitor to measure chlorine residual. These pumps are controlled by the station discharge pressure.

The Intertie Booster Pump Station pumps water, when required, from the Long Beach water system into the City's water system and vice versa. This station is equipped with two pumps with a capacity of 400 gpm each. This station is operated manually by the operator when needed.

TABLE 1-6

Booster Station Inventory

Booster Station	Date of Construction	Number of Pumps	Total Capacity	Motor Power
Baker Bay	1988	3	950 gpm	2 @ 20 hp 1 @ 10 hp
City Center BPS	2021	2	60 gpm	2 @ 1.5 hp
Spring Street	2003	2	1,000 gpm	2 @ 60 hp
Coastal Ridge	2005	1 Fire 2 Domestic	1,000 gpm 120 gpm	1 @ 40 hp 2 @ 5 hp
Lakeview Estates	2003	1 Fire 1 Domestic	500 gpm 45 gpm	1 @ 40 hp 1 @ 3 hp
Intertie	1980s	2	800 gpm	2 @ 15 hp

DISTRIBUTION SYSTEM

The City's current distribution system is composed of 103,154 linear feet of water main, approximately 19.5 miles of pipe. Table 1-7 shows the distribution system inventory by pipe diameter. The majority of water lines were installed in the 1970s. Distribution lines in the port area, along Lake and Spruce Streets, from the main reservoirs and from the Baker Bay Booster Station to the main part of the City have been replaced since 1995. The waterlines serving the Discovery Heights development, Cape Disappointment State Park, and the Coast Guard were installed in 2003.

Cape Disappointment State Park and the Coast Guard owns and maintains its water lines which are located after the park meters. Additionally, Table 1-7 only includes water lines owned and maintained by the City of Ilwaco.

TABLE 1-7

Pipe Lengths by Diameter

Pipe Diameter	Length of Pipe in System (linear feet)	Percent of System
4	1,158	1.1%
6	25,581	27.7%
8	22,020	25.2%
10	16,634	16.1%
12	29,604	28.7%
16	1,158	1.1%
Total	**96,155**	**100.0%**

Currently, the City has 114 hydrants located within the water system.

RELATED PLANNING DOCUMENTS

2020 PACIFIC COUNTY FINAL DRAFT COMPREHENSIVE PLAN

Pacific County's Comprehensive Plan was last updated in 2020. This plan is the guiding document for how the County plans to develop future growth and development over the next 20 years. The County's Comprehensive Plan applies to areas within the Water Service Area that are outside the City's corporate boundaries.

2020 CITY OF LONG BEACH WATER SYSTEM COMPREHENSIVE PLAN

The City of Long Beach's Water System Comprehensive Plan was last updated in 2020. This plan was prepared by Gray and Osborne, Inc. and includes information regarding the Long Beach Water System, including the intertie between Long Beach and Ilwaco.

2020 CITY OF ILWACO COMPREHENSIVE PLAN

The City of Ilwaco adopted its Comprehensive Land Use Plan in 1994 and last updated it in 2020. The Comprehensive Plan is a planning document with goals and objectives enforced by City codes.

2011 CITY OF ILWACO WATER SYSTEM PLAN

This document is a complete description of the City's water system in 2011. All components of the system are described and analyzed and a recommended list of capital improvements was created. Department of Health approved the plan and it was adopted by the City.

2006 REGIONAL JOINT OPERATIONS FEASIBILITY STUDY

This document was prepared by Gray & Osborne for the City of Long Beach at the request of the Department of Health to evaluate the potential for joint management, governance, and/or operations of water treatment facilities by the City of Long Beach, City of Ilwaco, and Chinook Water District. The recommended alternative of the analysis was for the three purveyors to continue to operate their own treatment plants and enter into an Interagency Cooperative Agreement to share resources and services. The analysis notes that future conditions, such as a decrease in available supplies, may increase the benefits of a regional solution to water supply.

AGREEMENTS

Agreements pertaining to the City's water system are given in Appendix B and summarized below.

LONG BEACH

The City has an interruptible supply agreement with the City of Long Beach. This agreement outlines the terms of water supply between the two purveyors. The intertie between the two systems allows water supply to be provided from either system to the other as needed.

WASHINGTON STATE PARKS

The City has an agreement with the Washington State Parks and Recreation Commission (Parks) to provide water supply to Cape Disappointment State Park. The City also has an agreement with Parks providing easements along the City's transmission waterlines that supply water to the park system (prior to the park meters) for maintenance.

LONGVIEW TIMBER

A portion of the land near the City's watershed was purchased by Longview Timber, LLC, from the Weyerhaeuser Company. The City's real estate contract with Weyerhaeuser to purchase land for the watershed included Timber Reservations and Timber Management Covenants that reserve the right to harvest timber from a portion of the watershed through 2027. This agreement is further discussed in the Watershed Control Program given in Chapter 6.

DISCOVERY HEIGHTS DEVELOPMENT AGREEMENT

The City entered into a development agreement with MSW Venture, LLC, regarding development of the Discovery Heights area. The agreement outlined the City's and developer's responsibilities for the water system utilities within the development.

SERVICE AREA CHARACTERISTICS

The City of Ilwaco water service area encompasses approximately 7,307 acres. The service area includes the city limits, as well as outlying rural areas along the City's existing distribution system.

RETAIL SERVICE AREA

The City's retail water service area, as described in the Municipal Water Law, is shown in Figure 1-2.

The City acknowledges that it has a duty to serve all new connections within its retail service area if:

1. Service can be provided in a timely and reasonable manner.

2. The City has sufficient water rights to provide service.

3. The City has sufficient capacity to serve water in a safe and reliable manner.

4. The service request is consistent with adopted local plans and development regulations.

WHOLESALE SERVICE AREA

The City also has an agreement with the City of Long Beach for the two purveyors to provide wholesale water to each other on an interruptible, as-needed basis. The City's intertie with the City of Long Beach is typically only used during emergencies.

FUTURE SERVICE AREA

The City does not anticipate expanding its water service area beyond the water service area boundaries identified above.

EXISTING LAND USE

The City of Ilwaco has a relatively compact, older downtown core surrounded by a larger low-density residential and mixed-use area. Directly south of the downtown area is the Port of Ilwaco and Ilwaco harbor. The City limits extend east to the Vandalia area and west to Cape Disappointment State Park and north to Black Lake.

The primary document for growth and land use decisions in Ilwaco is the September 2020 *City of Ilwaco Comprehensive Plan*. The zoning for the City of Ilwaco and unincorporated Pacific County (Figure 1-6) is separated into the classifications shown in Table 1-8.

TABLE 1-8

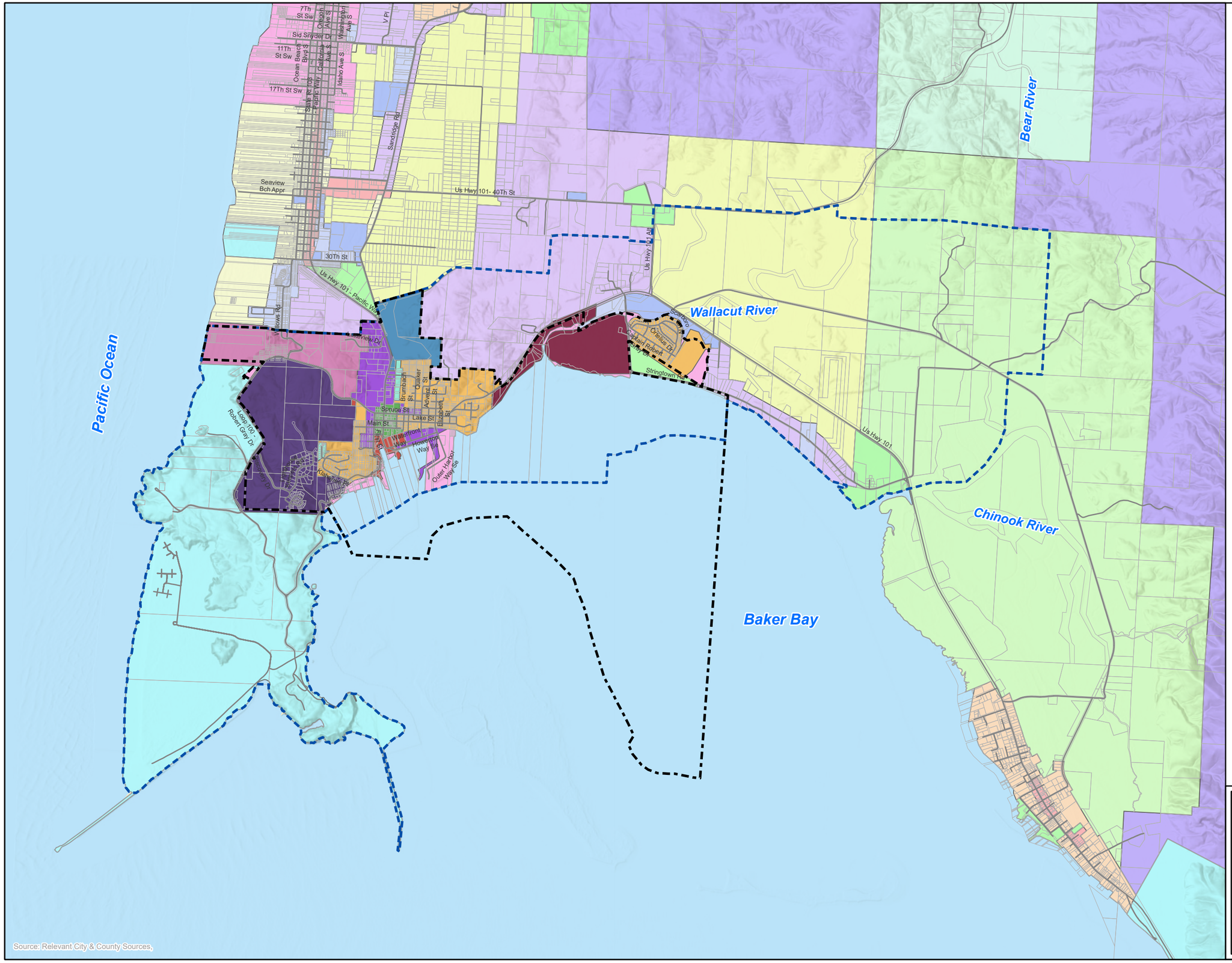
City of Ilwaco Land Use Classifications

Land Use Category	Acres	% of Area
Single-Family Residential, R-1	345.7	21.5
Multi-Family Residential, R-2	9.5	0.8
Resort Residential, R-3	446.9	39.1
Recreation Residential, R-4	112.2	9.8
Recreation, R-5	79.0	6.9
Core Commercial, C-1	20.7	1.8
Low-Density Commercial, C-2	124.7	10.9
Light Industrial, M-1	17.2	1.5
Park, P	86.6	7.6
Totals	**1,142.5**	**100%**

SERVICE AREA POLICIES AND CONDITIONS OF SERVICE

DESIGN STANDARDS

The City of Ilwaco has adopted developer standards that cover improvements to the City's water system. These design standards are given in Appendix D.



Zoning - City of Ilwaco

- C1 - Core Commercial
- C2 - Low-Density Commercial
- M - Light Industrial
- P - Park
- R1 - Single Family Residential
- R2 - Multi Family Residential
- R3 - Resort Residential
- R4 - Recreational Residential
- R5 - Recreation

Zoning - Pacific County

- Agricultural
- Commercial Forest
- Community Commercial
- Conservation
- General Residential
- Incorporated
- Industrial
- Mixed Use
- Mixed Use - Tokeland
- Remote Rural
- Resort
- Restricted Residential
- Rural Lands
- Rural Residential
- Shoalwater Tribe
- Transitional Forest
- Ilwaco City Limits
- Retail Service Area
- Parcels
- Surface Water
- Roads

N

0 1,000 2,000 4,000 Feet

CITY OF ILWACO

WATER SYSTEM PLAN UPDATE

FIGURE 1-6

ZONING MAP

Gray & Osborne, Inc.
CONSULTING ENGINEERS

Export Date: 2/21/2025

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APPLICATIONS FOR NEW SERVICE

Applications for new service by the City's water system must be made in writing.

The applicant will incur connection charges for the new service as outlined in Chapter 10. The costs of water main extensions or upsizing to accommodate the new service will also be borne by the applicant. Applicants may dispute decisions regarding water service connections or extensions by filing an appeal with the City Council.

Water services located outside of the city limits are charged a 50 percent surcharge on the connection charge and service charge for in-City services.

ADDITIONAL SERVICE AREA POLICIES

DOH has established a list of service area policies that will be addressed in a water system plan. These policies guide the development of the water system and provides direction as to how a utility will respond to requests for water service within its service area. Table 1-9 provides a list of these DOH policies and descriptions and the City's policies.

TABLE 1-9

Service Area Policies

DOH Policy Name	Policy Description	City of Ilwaco Policy	Source
Wholesaling Water	Will the City provide water to other utilities on a wholesale basis?	The City provides water to the City of Long Beach on a wholesale basis. Agreements concerning these wholesale supplies are given in Appendix B.	City of Ilwaco Agreements
Annexation Policy	How annexation relates to the provision of water service.	a) Only properties within the UGA can annex to the City. b) New development allowed only when and where public facilities are adequate. c) Existing and new development will share equally in the cost for new or expanded capital facility improvements that correct existing LOS deficiencies	a) Ilwaco Municipal Code (IMC) 15.90 b) 2020 City Comprehensive Plan c) 2020 City Comprehensive Plan
Direct Connection and Remote System Policy	New developments directly connect to existing water system, or whether satellite systems will be allowed.	Satellite systems are not allowed. The ownership and all necessary easements of all developer constructed water systems must be transferred to the City to enable the City to operate and maintain the system	IMC 15.76.010
Design and Performance Standards Policy	Minimum design and performance standards for development	All proposed developments must comply with standards and specification of the City. The City's design standards include the APWA Standard Specifications and DOH Design Manual.	IMC 15.76.170 and City of Ilwaco Development Standards
Surcharge for Outside Customers	A surcharge for customers outside of its corporate boundaries.	The City of Ilwaco imposes a 50 percent surcharge on monthly utility rates for service outside of the corporate boundaries.	Ilwaco Resolution No. 2010-09

TABLE 1-9 – (continued)

Service Area Policies

DOH Policy Name	Policy Description	City of Ilwaco Policy	Source
UGA	Responsibility for service provided in UGA, how provided, and how financed.	a) New development allowed only when and where public facilities are adequate. b) Existing and new development will share equally in the cost for new or expanded capital facility improvements that correct existing LOS deficiencies	a) 2020 City Comprehensive Plan b) 2020 City Comprehensive Plan
Late-Comer Agreements	Allows late-comer agreements for those who propose to extend the water system and provides provisions for pay back.	Decided on a case by case basis.	--
Oversizing Policy	Provides funds to install larger than needed facilities to allow for future development, if needed.	The City does not currently have an established oversizing policy for water.	--
Cross-Connection Control Program	Regulates cross-connections and includes steps taken if a cross-connection is discovered.	All residential and commercial customers are surveyed as to the existence of cross connections. The City will determine the type of protection required. Annual testing of devices required.	Cross-Connection Control Program, Appendix E

TABLE 1-9 – (continued)

Service Area Policies

DOH Policy Name	Policy Description	City of Ilwaco Policy	Source
Extension Policy	Regulates extension of the system, including identity of responsible party. Design standards and payment included in conditions of service.	a) New development allowed only when and where public facilities are adequate. b) Existing and new development will share equally in the cost for new or expanded capital facility improvements that correct existing LOS deficiencies c) The ownership and all necessary easements of all developer constructed water systems must be transferred to the City to enable the City to operate and maintain the system d) All proposed developments must comply with standards and specification of the City. The City's design standards include the APWA Standard Specifications and DOH Design Manual	a) 2020 City Comprehensive Plan b) 2020 City Comprehensive Plan c) IMC 15.76.010 d) IMC 15.76.170 and City of Ilwaco Development Standards
Satellite Management Agencies	Outlines policies for how satellite management agencies are managed.	The City does not intend to become a Satellite Management Agency	--
Duty to Provide Service	The City of Ilwaco has a duty to provide water service to potential customers residing within its retail service area.	If a potential customer is adjacent to an existing water main, the applicant is charged a connection fee and connected to the water main. If a water main extension is required, the City requires that engineered drawings be submitted for approval by the City's Engineer. Upon approval, the City will allow installation within its right-of-way.	Washington Administrative Code 246-290-106, Duty to Provide Service

CHAPTER 2

BASIC PLANNING DATA

INTRODUCTION

The objective of this chapter is to present basic planning data and derive characteristic water parameters for the City of Ilwaco's (City) water system. These characteristic parameters will then be used for forecasting the City's future water demand. This chapter provides existing and projected water demand, population, service connections, and Equivalent Residential Units (ERU). Water demands are forecasted through both the 10- and 20-year planning periods. These forecasted demands will later inform the system capacity analysis in Chapter 3.

EXISTING POPULATION, SERVICES, AND WATER DEMAND

SERVICE AREA POPULATION

The City's water retail service area (RSA) is comprised of the entirety of city limits as well as adjacent areas in unincorporated Pacific County. The City's retail service area population over the last 10 years is shown in Table 2-1. Historical population for the City of Ilwaco was obtained from the Washington State Office of Financial Management (OFM) while historical population outside of city limits was estimated by multiplying the given year's number of single-family residential connections outside city limits (obtained by the City's billing records) by Ilwaco's average household (2.98 persons per household) size as determined by the *2020 Comprehensive Plan.*

TABLE 2-1

Historical Retail Service Area Population

Year	Inside City Limits	Outside City Limits	Service Area Population	Annual Growth Rate
2014	993	134	1,127	-
2015	1,008	128	1,136	0.80%
2016	1,019	125	1,144	0.71%
2017	1,032	122	1,154	0.88%
2018	1,060	128	1,188	2.94%
2019	1,072	131	1,203	1.26%
2020	1,087	137	1,224	1.74%
2021	1,085	140	1,225	0.08%
2022	1,100	146	1,246	1.71%
2023	1,100	161	1,261	1.20%
Average				**1.26%**

Table 2-1 illustrates that the City's RSA population has steadily grown over the previous ten years. The average annual growth rate between 2014 and 2023 was 1.26 percent.

SERVICE CONNECTIONS

Unlike other coastal communities, the City of Ilwaco's customers are largely made up of full-time residents. Many of the part-time residents are associated with the camp grounds at Cape Disappointment State Park and other RV parks for visitors (although the RV parks do have a number of full-time residents). The City currently has four RV parks that are inside the RSA. Cape Disappointment State Park has multiple connections throughout park grounds and also has an area for visitors to camp at. The number of service connections in the City's water system is shown by customer class in Table 2-2.

TABLE 2-2

City of Ilwaco Historical Service Connections by Customer Class

Customer Type	2018	2019	2020	2021	2022	2023
Single-Family Residential	492	491	493	504	505	506
Multi-Family Residential(1)	22	22	22	22	22	22
Commercial	96	93	94	100	100	97
RV Parks	4	4	4	4	4	4
Cape Disappointment State Park(2)	6	6	6	5	5	5
Total	**620**	**616**	**619**	**635**	**636**	**634**

(1) The 22 multi-family residential connections served a total of 53 units. These units are primarily made up of apartments and triplexes.

As previously mentioned, the City's RSA covers the City's limits as well as some areas just outside of the City. A majority of the connections outside city limits comprise of single-family residences and some part-time connection services. The City's 2023 active service connections inside and outside city limits are shown in Table 2-3.

TABLE 2-3

City of Ilwaco Year 2023 Active Service Connections

Customer Type	Inside City Limits	Outside City Limits	Total
Single-Family Residential	452	54	506
Multi-Family Residential[(1)]	22	0	22
Commercial	97	0	97
RV Parks	3	1	4
Cape Disappointment State Park	0	5	5
Total	**574**	**60**	**634**

(1) These 22 multi-family residential connections served a total of 53 units. These units are primarily made up of apartments and triplexes.

HISTORIC WATER DATA

Production History

The City records the amount of water the system produces at the water treatment plant (WTP) on a daily basis. A summary of the City's historical annual water production is provided in Table 2-4 while monthly totals and seasonal trends are shown in Figure 2-1.

TABLE 2-4

Annual Net Metered Water Production

Year	Water Treatment Plant Production (MG)	Backwash (MG)	Backwash as Percentage of Total Production
2018	88.7	2.7	3.08%
2019	83.4	3.0	3.63%
2020	65.8	4.0	6.06%
2021	87.3	3.1	3.50%
2022	77.2	3.3	4.22%
2023	86.8	3.9	4.51%
Average	**81.5**	**3.3**	**4.17%**

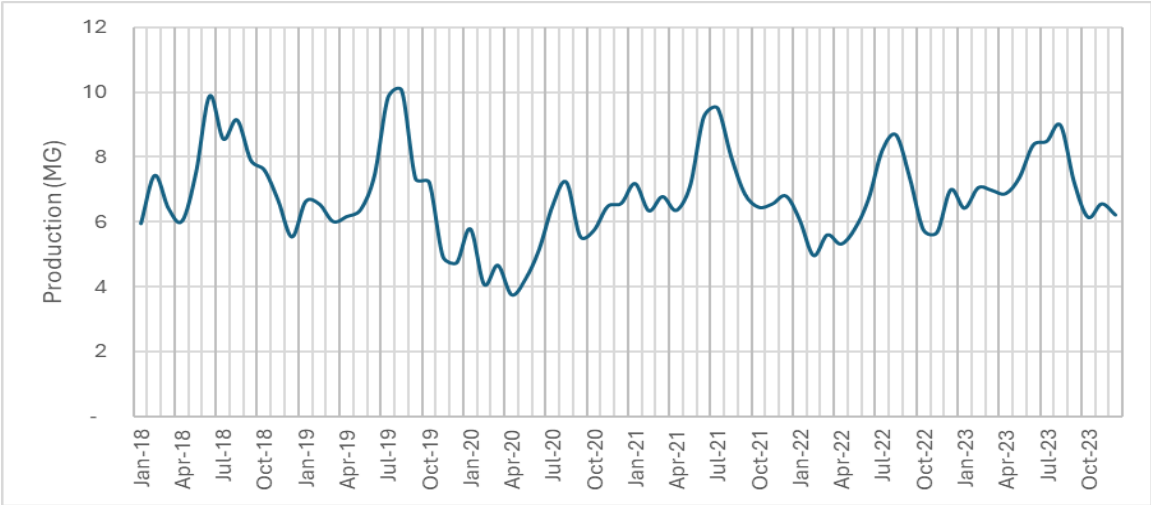


FIGURE 2-1

Monthly Metered Water Production

As shown in Table 2-4, the City's water production varied between 65.8 and 88.7 MG with notable lows in production occurring in 2020 and 2022. Production dipped in 2020 due to Jesse's Seafood processing plant ceasing operation and a pause in fish processing due to Covid. Additionally, production dipped in 2022 partially due to a SCADA formatting issue and an uncalibrated meter within the water treatment plant. Aside from 2020 and 2022 values, annual production totals have remained relatively steady.

As shown in Figure 2-1, production typically peaked in the summer months between July and September and was at its lowest during the winter months.

Average and Maximum Day Production and Max Day Peaking Factor

The terms average day production and maximum day production are intended to be used interchangeably with the terms Average Daily Demand (ADD) and Maximum Daily Demand (MDD) respectively as described in the Washington State Department of Health (DOH) *2020 Water System Design Manual.* One of the purposes of analyzing the ADD and MDD is to determine an annual maximum day peaking factor, which approximates the maximum amount of demand from a system in a singular day relative to the average day. The max day peaking factor will be used to project the MDD in the water demand forecasts summarized in Table 2-13 at the conclusion of this chapter.

The average day production for each year was calculated by dividing the total yearly metered water production (as shown in Table 2-4 above) by the number of days in a given year. Maximum day production was taken from the City's daily production records from the WTP. A max day peaking factor was then derived for each year by dividing the MDD

by the ADD of a given year. The average day and maximum day production along with the respective peaking factor for 2018 through 2023 is shown in Table 2-5.

TABLE 2-5

Maximum Day to Average Day Ratio

Year	Average Day Production (gpd)	Maximum Day Production (gpd)	Max Day Peaking Factor
2018	243,115	468,000	1.93
2019	228,439	583,000	2.55
2020	179,781	506,000	2.81
2021	239,193	516,000	2.16
2022	211,518	451,000	2.13
2023	237,694	653,000	2.75
Average Ratio			**2.39**

From Table 2-5, the maximum day peaking factor has fluctuated between 1.93 and 2.81 over the last 6 years while the average factor was 2.39. This characteristic ratio will be used to determine maximum day demand in the water demand projections at the conclusion of this chapter.

Consumption History

The City's water consumption from 2018 through 2023 for each customer class is shown in Table 2-6.

TABLE 2-6

Metered Consumption by Customer Class(1) (MG)

Year	Single-Family Residential	Multi-Family Residential	Commercial	RV Parks	State Park	Total
2018	20.96	1.09	22.09	2.92	3.44	50.50
2019	21.14	0.96	28.42	3.83	3.37	57.73
2020	21.86	1.09	16.53	4.89	2.61	46.99
2021	21.39	1.02	17.22	5.72	3.70	49.06
2022	19.45	0.92	16.20	4.34	3.03	43.94
2023	20.45	1.17	19.09	4.59	3.04	48.34
Average	**20.88**	**1.04**	**19.92**	**4.38**	**3.20**	**49.43**

(1) Includes totals of inside and outside city limits.

Single-family residential (SFR), multi-family residential (MFR), and State Park consumption has stayed relatively steady over the last 6 years except for 2020 when the restrooms were closed for COVID. Commercial consumption peaked in 2019, was lower between 2020 and 2022, and rebounded slightly in 2023, reflecting the changing of ownership and processing technique of the fish processing facilities in 2020. The RV parks have experienced growth over the period as a couple of the RV parks have expanded. Additionally, the Beacon RV Park does not currently have anyone living there but there is a large leak after their service meter, which the RV park is paying for.

Distribution System Leakage

Distribution system leakage (DSL) is defined as the difference between metered source production and all authorized water usage. All non-metered or untracked water is simply considered DSL, whether it is resulting from actual leakage in the distribution system or is caused by some other factor such as un-metered usage, theft or inaccurate meters. DSL from 2018 through 2023 is summarized in Table 2-7.

TABLE 2-7

Historical Distribution System Leakage

Year	Metered Production, MG	Metered Consumption, MG	Filtered Backwash (MG)	Total Accounted for Water (MG)	Distribution System Leakage (MG)	Distribution System Leakage (%)	3-Year Rolling Average
2018	88.74	50.50	2.73	53.23	35.51	40.0%	--
2019	83.38	57.73	3.02	60.76	22.62	27.1%	--
2020	65.80	46.99	3.99	50.97	14.83	22.5%	29.9%
2021	87.31	49.06	3.05	52.11	35.19	40.3%	30.0%
2022	77.20	43.94	3.26	47.20	30.01	38.9%	33.9%
2023	86.76	48.34	3.92	52.26	34.50	39.8%	39.6%

(1) Authorized consumption is the sum of WTP backwash and metered consumption.

Table 2-7 shows that DSL has hovered between 24 and 41 percent over the last 6 years. While most years were around 40 percent, DSL in 2018 and 2019 was 28 and 24 percent, respectively. The current 3-year running average as of 2023 is 40.7 percent. The City is not in compliance with the Water Use Efficiency Rule and a Water Loss Control Action Plan will be detailed in Chapter 4 to address the high DSL. It should be noted that City has recently installed a new flow meter at Indian Creek reservoirs and at the WTP and it was seen that the old meters were inaccurate and there may be less DSL than reported.

The forecasted projections at the end of this chapter will assume 92,000 gpd of DSL, equivalent to the average daily loss for the last 3 years.

EQUIVALENT RESIDENTIAL UNITS

The concept of Equivalent Residential Units (ERUs) is used to have a single characteristic parameter to describe water demand across all customer classes expressing water use by non-residential customers as an equivalent number of residential customers. Typical ERU consumption is calculated by dividing the total volume of water utilized in the single family residential (SFR) customer class by the total number of active SFR connections. This number defines the average consumption per ERU, which can be referred to as ERU_{ADD}. The average day demand of any other customer class can then be divided by ERU_{ADD} in order to determine the number of ERUs for a given customer class. The maximum day consumption per ERU (ERU_{MDD}) can also be determined by multiplying a given year's computed ERU_{ADD} by the corresponding maximum day peaking factor found in Table 2-4. The equivalent residential unit calculations for both ERU_{ADD} and ERU_{MDD} from 2018 through 2023 are summarized in Table 2-8.

TABLE 2-8

Equivalent Residential Units (ERUs) 2018-2023

Year	SFR Consumption (gpd)	Number of SFR Service Connections	ERU_{ADD}(1)	ERU_{MDD}(2)
2018	57,432	492	117	225
2019	57,926	491	118	301
2020	59,730	493	121	341
2021	58,609	504	116	251
2022	53,300	505	106	225
2023	56,031	506	111	304
Average			**115**	**274**

(1) ERU_{ADD} = (Single-Family Residential Consumption in GPD) / (Number of Single-Family Residential Connections).

(2) ERU_{MDD} = ERU_{ADD} * Maximum Day Peaking Factor for given year (from Table 2-5).

The average ERU_{ADD} and ERU_{MDD} values above are characteristic parameters to the Ilwaco water system and will be used to forecast water use projections later in this Chapter and will play a key role in determining system capacity in Chapter 3.

Table 2-9 presents consumption in the form of ERUs for all customer classes in Service Area, based on the value of ERU_{ADD} for 2023. DSL is included in order to quantify the distribution system's total water in terms of ERUs.

TABLE 2-9

2023 Consumption by Customer Class as Equivalent Residential Units

Customer Class	2023 Consumption (gpd)	Number of Connections	ERUs[(1)]	Number of ERUs per Connection
Single-Family Residential	56,031	506	506	1.0
Multi-Family Residential	3,204	22	29	1.3
Commercial	73,207	106	661	6.2
RV Parks	12,584	4	114	28.4
Cape Disappointment State Park	8,335	5	75	15.1
Distribution System Leakage	94,521	-	854	-
Total	**226,962**	**634**	**2,050**	**-**

(1) The ERU value used for this table is the 2023 ERU_{ADD} (111 gpd/ERU) from Table 2-8.

Large Water Users

The 10 largest water users in the City's water system are listed in Table 2-10, along with their year 2023 average day metered consumption.

TABLE 2-10

2023 Top Water Users

Customer	Customer Classification	2023 Average Day Metered Consumption (gpd)	Percent of Total Consumption	Number of ERUs
Safe Coast Seafoods, WA LLC	Commercial	21,856	16.5%	197
City of Ilwaco	Commercial	17,591	13.3%	159
Washington State Parks	Commercial	8,335	6.3%	75
Beacon RV Park - Deerpoint Meadows Investments	Commercial	6,340	4.8%	57
Port of Ilwaco	Commercial	5,182	3.9%	47
Eagle's Nest RV Resort LLC[(2)]	Commercial	3,582	2.7%	32
USCG Finance Center	Commercial	2,980	2.3%	27
A-1 Redi-Mix	Commercial	2,486	1.9%	22
Ocean Beach Hospital	Commercial	2,022	1.5%	18
Surf Pines, c/o Cascade Management	Multi-Family Residency	1,853	1.4%	17
2023 Total Consumption		**72,226**	**54.5%**	**652**

(1) The ERU value used for this table is the 2023 ERU_{ADD} (111 gpd/ERU) from Table 2-8.
(2) Large usage due to a leak on the customer side.

As shown in Table 2-10, these customers accounted for approximately 54.5 percent of metered consumption in 2023. The majority of the large users are commercial customers.

Peak Hour Demand

Peak Hour Demand (PHD) is the quantity of water that the City that uses on the peak hour of the peak day. Peak hour demand is determined by using the DOH's *2020 Water System Design Manual* guidelines. The equation used to estimate the peak hour demand is:

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

Where:

PHD = Peak Hourly Demand, (gallons per minute, gpm)
ERU_{MDD} = Maximum Day Demand per ERU (Table 2-8)
N = Number of ERUs (Table 2-9)
C = Coefficient Associated with Ranges of the number of ERUs (1.6)
F = Factor Associated with Ranges of the number of ERUs (225)

ERU_{MDD} for 2023 can be found in Table 2-8 and the number of ERUs for 2023 is calculated by dividing the average day production by ERU_{ADD}. The values for C and F of the peak hour demand formula are taken from the DOH Water System Design Manual, Table 3-1.

Given the number of ERUs currently served by the City, the C value is equal to 1.6 and the F value is equal to 225. The peak hour factor from 2018 through 2023 is reported in Table 2-11.

TABLE 2-11

Peak Hour Demand from 2018 through 2023

Year	Number of System ERUs[(1)]	ERU_{MDD}[(2)] (gpd/ERU)	Peak Hour Demand (gpm)	Maximum Day Production[(3)] (gpm)	Peak Hour Peaking Factor[(4)]
2018	2,083	225	573	325	1.76
2019	1,936	301	713	405	1.76
2020	1,484	341	634	351	1.80
2021	2,057	251	631	358	1.76
2022	2,004	225	554	313	1.77
2023	2,147	304	791	453	1.75
Average					**1.77**

(1) Number of System ERUs = Average Day Production (from Table 2-4) / ERU_{ADD} (from Table 2-8).
(2) From Table 2-8.
(3) From Table 2-5, converted from gpd to gpm.
(4) Peak Hour Factor = Peak Hour Demand/Maximum Day Production.

The City's peak hour demand has stayed steady between 2018 and 2023. A peak hour peaking factor of 1.77 will be used for the water demand projections at the end of this chapter.

FUTURE POPULATION AND WATER DEMANDS

PROJECTED POPULATION

Population projections for the 20-year planning horizon were estimated for the City of Ilwaco RSA after assessing historical population data, projections in the City's Comprehensive Plan, and estimates provided by the Washington Office of Financial Management (OFM).

For the population inside city limits, OFM projects that the City will grow 0.38 percent annually over the 20-year planning horizon. In comparison, the historical annual growth rate has been 1.26 percent over the last 10 years. To be conservative, an annual growth rate of 1.26 percent has been used to project inside city limits population over the next 20 years.

The outside City limits population was estimated using OFM county projections. OFM projects annual county population using a low, medium, and high population growth estimate. The high annual population growth rate, 0.48 percent, will be used for projection purposes.

Table 2-12 shows projected annual water service area population over the 20-year planning horizon for the City.

TABLE 2-12

Projected Service Area Population

Year	Inside City Limits Population	Outside City Limits Population	Service Area Population	Annual Growth Rate
2024	1,115	167	1,282	1.66%
2025	1,129	168	1,297	1.16%
2026	1,143	168	1,311	1.16%
2027	1,158	169	1,327	1.16%
2028	1,172	170	1,342	1.16%
2029	1,187	171	1,358	1.16%
2030	1,202	172	1,374	1.16%
2031	1,217	173	1,390	1.16%
2032	1,232	173	1,405	1.16%
2033	1,248	174	1,422	1.16%
2034	1,263	175	1,438	1.16%
2035	1,279	176	1,455	1.16%
2036	1,295	177	1,472	1.16%
2037	1,312	178	1,490	1.16%
2038	1,328	179	1,507	1.17%
2039	1,345	179	1,524	1.17%
2040	1,362	180	1,542	1.17%
2041	1,379	181	1,560	1.17%
2042	1,396	182	1,578	1.17%
2043	1,414	183	1,597	1.17%
2044	1,432	184	1,616	1.17%
2045	1,450	185	1,635	1.17%
2046	1,468	186	1,653	1.17%

WATER DEMAND PROJECTIONS

Water use projections will use the City's characteristic water demand parameters, which are derived from historic water data earlier in this chapter and summarized below. Single-family residential, multi-family residential, and commercial ERUs will be multiplied by ERU_{ADD} (115 gpd/ERU) in order to determine average day consumption for each category. The number of ERUs for each customer class will grow at the same rate as population as it is assumed that total population growth in the City will translate to an equivalent amount of growth amongst all customer classes. The percent growth each year

will match the projected growth rates described in Table 2-12. Yearly DSL will be held constant at 92,000 gallons per day, which corresponds to the average day DSL over the past 3 years. Filter backwash is projected to make up 4.2 percent of total production as that was the average filter backwash to total production ratio over the last six years. Maximum day production will be determined by multiplying the computed average day production by the 2.39 peaking factor determined in Table 2-5, while peak hour demand will be determined by multiplying MDD (in gpm) by the peak hour peaking factor of 1.77, as determined in Table 2-11.

Water demand projections for the 10- and 20-year planning periods are presented in Table 2-13.

TABLE 2-13

Water Demand Projections

Year	Population	Average Day Consumption by Customer Class						DSL		Total System ERUs[2]	Filter Backwash[3] (gpd)	ADD[4] (gpd)	MDD[5] (gpd)	PHD[6] (gpm)
		SFR[1] (gpd)	MFR[1] (gpd)	Commercial[1] (gpd)	RV Parks[1] (gpd)	Cape Disappointment State Park[1] (gpd)	Total (gpd)	DSL (gpd)	DSL (%)					
2024	1,282	59,157	3,390	55,182	13,328	8,768	139,826	92,000	38%	2,016	10,164	241,990	578,356	711
2025	1,297	59,841	3,430	55,821	13,482	8,870	141,444	92,000	38%	2,030	10,234	243,678	582,390	716
2026	1,312	60,534	3,469	56,467	13,638	8,972	143,080	92,000	37%	2,044	10,306	245,387	586,474	721
2027	1,327	61,235	3,510	57,120	13,796	9,076	144,737	92,000	37%	2,059	10,379	247,116	590,607	726
2028	1,342	61,944	3,550	57,782	13,956	9,181	146,414	92,000	37%	2,073	10,452	248,866	594,791	731
2029	1,358	62,663	3,591	58,452	14,118	9,288	148,111	92,000	37%	2,088	10,527	250,638	599,025	736
2030	1,374	63,389	3,633	59,130	14,281	9,396	149,829	92,000	36%	2,103	10,602	252,431	603,311	742
2031	1,390	64,125	3,675	59,816	14,447	9,505	151,568	92,000	36%	2,118	10,678	254,247	607,649	747
2032	1,406	64,870	3,718	60,511	14,615	9,615	153,328	92,000	36%	2,133	10,756	256,084	612,040	752
2033	1,422	65,623	3,761	61,214	14,785	9,727	155,110	92,000	36%	2,149	10,834	257,943	616,484	758
2034	1,439	66,386	3,805	61,925	14,957	9,840	156,913	92,000	35%	2,164	10,913	259,825	620,983	763
2035	1,455	67,158	3,849	62,646	15,131	9,954	158,738	92,000	35%	2,180	10,993	261,731	625,536	769
2036	1,472	67,940	3,894	63,375	15,307	10,070	160,585	92,000	35%	2,196	11,074	263,659	630,145	775
2037	1,489	68,731	3,939	64,113	15,485	10,187	162,455	92,000	35%	2,213	11,156	265,611	634,810	780
2038	1,507	69,532	3,985	64,860	15,665	10,306	164,348	92,000	34%	2,229	11,239	267,586	639,531	786
2039	1,524	70,342	4,031	65,616	15,848	10,426	166,263	92,000	34%	2,246	11,323	269,586	644,311	792
2040	1,542	71,163	4,078	66,381	16,033	10,548	168,202	92,000	34%	2,263	11,408	271,610	649,148	798
2041	1,560	71,993	4,126	67,155	16,220	10,671	170,165	92,000	34%	2,280	11,494	273,659	654,045	804
2042	1,578	72,833	4,174	67,939	16,409	10,795	172,152	92,000	33%	2,297	11,581	275,733	659,001	810
2043	1,597	73,684	4,223	68,733	16,601	10,922	174,163	92,000	33%	2,314	11,669	277,832	664,017	816
2044	1,615	74,545	4,272	69,536	16,795	11,049	176,198	92,000	33%	2,332	11,758	279,956	669,095	822
2045	1,634	75,417	4,322	70,349	16,991	11,178	178,258	92,000	33%	2,350	11,848	282,107	674,235	829
2046	1,653	76,299	4,373	71,172	17,190	11,309	180,343	92,000	32%	2,368	11,940	284,284	679,438	835

(1) Assumes an annual growth rate equivalent to the annual growth rates (Table 2-12)
(2) Total Consumed ERUs = (Total Customer Consumption + DSL) / ERUADD definition (Table 2-8).
(3) Filter Backwash = 4.2 percent of Average Day Production (ADD)
(4) Average Day Production (ADD) = Total Customer Consumption + DSL + Filter Backwash
(5) Maximum Day Production (MDD) = ADD * 2.39 MDD Peaking Factor (Table 2-5).
(6) PHD = MDD * 1.77 Peak Hour Peaking Factor (Table 2-11).

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CHAPTER 3

SYSTEM ANALYSIS

OBJECTIVE

Water system planning includes a careful analysis of a water utility's ability to meet minimum level of service standards for existing and future customers. In this chapter, design standards are presented which identify criteria that are applicable to the City of Ilwaco's water system. A water quality and facility analysis will then compare the existing water quality and system facilities to these design standards. Based on this comparison, water system deficiencies will be identified and recommendations to improve compliance with the required standards are developed. Proposed improvement projects to address system deficiencies are presented in Chapter 7.

SYSTEM DESIGN STANDARDS

STATE STANDARDS

The Washington State Department of Health (DOH) relies on various publications of standards, agencies, and the utility itself to establish design criteria. The following is a brief description of three of the most widely recognized performance and design standards:

WAC 246-290, Group A Public Water Systems, Washington State Department of Health (May 2024)

This is the primary drinking water regulation utilized by the Washington State Department of Health (DOH) to assess capacity, water quality, and overall compliance with drinking water standards.

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

Significant revisions to the Water System Design Manual have recently been adopted. These standards will 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.

CITY STANDARDS

DOH relies on the City itself to establish design criteria. The following gives a brief description of the referenced City design standards:

City of Ilwaco Standard Water System Standards

These standards include detailed specifications for materials and workmanship for installation of water main extensions, including piping installation details, 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 D.

SYSTEM CAPACITY 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 with regard to each standard for general facility design.

TABLE 3-1

General Facilities Requirements

Standard	DOH Water System Design Manual (June 2020)	City of Ilwaco Water System Standard
Average Day and Maximum Day Demand	Average Day Demand (ADD) per ERU (ERU_{ADD}) and Maximum Day Demand (MDD) per ERU (ERU_{MDD}) should be determined from metered water use data if available.	ADD = Calculated from Metered Monthly Production Data MDD = 2.39 * ADD; with 2.39 being the maximum day peaking factor (See Table 2-5)
Peak Hour Demand	Peak hour demand in gallons per minute is estimated using the following equation: $PHD = (ERU_{MDD}/1440)[(C)(N) + F] + 18$ C = Coefficient from DOH Table 3-1 N = Number of connections, ERUs F = Factor from DOH Table 3-1	PHD = 1.77 * MDD; with 1.77 being the maximum day peaking factor (See Table 2-11, which takes the average of the DOH formula across 5 years)
Storage Capacity	Water systems must account for and provide storage equal to the sum of: Operational Storage = Volume sufficient to prevent excessive pump cycling. Equalizing Storage = (PHD – QS) *(150 mins) Standby Storage = $(N)(SB_i)(T_d)$ Fire Suppression Storage = $(FF)(t_m)$	Same as DOH Water System Design Manual. Standby storage and fire suppression storage are nested *See storage capacity analysis
Minimum System Pressure	The system shall be designed to maintain a minimum of 30 psi in the distribution system under peak hour demand and 20 psi under fire flow conditions during MDD.	Same as DOH Water System Design Manual.
Maximum System Pressure	Working pressure in the distribution system should be limited to 80 psi unless the design engineer can justify the need for higher pressure and verify that the pipe material is appropriate for the design working pressure.	Pressure reducing valves in the water service pipe are required when street main pressure exceeds 80 psi per City of Ilwaco Development Standards, Chapter 7.

TABLE 3-1 – (continued)

General Facilities Requirements

Standard	DOH Water System Design Manual (June 2020)	City of Ilwaco Water System Standard
Fire Flow Standards	The minimum fire flow shall be determined by the local fire authority or WAC 246-293 for systems within a Critical Water Supply Service Area (CWSSA), whichever is greater.	Ilwaco sets flow requirements of 500 gpm for single-family residential and 3,000 gpm for Multi-Family/Commercial/ Industrial flows in the City Center Zone
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.	Same as DOH Water System Design Manual.
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, three valves at every tee and four at every cross unless otherwise directed by the City. Valves on each end of an easement or at each end of a water main in an easement.
Source Reliability	Minimum requirement is to supply MDD in 24 hours of pumping. Supply of MDD in 20 hours of pumping is recommended.	Since the City has a single source of supply and no interties, the City has adopted a source reliability criteria of supplying MDD in 20 hours of pumping

WATER QUALITY STANDARDS

The City's water system 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 13, 2024, as well as sections of Code of Federal Regulations (CFR) Title 40, Parts 141 and 143, adopted by reference in WAC 246-290. The City has a surface water supply, so surface water supply regulations apply.

Group A public community water systems must comply with the drinking water standards of the Federal Safe Drinking Water Act and its amendments. DOH adopted the updated Federal Standards under WAC 246-290. Furthermore, since the City of Ilwaco receives water from a surface water source, the Groundwater Rule applies.

Table 3-2 lists existing drinking water regulations. The table also indicates whether or not the regulation is applicable to the City of Ilwaco. Existing state law contains regulations concerning bacteriological contaminants, disinfection by-products (DBPs), inorganic chemicals and inorganic physical parameters (IOCs), volatile organic chemicals (VOCs), synthetic organic chemicals (SOCs), and radionuclides.

TABLE 3-2

Existing Drinking Water Regulations

Rule	Regulated Contaminant	Sample Location	City Action
Surface Water Treatment Rule	Microbial Contaminants	Source	Monitoring
Long-Term 1 Enhanced Surface Water Treatment Rule	Bacteriological	Source	Monitoring
Long-Term 2 Enhanced Surface Water Treatment Rule	Bacteriological	Source	Monitoring
Inorganic Chemicals (IOC), and Physical Parameters	IOCs	Source	Monitoring
Arsenic Rule	Arsenic	Source	Monitoring
Volatile and Synthetic Organic Compounds	VOCs, SOCs	Source	Monitoring
Per- and Polyfluoroalkyl Substances	PFAS	Source	Monitoring
Radionuclides Rule	Radionuclides	Source	Monitoring
Revised Total Coliform Rule	Coliform – Distribution System	Distribution	Monitoring
Disinfectants/Disinfection Byproducts Rule (DBPR) (Stage 1 and 2)	TTHMs, HAA5, Chlorite, Bromate(1)	Distribution	Monitoring
Asbestos Rule	Asbestos	Distribution	Monitoring
Lead and Copper Rule	Lead, Copper	Distribution	Monitoring
Revised Lead and Coper Rule	Lead, Copper	Distribution	Monitoring and Inventory submitted by October 2024
Residual Disinfectant	Total Free Chlorine	Distribution	Monitoring
Consumer Confidence Report	Reporting Only	N/A	In compliance

(1) TTHM = Total Trihalomethanes; HAA5 = Five Haloacetic Acids;

WATER QUALITY REPORTING

WAC 246-290-72001 requires the City to distribute a Consumer Confidence Report (CCR) annually to each customer. The City issues a report annually titled *Ilwaco Water Department CCR* that contains water quality data from the previous year. The 2023 issue of this report is included in Appendix F. General water quality monitoring requirements are summarized in *The Water Quality Schedule* for year 2024 available in Appendix G. The City has obtained several water quality monitoring waivers, which affect the monitoring requirements. Table 3-11 summarizes the City's monitoring requirements as shown on the *Water Quality Monitoring Schedule* for the year 2024.

TABLE 3-3

Source Monitoring Requirements and Waivers

Monitoring Parameter	Sampling Requirement	Sampling Location
Nitrate	One sample every year	Source
IOC	One sample every 9 years	Source
VOC	One sample every 6 years	Source
Herbicides, SOC 515.2	One sample every 9 years	Source
General Pesticides, SOC 525.2	State waiver thru Dec. 2025 for no samples	Source
Arsenic	One sample every 9 years	Source
Gross alpha	One sample every 6 years	Source
Radium 228	One sample every 6 years	Source
Coliform	Two samples/month until Aug 2024 Three samples/month post-Aug 2024	Distribution System
Lead and Copper	10 samples between Jan. 2023 –Dec. 2025	Distribution System

The following sections evaluate the record of water quality for the City. The water quality analysis is divided into five categories:

- Source Water Quality;
- Finished Water Quality;
- Distribution System Water Quality;
- Water Quality Reporting; and
- Water Quality Complaints.

SOURCE WATER QUALITY

As described in Chapter 1, the City has a single surface water source with a dam that impounds water from Indian Creek, a tributary of the Bear River. As the raw water is conveyed to the water treatment plant, water treatment chemicals are added and vary based on the water's turbidity. After the chemical additions, the water flows to the treatment units where it goes through a clarifying process. After it goes through the filtration system, the water is collected by the underdrain and flows to the clearwell.

Due to the filtering effect of riverbed gravels, the treatment plant influent waters have an average turbidity below 0.3 NTU.

Surface Water Source Monitoring

Monthly water treatment reports include basic raw water data, including raw water turbidity, temperature and pH. These tests are conducted from a raw water line and may be different from water quality data for water taken directly from Indian Creek.

Surface Water Treatment Regulatory Requirements

Description

The City's Drinking Water Treatment Facility (DWTF) currently meets all requirements of the Surface Water Treatment Rule, the Long Term 1 Enhanced Surface Water Treatment Rule, and the Long Term 2 Enhanced Surface Water Treatment Rule (LT2ESWTR).

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. The LT2ESWTR is intended to provide additional protection against Cryptosporidium by requiring purveyors with susceptible raw water supplies to provide additional treatment. The rule required purveyors serving less than 10,000 people to measure E. coli levels in their raw water for one year to determine their susceptibility to Cryptosporidium. For systems using a river as their primary source, if the average E. coli concentration was greater than 50 E. coli/100 mL, then the system is required to monitor their raw water for Cryptosporidium depending upon the level of Cryptosporidium in the source water.

Monitoring Requirements and Analysis

The City of Ilwaco's historical raw water coliform data was reviewed by the Department of Health and the City was not deemed to be a high-risk system. Therefore, no additional treatment is required to meet LT2ESWTR and the City is in compliance with these treatment rules.

Inorganic Chemical and Physical Water Quality

Inorganic chemical and physical (IOC) water quality monitoring results are summarized in Table 3-4. All samples are taken before treatment. The Maximum Contaminant Level (MCL) for all inorganic chemical and physical water quality parameters for which there are MCLs is listed in the right hand column. In most cases the detected chemicals and physical parameters are below the MCL, with the exception color, which was above the MCL limits.

TABLE 3-4

Inorganic Chemical Sampling Results[(1)]

Location	Raw Water Line	
Sample Date	1/14/2019	MCL
Primary Contaminants		
Arsenic	ND	0.01
Barium	0.0110	2.0
Cadmium	ND	0.005
Chromium	ND	0.1
Mercury	ND	0.002
Selenium	ND	0.05
Beryllium	ND	0.004
Nickel	ND	0.1
Antimony	ND	0.006
Fluoride[(2)]	ND	4.0
Nitrate-N	0.38	10.0
Total Nitrite/Nitrate	0.38	10
Secondary Contaminants		
Iron	ND[(5)]	0.3
Manganese	ND[(5)]	0.05
Silver	ND	0.1
Chloride	9.86	250.0
Sulfate	0.77	250.0
Zinc	ND	5.0
Sodium[(3)]	7.05	None
Hardness (mg/L as $CaCO_3$)	14.9	None
Conductivity (mmho/cm)	70.3	700.0
Color (color units)	**20**	15.0
Total Dissolved Solids	35.7	500
Lead[(4)]	ND	None[(4)]
Copper[(4)]	0.0440	None[(4)]

(1) All results mg/L unless otherwise noted.
(2) Fluoride has both a primary and secondary MCL. Concentrations above the secondary MCL (2.0 mg/L) cause aesthetic problems, while concentrations above the primary MCL (4.0 mg/L) are a public health concern.
(3) Sodium does not 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.
(4) The standards for Lead and Copper are distribution system action levels based on 90^{th} percentile distribution sample values.
(5) Sample taken 3/21/2023.

Arsenic

Description

Long-term exposure to low concentrations of arsenic in drinking water can lead to skin, bladder, lung, or prostate cancer. Non-cancer effects of ingesting arsenic at low levels include cardiovascular disease, diabetes, and anemia, as well as reproductive, developmental, immunological, and neurological effects. The EPA's Arsenic MCL is 0.01 mg/L.

Monitoring Requirements and Results

The Arsenic Rule makes monitoring requirements consistent with monitoring for other IOCs. Groundwater sampling for arsenic is required once every 3 years. Any system that has a sampling point monitoring result exceed the MCL must increase the frequency of monitoring at that sampling point to quarterly sampling. Compliance with the MCL is based on the running annual average of the samples. Systems triggered into increased monitoring are not considered in violation of the MCL until they have completed 1 year of quarterly sampling. However, if any sample result causes the running annual average to exceed the MCL at any sampling point, the system is out of compliance with the MCL immediately.

Arsenic results from the most recent testing is shown in Table 3-4. As shown, arsenic was non-detected.

Nitrite

Nitrite is an additional IOC sample that must be taken. These samples are required in years when complete inorganic chemical samples are not required. Table 3-5 summarizes additional nitrite and nitrate monitoring results.

TABLE 3-5

Nitrate Monitoring Results

Location	**Plant s/t**				
Sample Date	**3/27/2024**	**3/21/2023**	**3/17/2022**	**12/29/2021**	**MCL**
Nitrate	0.29	0.28	0.42	0.43	10

There are no IOCs that are over the MCL limit besides color. **The City of Ilwaco is in compliance with standards for IOCs.**

Volatile and Synthetic Organic Chemical Water Quality

Description

Volatile organic compounds (VOCs) are manufactured, carbon-based chemicals that vaporize quickly at normal temperatures and pressures. VOCs include many hydrocarbons associated with fuels, paint thinners, and solvents. This group does not include organic pesticides or herbicides, which are regulated separately as synthetic organic compounds (SOCs). VOCs are divided into the two following groups:

1. Regulated VOCs that have been determined to pose a significant risk to human health.

2. Unregulated VOCs for which the level of risk to human health has not been established.

Monitoring Requirements and Analysis

The City's sampling requirements for VOCs are shown in the Water Quality Monitoring Schedule. Indian Creek currently has a six-year waiver through at least December 2025. Table 3-6 shows the detected VOCs from the last sampling period.

TABLE 3-6

Volatile Organic Compounds Sampling Results(1)

Location	Indian Creek 2 Reservoir		
Sample Date	**10/4/2023**		
VOC	**Sample Result**	**SRL(2)**	**MCL**
Chloroform	5.3	0.5	N/A(3)
Bromodichloromethane	9.4	0.5	N/A(3)
Dibromochloromethane	8.4	0.5	N/A(3)
Bromoform	1.5	0.5	N/A(3)
Total Trihalomethane	24.6	N/A(3)	80.4

(1) Results are given in mg/L. All other VOC constituents were not detected.
(2) SRL = State Reporting Limit.
(3) N/A = Not Applicable (No requirement given)

The City's sampling requirements for SOCs (herbicides and pesticides) are shown in the Water Quality Monitoring Schedule. The City has a 3-year waiver through at least December 2025 requiring no samples to be tested for pesticides. Pesticides were last sampled in September 2006. The City also have a nine-year waiver through December 2031 requiring one sample of herbicides. Herbicides were last tested for in October 2015.

No SOCs were detected in either of these samples and no VOCs were over the MCL limit. **The City of Ilwaco is in compliance with the standards for VOCs and SOCs.**

Per- and Polyfluoroalkyl Substances (PFAS)

PFAS have become an increased concern for groundwater contamination in recent years. The substances are used to manufacture heat-, grease-, oil-, stain-, and water-resistant materials and are commonly found in consumer goods such as clothing, nonstick cookware and food packaging, as well as fire retardants and surfactants. PFAS are resistant to heat and chemical degradation and can build up in people, animals and the environment over time. The chemicals in the group known as PFAS may lead to negative health effects, including cancer, liver damage, and negative effects on developing babies. PFAS are typically found in groundwater near military bases, airports, and local fire departments.

Monitoring Requirements and Analysis

In Washington State, DOH's PFAS rule took effect in January 2022 and established state action levels (SAL) for five PFAS commonly found in drinking water (WAC 246-290-315(4)). The rule will require water systems to monitor all active, permanent, and seasonal sources beginning in 2023 and no later than 2025.

In March, 2023 the EPA established federal regulatory levels for six PFAS, including the five PFAS regulated by Washington State. The EPA Maximum Contaminant Levels (MCLs) are more stringent than those established by Washington State, thus adhering to federal MCLs will achieve compliance with both regulations. State Action Levels and EPA MCLs as well as 2024 sample results are displayed in Table 3-7.

TABLE 3-7

PFAS Monitoring[(1)(2)]

Sample Date	**8/21/2024**		
Compound	**Sample Results**	**SRL[(3)]**	**MCL**
PFOA	ND	10 ng/L	4.0 ng/L
PFOS	ND	15 ng/L	4.0 ng/L
PFHxS	ND	65 ng/L	Hazard Index = 1.0
PFNA	ND	9 ng/L	
PFBS	ND	345 ng/L	
HFPO-DA (Commonly known as GenX Chemicals)	ND	N/A	

(1) One nanogram per liter (ng/L) is equal to part per trillion (ppt)

(2) The PFA Hazard Index (HI) is made up of a sum of fractions. Each fraction compares the amount of four PFAs measured to the level determined not to cause health effects. HI can be found using the following equation: $PFHxS_{measured}/9 + PFNA_{measured}/10 + PFBS_{measured}/2000 + GenX_{measured}/10$.

(3) SRL = State Reporting Limit.

The City conducted tests at Indian Creek and results yielded no detectable levels of PFAs in the samples. **The City is in compliance with the standards for PFAs.**

Radionuclides

Radionuclides include radioactive substances occurring naturally in subsurface waters. Regulated substances include radium-226, radium-228, uranium, and gross alpha and beta particles. Radionuclide MCLs, as defined by EPA's Radionuclide Rule and WAC 246-290.

As shown on the Water Quality Monitoring Schedule, all sources require one sample for radionuclides every 6 years. The City has completed all radionuclide testing required through December 2025. Results of radionuclide testing are shown in Table 3-8.

TABLE 3-8

Radionuclide Testing

Sample Location: Well Treatment Plant Tap		**Sample Type:** Post-Treatment/Finished	
Sample Date	**Units**	**Gross Alpha**	**Radium 228**
7/6/2022	pCi/L	ND	ND

Results for the radionuclide tests are below the state reporting limits of 1.0 pCi/L for Radium 228 and 3.0 pCi/L for Gross Alpha. All previous tests before this date were also below the state reporting limit. **The City of Ilwaco is in compliance with the standards for radionuclides.**

PERFORMANCE OF WATER TREATMENT PLANT

The performance of the water treatment plant or finished water is defined by the water that has been treated but not yet in the distribution system. The following section outlines the City's sampling of finished water.

Turbidity

To meet the requirements of the Surface Water Treatment Rule, Long Term 1 Enhanced Surface Water Treatment Rule, and Long Term 2 Enhanced Surface Water Treatment Rule, the City's DWTF must meet certain turbidity performance requirements. Since the DWTF uses direct filtration, the DWTF must produce water that is less than 0.3 NTU in 95 percent of the measurements taken each month and must produce water that is less than 1.0 NTU at all times.

Finished water turbidity is reported on Water Treatment Plant Monthly Reports. Each day that the water treatment plant operates, the operators report a turbidity measurement for each 4-hour period that the plant operates. Water Treatment Plant Monthly Reports were

reviewed for the time period from January 2018 through December 2023. The finished water turbidity during the data period never exceeded the 1.0 NTU. All samples were below 0.3. NTU values typically ranged from 0.01 to 0.1 NTUs. No SWTR violations were noted during this period.

Disinfection

To meet the requirements of the Surface Water Treatment Rule, the City's DWTF must provide at least 1 log (90 percent) inactivation of Giardia lamblia cysts through disinfection. The performance in meeting this requirement is measured by determining on a daily basis whether the DWTF has provided adequate chlorine residual and contact time (CT) to during peak flows to provide 1 log inactivation of Giardia lamblia. On a daily basis, operating staff compare the CT provided to the CT required and determine an inactivation ratio. An inactivation ratio of greater than 1 means that the DWTF has provided a least 1 log inactivation of Giardia lamblia cysts. Reviewing water treatment plant monthly reports from January 2018 to December 2023, the City has always provided an inactivation ratio of at least 1.0.

Corrosion Control (pH)

The City of Ilwaco adjusts the pH of its finished water by adding sodium hydroxide to reduce corrosion of pipes in the distribution system. In 2018 and the beginning of 2019, pH levels typically ranged from 6.7 to 7.3, with the lowest pH level recorded in that time span being 6.6. The second half of 2019, DWTF staff adjusted pH levels to between 7.9 and 8.5. From 2020 to 2023, the City has adjusted and maintained a finished water pH between a typical range of 7.6 to 8.1. The City targets a finished water pH of 7.6 to 8.

DISTRIBUTION SYSTEM WATER QUALITY

Delivered water quality applies to a number of water quality monitoring requirements for the water 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. Chlorine residual decays in the distribution system, coliform bacteria can grow or can be introduced into the distribution system, disinfectant byproducts develop in the distribution system, asbestos is released into the distribution system from asbestos-concrete pipes, and water that is excessively corrosive can dissolve lead and copper from building plumbing. For these reasons, distribution system or delivered water quality monitoring is required. The following sections summarize delivered water quality monitoring by the City.

Revised Total Coliform Rule

Description

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.

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.

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.

Within 24 hours of learning of the total coliform positive sample result, at least three repeat samples must be collected and analyzed for total coliform. One repeat sample must be collected from the same tap as the original sample, one repeat sample must be collected within five service connections upstream, and one repeat sample must be collected within five service connections downstream. 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.

Monitoring Requirements and Analysis

The number of coliform samples required per monitoring period is based on the population served during the monitoring period. Each monitoring period is a calendar month. The City was required to take two distribution system coliform samples per month up until August 2024. As the population is expected to increase, the city is required to take 3 distribution system coliform samples per month from September 2024 and throughout 2025. A copy of the City's Coliform Monitoring Plan (CMP) is included in Appendix G.

The City currently takes three samples a month for all months except for July and August, which the City takes two samples. The City has taken all required samples, and had only one exceedance of total coliform on January 2, 2024. Follow up tests were taken the next day as per the Revised Total Coliform Rule, with all tests resulting in the

absence of total coliform and E coli. **Therefore, the City is in compliance with the Revised Total Coliform Rule.**

Disinfectant and Disinfection Byproduct Rule

Description

WAC 246-290-300(6) requires purveyors of public systems that provide water treated with chemical disinfectants to monitor for disinfectants and disinfection byproducts (D/DBP). The D/DBP Rule establishes residual disinfectant concentrations and MCLs for disinfection byproducts. Trihalomethanes (THMs) and haloacetic acids (HAA5) are a group of organic compounds that can be formed as a result of drinking water disinfection by chlorine and are; therefore, often referred to as disinfection byproducts. Total THMs include the sum of the concentrations of four disinfection byproducts: chloroform, bromoform, bromodichloromethane, and dibromochloromethane.

Monitoring Requirements and Analysis

Stage 1 of the D/DBP Rule was published in November 1998 and became effective in 2000. Under Stage 1 of the D/DBP Rule, the MCLs for TTHM and HAA5 is 80 micrograms per liter (µg/L) and 60 µg/L, respectively, and is based on the running annual average of two annual samples. Systems are required to prepare and implement a disinfection byproducts monitoring plan. The City's disinfection byproducts monitoring plan is included in the Water Quality Monitoring Plan. 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 number of samples taken is dependent on the population served. Systems serving between 500 and 9,999 people must collect two samples per year and systems serving between 10,000 and 99,999 people must collect four samples per quarter. Ilwaco's water system serves 500-9,999 people so they are required to collect two samples per year.

Samples were collected at the point of maximum residence time at the intersection of Lamontay Place and Ilahee Place. Recent samples were collected on March 27, 2024. Results of the most recent disinfection byproduct sampling are shown in Table 3-9.

TABLE 3-9

THM and HAA5 Sample Results

Sample Date	TTHM Concentration (ug/L)	HAA5 Concentration (ug/L)
MCL	**80**	**60**
1/17/2018	48.5	51.4
4/19/2018	34.3	29.5
8/15/2018	50.3	53.8
10/2/2018	61	25.9
2018(1)	48.5	40.2
3/29/2019	32.5	20.6
6/4/2019	46	20.3
8/7/2019	41.5	16.3
12/10/2019	**93**	**68.4**
2019(1)	53.3	31.4
2/12/2020	27.5	8.1
6/10/2020	40.3	20.3
10/13/2020	67.6	20.2
2020(1)	45.1	16.2
1/12/2021	34.4	33
3/2/2021	24.4	7.4
6/1/2021	36.7	12.4
9/7/2021	68.8	45
12/29/2021	49.9	32.9
2021(1)	42.8	26.1
3/2/2022	29.7	6.9
6/14/2022	34.6	13.3
9/7/2022	50.5	14.7
12/6/2022	52.3	19.5
2022(1)	41.8	13.6
3/7/2023	37.7	8.1
12/5/2023	52.4	29
2023(1)	45.1	18.6

(1) Locational running annual average.

There was one exceedance of HAA5 and TTHM that occurred in December 2019 but the running annual average was below the MCL. Additionally, all samples before and after December 2019 were reported below the Maximum Contaminant Level (MCL). **The City of Ilwaco is in compliance with the standards for THM and HAA5.**

Asbestos

Description

There has historically been much concern with the health risks associated with asbestos. Several studies and case histories have documented the hazards to internal organs as a result of inhalation of asbestos fibers. Data is limited on the effects of ingestion of asbestos fibers or on the effects of inhalation exposure from drinking water. Ingestion studies have not caused cancer in laboratory animals, although studies of asbestos workers have shown increased rates of gastrointestinal cancer.

Monitoring Requirements and Analysis

Asbestos is listed as a primary inorganic contaminant. However, it is not routinely included in IOC samples for public water systems. Because the City's system still contains asbestos-cement (AC) water lines, it must monitor asbestos in accordance with 40 CFR 141.23 (b). One sample in an area with AC pipe is required every 9 years. The City conducted asbestos sampling in 1999, 2009, and 2018. Results from their last three tests are displayed in Table 3-10.

TABLE 3-10

Asbestos Sample Results(1)

Date	Sample Result	SAL	MCL
1999	ND	0.20	7.0
2009	ND		
2018	ND		

(1) All units are in million fibers per liter (MFL).

There have been no detections of asbestos in their last three samples. **The City of Ilwaco is in compliance with the standards for asbestos.**

Lead and Copper Monitoring

Lead and copper monitoring is to determine if lead or copper are leaching out of customer service lines at a rate that is a health concern. The rule states that if 90 percent of the representative samples do not exceed the action levels for lead or copper, then the system is in compliance and no further action is required. The action level for lead is 0.015 mg/L and the action level for copper is 1.3 mg/L. The latest round of lead and copper sampling was completed in January 2022, which consisted of 20 samples. The highest level of lead was 0.0040 mg/L, the 90th percentile for lead was not detectable amounts of lead, and all other samples were not detectable amounts of lead. The highest level of copper was 0.0550 mg/L and the 90th percentile level for copper was

0.0440 mg/L. The City is on a reduced sampling schedule of one round of samples every 3 years. Table 3-11 summarizes the City's lead and copper monitoring results for 2022.

TABLE 3-11

Lead and Copper Monitoring Results 2022 Testing

Lead	
Sample Date	**1/11/2022**
Action Level, mg/L	0.015
State Reporting Level, mg/L	0.001
Maximum Concentration, mg/L	0.004
90th Percentile Concentration, mg/L	ND(1)
Number of Samples Taken	20
Number of Samples Exceeding Action Level	0
Copper	
Sample Date	**1/11/2022**
Action Level, mg/L	1.3
State Reporting Level, mg/L	0.02
Maximum Concentration, mg/L	0.0550
90th Percentile Concentration, mg/L	0.0440
Number of Samples Taken	20
Number of Samples Exceeding Action Level	0

(1) Non Detectable amount of contaminant.

From the City's most recent lead and copper test results, neither the 90th percentile concentration nor the maximum concentration test samples for both lead and copper exceed the action level limit. **The City is in compliance with the standards for Lead and Copper.**

Revised Lead and Copper Rule

The Revised Lead and Copper Rule (RLCR) set by the EPA will take effect in October 2024. It will focus on the creation and maintenance of a lead service line inventory where the water purveyor is required to test the service line on both the purveyor and customer sides of the meter with the ultimate goal of replacing all lead service lines. The inventory is required to be submitted by October 2024. Water systems will be required to identify and make public the locations of lead service pipes. The rule will also focus and establishing a "trigger level" for each containment. The EPA has also signaled its intent to emphasize testing for lead and copper in schools and child care facilities.

The City of Ilwaco completed this inventory before October 2024 and had a number of service lines made of unknown materials. These were noted for follow up investigation and customers were notified.

Residual Disinfectant

Description

According to WAC 246-290-300, systems providing surface water disinfection treatment or receiving water that has been disinfected, shall measure residual disinfectant concentration within the distribution system daily. A disinfectant residual must be maintained throughout the distribution system.

Monitoring Requirements and Analysis

Water in the distribution system must maintain a residual disinfectant concentration of at least 0.2 mg/L. City staff report a consistent chlorine residual of 1.6 to 0.7 mg/L.

WATER QUALITY COMPLAINTS

The City handles water quality complaints pursuant to their policy for dealing with complaints as described in Chapter 1. In the case of 'dirty' water complaints, the water operator will generally check the validity of the complaint by performing an on-site investigation and flush water mains if appropriate. The City's routine water main flushing program generally keeps water quality complaints to a minimum.

SYSTEM COMPONENT 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 and projected requirements based on growth and demand projections from Chapter 2. An overview and general description of the system is presented in Chapter 1.

WATER RIGHTS ANALYSIS

As shown in Table 1-5, the City's total water rights are currently 2.33 cfs, or 1,046 gpm, of instantaneous supply and 732 acre-ft of annual supply. Table 3-12 compares the existing water rights to the projected annual average and maximum day demand for the 20-year planning period.

TABLE 3-12

Water Rights Projection Analysis

Year	Annual Withdrawal Qa			Instantaneous Withdrawal Qi		
	Authorized by Water Right (ac-ft/yr)	Projected Production (ac-ft/yr)[(1)]	Surplus/ (Deficit) (ac-ft/yr)	Authorized by Water Right (gpm)	Projected Peak Day Production (gpd)[(2)]	Surplus/ (Deficit) (gpd)
2024	732	270	462	1,046	401	645
2025		272	460		403	642
2026		274	458		406	640
2027		276	456		409	637
2028		278	454		412	634
2029		280	452		415	631
2030		282	450		418	628
2031		284	448		421	625
2032		286	446		424	621
2033		288	444		427	618
2034		291	441		431	615
2035		293	439		434	612
2036		295	437		437	609
2037		297	435		440	605
2038		299	433		444	602
2039		302	430		447	599
2040		304	428		451	595
2041		306	426		454	592
2042		309	423		457	588
2043		311	421		461	585
2044		314	418		465	581
2045		316	416		468	578

(1) Annual production corresponds to projected average day production for a given year (see Table 2-13) multiplied by the number of days in a given year.

(2) Peak day production corresponds to the projected maximum day production for a given year (see Table 2-13).

The above water rights analysis indicates that the City has adequate annual and instantaneous water rights through 2045.

Water Rights ERU Capacity

Instantaneous water rights ERU capacity is determined based on ERUMDD and annual water rights ERU capacity is determined based on ERUADD. See below for the calculations and results.

$$\text{Instantaneous Water Rights (ERUs)} = 1{,}046\ gpm * \left(\frac{60\ minutes}{1\ hour}\right) * \left(\frac{24\ hours}{1\ day}\right) \div 274\ gpd/ERU$$

$$= 5{,}487 \text{ ERUs}$$

$$\text{Annual Water Rights (ERUs)} = 732\ \frac{acre-ft}{year} * \left(\frac{325{,}900\ gallons}{1\ acre-ft}\right) * \left(\frac{1\ year}{365\ day}\right) \div 115\ gpd/ERU$$

$$= 5{,}683 \text{ ERUs}$$

SOURCE CAPACITY ANALYSIS

According to section 3.10 of the DOH 2020 Water System Design Manual, source production capacity must be sufficient to supply maximum day demands. Maximum day and average day demands must also comply with the maximum instantaneous and maximum annual withdrawal limitations of associated water rights. The following source capacity criteria have been analyzed in accordance with the DOH Water System Design Manual (WSDM):

- **Criteria 1 (Required by WSDM):** The source or sources for a water system must be able to meet the water system's maximum day demand.
- **Criteria 2 (Recommended by WSDM):** Sources capable of supplying the MDD of the system with 20 hours of pumping.
- **Criteria 3 (Recommended by WSDM):** Permanent and seasonal sources are capable of replenishing depleted fire suppression storage within a 72-hour period while concurrently supplying the maximum day demand of the system.

The City plans to meet Criteria 2 from the WSDM.

The City's current and projected ability to meet each of these criteria outlined above are analyzed in upcoming Tables 3-13 and 3-14.

Criteria 2 – 20-Hour Pumping

The water systems ability to meet maximum day demand through the 20-year planning period is summarized in Table 3-13. The projected maximum day demand for each respective year is from Table 2-13 where it is referred to as maximum day production.

TABLE 3-13

Ilwaco Source of Supply Analysis: Criteria 2
Supply Maximum Day Demand in 20 Hours of Pumping

Year	20-Hour Source Pumping Capacity[(1)] (gpd)	Projected Peak Day Production[(2)] (gpd)	Production Surplus/(Deficit) (gpd)
2024	1,198,000	578,356	619,644
2025		582,390	615,610
2026		586,474	611,526
2027		590,607	607,393
2028		594,791	603,209
2029		599,025	598,975
2030		603,311	594,689
2031		607,649	590,351
2032		612,040	585,960
2033		616,484	581,516
2034		620,983	577,017
2035		625,536	572,464
2036		630,145	567,855
2037		634,810	563,190
2038		639,531	558,469
2039		644,311	553,689
2040		649,148	548,852
2041		654,045	543,955
2042		659,001	538,999
2043		664,017	533,983
2044		669,095	528,905
2045		674,235	523,765

(1) Present source capacity from the Indian Creek impoundment dam (1,042 gpm) converted to gpd. The source capacity is converted to gpd and multiplied by 20/24 to indicate the source is only running for 20 hours out of a 24 hour day and 4.17 percent of water is removed due to filter backwash run time.

(2) Projected maximum day demand is from Table 2-13.

As shown in Table 3-13, the City has the ERU capacity to maintain Criteria 2 through the 20-year planning horizon. Criteria 1 of supplying maximum day demand in 24 hours of pumping does not have to be calculated as the City meets Criteria 2 of supplying maximum day demand in 20 hours of pumping.

Criteria 3 Source Analysis – Fire Suppression Replenishment

The City's required fire suppression storage is 540,000 gallons and is further discussed in the upcoming storage capacity analysis section. In order to replenish this volume in 72 hours, 180,000 gpd or 125 gpm must be pumped for three days. Table 3-14 summarizes the water systems ability to meet this requirement along with MDD.

TABLE 3-14

Ilwaco Source of Supply Analysis: Criteria 3 Supply Maximum Day Demand in 24 Hours of Pumping Plus Replenish Fire Suppression Storage in 72 Hours

Year	Maximum Day Demand Plus Replenish Fire Suppression in Storage in 72 Hours[(1)] (gpd)	Projected Peak Day Production[(2)] (gpd)	Surplus/(Deficit) (gpd)	Surplus/(Deficit) (gpm)
2024	758,356	1,500,000	741,644	515
2025	762,390		737,610	512
2026	766,474		733,526	509
2027	770,607		729,393	507
2028	774,791		725,209	504
2029	779,025		720,975	501
2030	783,311		716,689	498
2031	787,649		712,351	495
2032	792,040		707,960	492
2033	796,484		703,516	489
2034	800,983		699,017	485
2035	805,536		694,464	482
2036	810,145		689,855	479
2037	814,810		685,190	476
2038	819,531		680,469	473
2039	824,311		675,689	469
2040	829,148		670,852	466
2041	834,045		665,955	462
2042	839,001		660,999	459
2043	844,017		655,983	456
2044	849,095		650,905	452
2045	854,235		645,765	448

(1) 180,000 gpd is required to replenish fire suppression storage in 72 hours; this is added to the projected maximum day demand from Table 2-13.

(2) Present source capacity from the Indian Creek impoundment dam (1,042 gpm) converted to gpd.

Assuming 24-hour pumping, the City's current sources can meet replenish fire suppression storage while meeting MDD throughout the 20-year planning horizon.

ERU Source Capacity Analysis

Based on Criteria 2 and 3 outlined in the previous sections, the systems source capacity can be summarized in terms of supported ERUs as shown in Table 3-15.

TABLE 3-15

Source ERU Capacity

Criteria	Maximum Storage Capacity	ERU Capacity	Deficit Year
Criteria 2 – MDD w/20-hour pumping	1,198,000	4,365	Beyond 20-year
Criteria 3 – Replenish Fire Flow in 72 hours w/MDD	1,500,000	5,465	Beyond 20-year

Table 3-15 shows that Criteria 2 represents the lowest ERU capacity of 4,365 ERUs. Source capacity will therefore be defined by the ERU capacity of Criteria 2.

Source Condition

The Indian Creek Dam was constructed in 1987 and 1988. The reservoir was initially filled in the fall and winter of 1988. The dam is an earthen embankment structure. Sometime after construction, the hydraulically operated upper and lower intake sluice gates stopped working.

The City installed a modified intake on the lower sluice gate shortly after construction due to the faulty hydraulic operators. This intake was intended to draw water from the middle of the water column to access higher quality water. The water quality did not appear to match the expected results following installation of the modified intake. In 2011, the City worked with divers to install a plenum and an updated intake structure. The water quality did not appear to match the expected results following installation of the second version of the modified intake. It was suspected that the upper sluice gate was allowing water in from a lower water level then the modified.

The City found that the upper sluice gate was stuck in a partially open condition. In June 2021, the City inspected the condition of the gates using a diver. A dye test confirmed that the upper sluice gate was stuck in the open position. In July 2021, the City had the diver return and manually closed the upper sluice gate. The gate was confirmed to be closed by dye testing. Closing the upper sluice gate resulted in an improvement in water quality.

STORAGE ANALYSIS

The City of Ilwaco owns and operates five storage reservoirs that serve the water system. There is one steel and one glass fused reservoir in City Center (City Center Reservoirs 1 and 2, respectively) that each have an overflow elevation of 157 feet and provide service to City Center (157 zone), Upper City Center (230 zone), and Lakeview Estates Zone (317 zone). There are two concrete reservoirs located in Indian Creek that each have an overflow elevation of 160.5 feet and provide service to Indian Creek (160 zone). There is one on-grade steel bolted reservoir located in Discovery Heights with an overflow elevation of 339 feet that provides service to Discovery Heights (339 zone), Coastal Ridge (547 zone) and Cape Disappointment (269 zone).

Storage requirements for the City are determined by applying the design standards outlined in the DOH Water System Design Manual, October 2019. The storage volume recommended according to this guidance document is based on the sum of the following:

- Operational Storage (OS);
- Equalizing Storage (ES);
- Standby Storage (SB);
- Fire Suppression Storage (FSS);
- Dead Storage (if any).

Storage Capacity Analysis

Equalizing Storage

Equalizing storage is typically used to meet diurnal demands which exceed the average day and maximum day demands. The volume of equalizing storage required depends on peak system demands, the magnitude of diurnal water system demand variations, 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.

Equalizing storage is calculated using equation 7-1 from the DOH Water System Design Manual, but in no case should it be less than zero:

$$ES = (PHD - Q_s) \times 150 \text{ minutes}$$

Where:

ES = Equalizing storage component, gallons
PHD = Peak hourly demand, gpm
Q_s = Total source of supply capacity, excluding emergency sources, gpm

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 standby storage is 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.

Standby storage is calculated using Equation 7-2 from the DOH Water System Design Manual:

$$SB = (N)(SB_i)(T_d)$$

Where:

SB = Total standby storage component, gallons
N = Number of ERUs for the design year
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 DOH Water System Design Manual also discusses provisions for modifying the standby storage requirement based on various factors related to water system reliability. With these reliability measures considered, the DOH recommendation for a minimum standby storage volume is 200 gallons per ERU. The applicable standard for required standby storage volume selected by the City is the following:

SBi = ERU_{MDD} = 274 gpd/ERU
T_d = 1 day

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:

$$FFS = FF*T_m$$

Where

FFS = Volume of fire suppression storage component, gallons
FF = Fire flow rate, gpm
T_m = fire flow duration, minutes

DOH Note: The standby storage component or the fire suppression storage component, whichever volume is smaller, can be excluded from a water system's total storage requirement provided that such practice is not prohibited by: (1) a locally developed and adopted Coordinated Water System Plan; (2) local ordinance; or (3) the local fire protection authority or County Fire Marshal (reference WAC 246-290-235(4)).

Minimum fire flows are given in Ilwaco Municipal Code 15.86.060.C, which states that the flow required to all buildings other than single dwellings shall be determined by the Universal Fire Code and that no hydrant shall provide less than 500 gpm at 20 psi. The maximum fire flow required in the City Center commercial/industrial area is 3,000 gpm for 3 hours. The buildings in the proposed commercial development in Discovery Heights are anticipated to have automatic sprinkler systems and require a fire flow of 1,500 gpm for 3 hours. The City has a goal to provide 1,000 gpm in residential areas. The City's typical fire flow requirements are summarized in Table 3-16.

TABLE 3-16

Typical Fire Flow Requirements

Zoning	Fire Flow Required (gpm)	Duration (hours)
Single-Family Residential	500	1
City Center – Multi-Family/Institutional/ Commercial/Industrial	3,000	3

For purposes of this analysis, fire suppression storage is based on the current maximum fire flow requirement of its pressure zone. The City of Ilwaco will continue to nest standby and fire suppression storage.

Dead Storage

Dead storage is the volume of the reservoir that cannot be utilized because minimum system pressures would be below the 20 psi minimum during a fire flow event or 30 psi during peak hour demand.

Methodology for Distribution of Demands to Each Reservoir

Demands for each reservoir is distributed by the percentage of total active meters in each zone and is further broken down by the five customer classes: single-family residential, multi-family residential, commercial, RV parks, and State parks. These percentages are used to determine how much water usage is in each zone.

Water demand for each reservoir is a combination of the zone(s) that the reservoir serves. An example of this is the City Center Reservoirs 1 and 2. These two reservoirs serve all of the City Center zone in addition to the Upper City Center zone, and Lakeview Estates zone, Discovery Heights zone and Coastal Ridge zone.

Projections for future reservoir demands were determined based on growth occurring uniformly across the service area, with each reservoir continuing to serve the same proportion of total residential, multi-family, commercial, RV parks and state parks demands. Year 2023 data was used to evaluate the present storage condition of the reservoirs. Table 3-17 shows the storage analysis for years 2024, 2035, and 2045.

TABLE 3-17

Storage Analysis

Year	OS (gal)	ES (gal)	SB (gal)	FSS (gal)	Total Required Storage (Assumes SB and FSS Nested) (gal)	Total Storage (gal)	Dead Storage (gal)	Available Storage (gal)	Surplus/ (Deficit) (gal)
Indian Creek Reservoirs 1 and 2									
2024	30,000	0	17,000[(1)]	60,000	90,000	339,000	0	339,000	249,000
2035	30,000	0	18,200[(1)]	60,000	90,000	339,000	0	339,000	249,000
2045	30,000	0	19,600[(1)]	60,000	90,000	339,000	0	339,000	249,000
City Center Reservoirs 1 and 2									
2024	102,000	0	491,600	540,000	642,000	1,000,000	0	1,000,000	460,000
2035	102,000	0	532,200	540,000	642,000	1,000,000	0	1,000,000	460,000
2045	102,000	0	574,400	540,000	676,400	1,000,000	0	1,000,000	425,600
Discovery Heights Reservoir									
2024	30,000	0	79,500	60,000	109,500	412,000	3,000	409,000	299,500
2035	30,000	0	85,500	60,000	115,500	412,000	3,000	409,000	293,500
2045	30,000	0	91,700	60,000	121,700	412,000	3,000	409,000	287,300

(1) Includes backwash water.

The City does not have any deficiencies in the 20-year planning horizon for its storage facilities.

BOOSTER PUMP STATION CAPACITY ANALYSIS

The City of Ilwaco's distribution system contains six booster pump stations, which pump water to both open and closed zones. The city center booster station is not required to provide fire flow to the upper city center zone because it is within range of hydrants from the city center zone.

According to the 2020 *Water System Design Manual*, to provide for satisfactory operation, the booster pump stations must meet the requirements of WAC 246-290-230. For an open system, booster pump station must be designed, at a minimum, to meet MDD of the pressure zone and any sequential zones served with all pumps in service. Additionally, the design should be capable of meeting ADD with the largest pump out of service.

For a closed system, the booster pump station must be designed to meet PHD when the largest capacity booster pump is out of service. In addition, a closed system pump station must be able to meet the fire flow requirements, maintain a pressure of 20 psi at all ground level points in the zone, and supply MDD and fire flow.

Table 3-18 and 3-19 analyzes the City's existing booster pump stations for open and closed zones.

TABLE 3-18

Closed Zone Booster Pump Station Analysis

Year	Capacity w/Largest Pump Offline (gpm)	PHD in Zone (gpm)	Meets PHD? Surplus/(Deficit) (gpm)		Largest FF Required in Zone (gpm)	MDD in Zone (gpm)	Meets MDD & FF? Surplus/ (Deficit) (gpm)	
City Center Booster Pump Station								
2024	30	7	Yes	23	0[(1)]	4	N/A	56
2035		7	Yes	23		4	N/A	56
2045		7	Yes	23		4	N/A	56
Coastal Ridge Booster Pump Station								
2024	120	15	Yes	105	500	8	No	(388)
2035		16	Yes	104		9	No	(389)
2045		17	Yes	103		9	No	(389)
Lakeview Estates Booster Pump Station								
2024	500	16	Yes	484	500	9	No	(9)
2035		17	Yes	483		9	No	(9)
2045		17	Yes	483		10	No	(10)

(1) The city center booster station does not provide fire flow as the City Center Reservoirs provide fire flow to the hydrants located in the Upper City Center Zone.

Table 3-18 shows that the capacities of all of the closed zone booster pump stations are adequate to meet projected PHD through 2045; however, the Coastal Ridge and Lakeview Estates BPS cannot currently meet MDD and fire flow with their largest pump out of service.

TABLE 3-19

Open Zone Booster Pump Station Analysis

Year	Capacity w/All Pumps Online (gpm)	MDD in Zone(s) (gpm)	Meets MDD? Surplus/(Deficit) (gpm)		Capacity w/Largest Pump Offline (gpm)	ADD in Zone(s) (gpm)	Meets ADD? Surplus/(Deficit) (gpm)	
Baker Bay Booster Pump Station								
2024	950	397	Yes	553	570	166	Yes	404
2035		426	Yes	524		178	Yes	392
2045		459	Yes	491		168	Yes	402
Spring Street Booster Pump Station								
2024	1,000	47	Yes	953	500	83	Yes	417
2035		50	Yes	950		89	Yes	411
2045		54	Yes	946		95	Yes	405

Table 3-19 shows that the capacities of all of the open zone booster pump stations are adequate to meet projected ADD and MDD through 2045 should growth occur as projected.

SYSTEM CAPACITY SUMMARY

The maximum ERU capacity of each component of the City's water system must be analyzed and compared to the projected ERUs determined in the projections and summarized in Table 2-13. The system capacity of analysis is summarized in Table 3-20.

TABLE 3-20

System ERU Capacity Summary

Water System Component	ERU Limit	Projected Deficit Year
Instantaneous Water Rights	5,487	Beyond 2045
Annual Water Rights	5,683	Beyond 2045
Source Capacity	4,365	Beyond 2045
Standby and Equalizing Storage	7,780	Beyond 2045

Source capacity is the City of Ilwaco's limiting factor with an ERU limit of 4,365. Based on current growth projections, the City is well-positioned to avoid any capacity limitations over the next 20 years.

DISTRIBUTION SYSTEM HYDRAULIC ANALYSIS

This section presents information on the computer hydraulic model of the City's water system and the results of hydraulic analyses conducted to evaluate the existing and future capabilities of the water system.

The Washington State Department of Health's WAC 246-290 requires hydraulic modeling as a component of water system plans. A computer hydraulic model, which can accurately and realistically simulate the performance of a water system in response to a variety of conditions and scenarios, is an important element in the planning, design, and analysis of municipal water systems.

The operation of a water system involves dynamic interactions between various water system components, including source, storage, and distribution system facilities. These interactions and their effect on the level of service provided to the City's customers are dependent on the distribution and magnitude of water demands within the system and the performance characteristics of the water system facilities. In addition to normal diurnal demands, infrequent demand events, such as fires, can significantly alter the normal flow patterns and pressures in the municipal water system and its components. These factors must be considered in analyzing the ability of a water system to provide for future demands, while maintaining an adequate level of water service to customers.

HYDRAULIC MODELING SOFTWARE

The City's system has been modeled using InfoWaterPro by Innovyze, which operates in an ArcGIS Pro environment. The model has been updated to include changes to water system components since the previous planning effort. The hydraulic modeling results are included in Appendix H.

The hydraulic model is configured with a graphical user interface. All water system elements, including pipes, control valves, pumps, source, and reservoirs are 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 modeling software produces the model output in the form of flows and pressures throughout the simulated water system.

MODEL CALIBRATION

The model was calibrated using hydrant flow data from tests conducted in January 2025 at five locations throughout the City's water system. The hydrant test locations are shown in Figure 3-1. These hydrant tests were compared against the modeled results that assumed present average day demand and pumping and reservoir data observed during the flow tests. These real-world data were used to calibrate the hydraulic model through adjustment of the friction coefficient factors. Table 3-21 matches each flow test with its corresponding model node number and summarizes the field results, the calibrated model results, and the difference between the two after calibration.

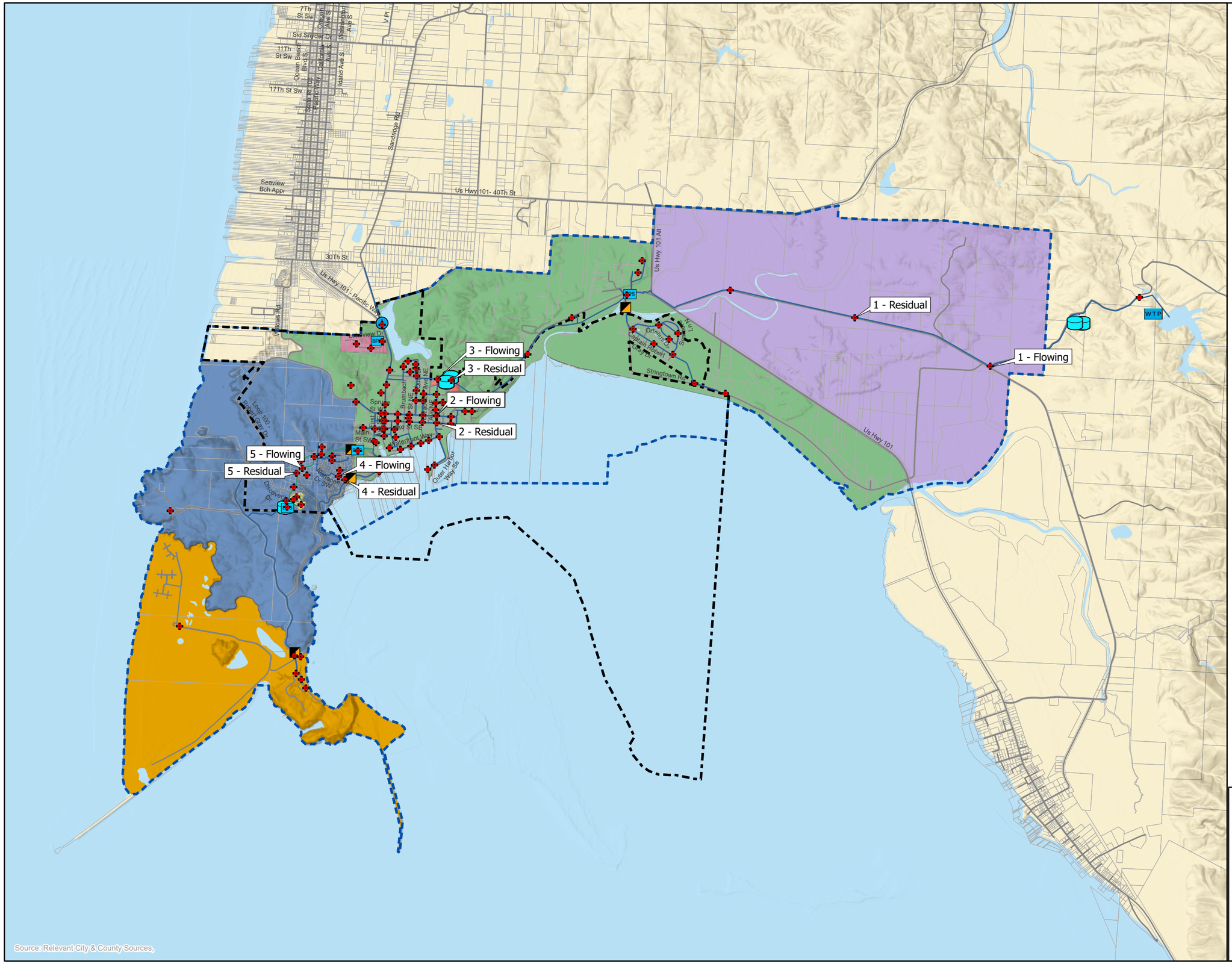
The DOH *2020 Water System Design Manual* states that there is no standard national or industry-adopted criteria for calibrating a hydraulic network model, but it is generally acceptable for modeling results to be within 5 psi of the difference between the delta static pressure and delta residual pressure. The delta static pressure is the difference between the field and modeled pressures for the static scenario and the delta residual pressure is the difference between the field and modeled pressures for the residual scenario.

TABLE 3-21

Calibration Results

Test	Pressure Node	Flow Node	Field Results				Modeling Results		Difference Between Model and Field	
			Flow Pressure (psi)	Hydrant Flow (gpm)	Static Pressure[(1)] (psi)	Residual Pressure[(2)] (psi)	Static Pressure (psi)	Residual Pressure (psi)	ΔStatic Pressure (psi)	ΔResidual Pressure (psi)
1	226	228	56	1,256	64	59	64.3	57.5	+0.3	-1.5
2	32	20	52	1,210	62	57	58.9	56.7	-3.1	-0.3
3	122	282	23	805	12	11	7.4	7.4	-4.6	-3.6
4	338	334	55	1,244	110	73	111.6	77.1	+1.6	+4.1
5	310	180	33	964	34	31	35.5	31.3	+1.5	+0.3

(1) Static pressure at the pressure hydrant as measured during testing, prior to the flow hydrant being opened.
(2) Residual pressure at the pressure hydrant as measured during testing, after the flow hydrant was opened.



Facilities

- Water Treatment Plant
- Intertie
- Reservoir
- Booster Pump Station
- Pressure Release Valve
- Hydrant

Waterlines (Diameter)

- Ilwaco Water Lines

Pressure Zones

- City Center (157 ft)
- Indian Creek (160 ft)
- Upper City Center (230 ft)
- Lakeview Estates (300 ft)
- Discovery Heights (339 ft)
- Coastal Ridge (574 ft)
- Cape Dissapointment & Coast Guard (269 ft)

Reference

- Retail Service Area
- Ilwaco City Limits
- Parcels
- Surface Water
- Roads

N

0 1,000 2,000 4,000 Feet

CITY OF ILWACO

WATER SYSTEM PLAN UPDATE

FIGURE 3-1

HYDRANT TEST LOCATIONS

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CONSULTING ENGINEERS

The calibrated hydraulic model results were within 5 psi of the difference between the delta static pressure and delta residual pressure., meeting the recommended guidelines discussed above. After this calibration effort, future model outputs can be considered representative of the water system.

MODEL ASSUMPTIONS

The following sections present the assumptions regarding the City's water sources, system demands, storage, booster station settings, and PRV settings.

United States Coast Guard Area

Modeled areas include all areas owned and operated by the City of Ilwaco. The United Stated Coast guard (USCG) owns and operates its water system but receives all water from the City of Ilwaco. These water mains are past the City of Ilwaco's meters. Ilwaco-owned water mains are shown in Figure 1-5.

Source

Because the Water Treatment Plant is not in continuous operation, the Water Treatment Plant is assumed to be idle for all modeled scenarios. This assumption also results in also conservative pressures within the Indian Creek Zone.

Demands

Present and projected system demands were developed in Chapter 2 of this Plan using historical data and characteristic water demand parameters. Chapter 3 presents estimates of projected usage by pressure zone. Existing and projected demands are distributed to each pressure zone based on the number of water connections per customer class in each zone. Additionally, large users such as Safe Coast Seafoods, City of Ilwaco, Washington State Parks, and RV Parks were given individual demands.

Six demand scenarios were used in the hydraulic analysis:

- 2024 Peak Hour Demands: These demands were used to evaluate the system's ability to meet the DOH standards to supply domestic water at a minimum system wide pressure of 30 psi under existing demand.

- 2024 Maximum Day plus Fire Flow Demands: These demands were used to evaluate the water system's ability to meet fire flow requirements within the City's retail service area (RSA) under existing demand.

- 2035 Peak Hour Demands: These demands were used to evaluate the system's ability to meet the DOH Standards to supply domestic water at a minimum system wide pressure of 30 psi at the end of the 10-year planning period.

- 2035 Maximum Day plus Fire Flow Demands: These demands were used to evaluate the ability for the water system to meet fire flow requirements within the City's RSA at the end of the10-year planning period.

- 2045 Peak Hour Demands: These demands were used to evaluate the system's ability to meet the DOH standards to supply domestic water at a minimum system wide pressure of 30 psi at the end of the 20-year planning period.

- 2045 Maximum Day plus Fire Flow Demands: These demands were used to evaluate the ability for the water system to meet fire flow requirements within the City's RSA at the end of the 20-year planning period.

Storage

The levels within the City's reservoirs are modeled with operating and equalizing storage depleted when modeling peak hour demand scenarios and with operating, equalizing, and fire suppression storage depleted when modeling maximum day plus fire flow scenarios Initial water levels in each reservoir for each modeled scenario are shown in Table 3-22.

TABLE 3-22

Reservoir Levels During Model Scenarios (feet)

Initial Water Level	Peak Hour Scenario			MDD+FF Scenario		
Reservoir Name	**2024**	**2035**	**2045**	**2024**	**2035**	**2045**
Indian Creek Reservoir 1	25.9	26.0	26.0	21.9	21.9	21.9
Indian Creek Reservoir 2	25.2	25.2	25.2	12.4	12.4	12.4
City Center Reservoir 1	21.6	21.6	21.6	12.8	12.8	12.8
City Center Reservoir 2	29.2	29.2	29.2	23.5	23.5	23.5
Discovery Heights Reservoir	29.2	29.2	29.2	23.5	23.5	23.5

Booster Stations

In accordance with the DOH 2020 *WSDM*, the City's booster pump stations were modeled with all domestic pumps operating during peak hour scenario modeling. For the fire flow scenario, modeling was completed with all pumps operating except the largest capacity pump, which is assumed to be out of service.

Pressure Reducing Valves

The City's system currently includes pressure reducing valves (PRVs) at the intersection of Klahanee Drive SW and Robert Gray Drive, at the intersection of Ft. Canby Road and Coast Guard Road, and at the Spring Street and Baker Bay booster stations. However, the Baker Bay PRV to the Vandalia area is currently set at fully open. The model is set to reflect current conditions. In an emergency, the PRV at the Spring Street Booster Station would open to provide flows from the Discovery Heights tank to the City Center Zone.

HYRAULIC MODEL RESULTS

Results for the peak hour demand and available fire flow scenarios for the present, 10-year, and 20-year planning horizons are discussed at length below. Full tabulated results of the hydraulic analysis are included in Appendix H.

Peak Hour Demand

In order to evaluate the water system's ability to meet future demands, the existing system has been modeled under the projected peak hour demand conditions for 2024, 2035, and 2045. WAC 246-290-230 (5) requires that public water systems be designed to deliver peak hour demand while maintaining minimum system-wide pressures of 30 psi, with equalizing storage depleted from any reservoirs. The storage analysis, which provides a breakdown of the storage components, is presented earlier in this chapter and in Table 3-17.

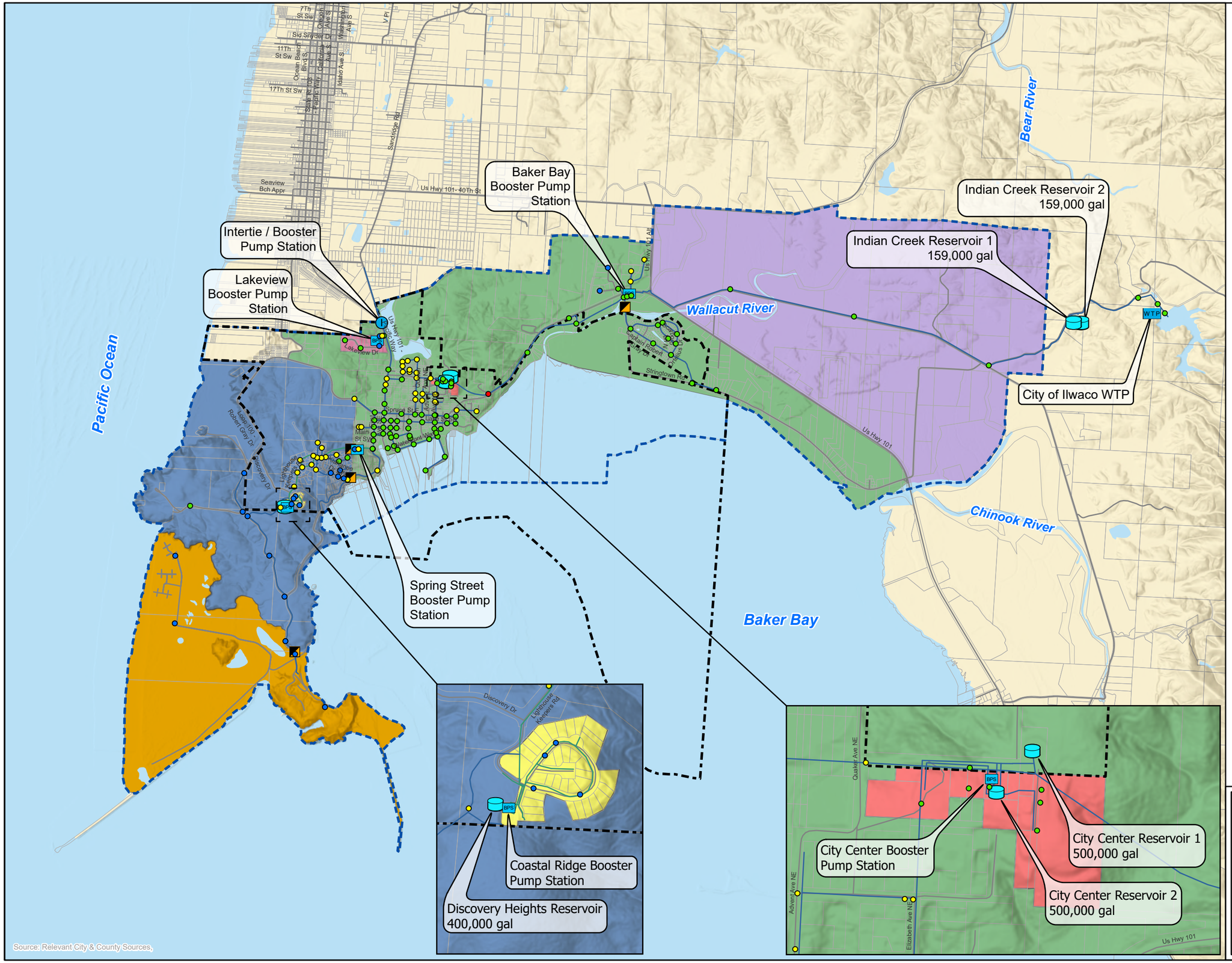
Figures 3-1, 3-2, and 3-3 show the 2024, 2035, and 2045 modeled peak hour pressures generated by the model, respectively. The modeling results indicate the City's water system currently has one area of peak hour pressure deficiency, node 124. This node had a pressure of 27.5 and 27.4 psi for the 2024 and 2045 Peak Hourly Demand Scenarios, respectively. The pressure deficiency at this node is the result of its location at a local high point in the City Center Zone. According to City staff, the sole nearby resident operates a private booster pump, which allows the service to maintain a pressure higher than 30 psi. As a result, there no improvement project is planned to address service pressure at this node.

Available Fire Flows

For design of water systems, WAC 246-290-230 states, "If fire flow is to be provided, the distribution system shall also provide (MDD) plus the required fire flow at a pressure of at least 20 psi at all points throughout the distribution system, and under the condition where the designed volume of fire suppression and equalizing storage has been depleted."

It's worth noting that the residual hydrant for calibration test 3 is not included in the analysis of fire flow because it is below the pressure threshold of 20 psi. The fire department is aware of this, and this hydrant will not be used during firefighting events.

As stated in Table 3-1, residential zoned areas in the City are required to provide a fire flow of at least 500 gpm while the City Center industrial area requires a fire flow of 3,000 gpm. Figures 3-4, 3-5, and 3-6 show the available fire flows for the 2024, 2035, and 2045 demand scenarios generated by the model, respectively. Table 3-21 provides a summary of results for areas with fire flow deficiencies. Table 3-23 also summarizes an available fire flow scenario that includes 2045 demands when the City's Capital Improvement Program (CIP) projects are implemented. A discussion of these projects follows Table 3-23.



Peak Hour Pressure (psi)

- <30.00
- 30.01 - 50.00
- 50.01 - 80.00
- >80

Facilities

- Water Treatment Plant
- Intertie
- Reservoir
- Booster Pump Station
- Pressure Release Valve

Waterlines (Diameter)

- Ilwaco Water Lines

Pressure Zones

- City Center (157 ft)
- Indian Creek (160 ft)
- Upper City Center (230 ft)
- Lakeview Estates (300 ft)
- Discovery Heights (339 ft)
- Coastal Ridge (574 ft)
- Cape Dissapointment & Coast Guard (269 ft)

Reference

- Retail Service Area
- Ilwaco City Limits
- Parcels
- Surface Water
- Roads

N

0 1,000 2,000 4,000 Feet

CITY OF ILWACO

WATER SYSTEM PLAN UPDATE

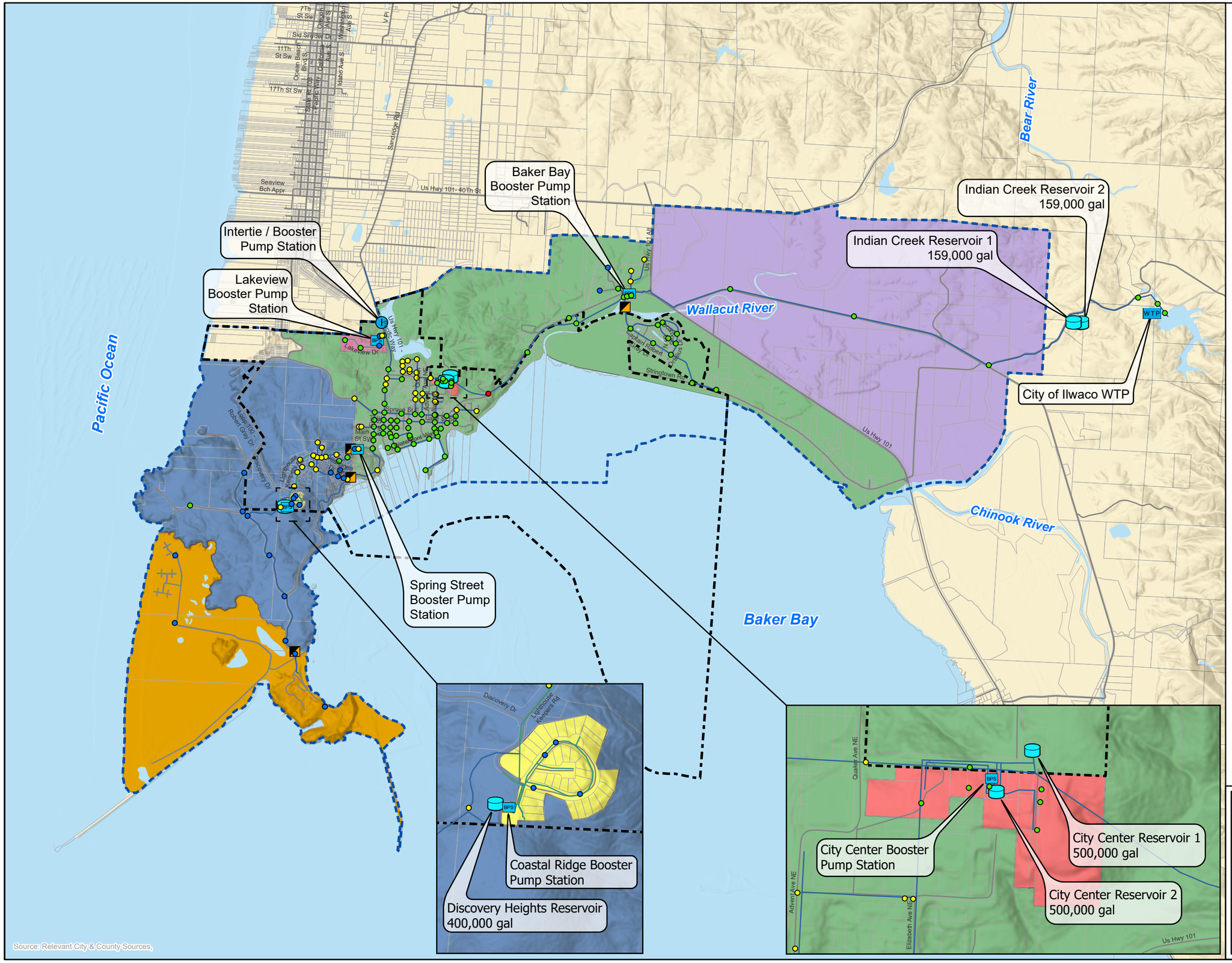
FIGURE 3-2

2024 PEAK HOUR DEMAND

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Peak Hour Pressure (psi)

- <30.00
- 30.01 - 50.00
- 50.01 - 80.00
- >80

Facilities

- Water Treatment Plant
- Intertie
- Reservoir
- Booster Pump Station
- Pressure Release Valve

Waterlines (Diameter)

- Ilwaco Water Lines

Pressure Zones

- City Center (157 ft)
- Indian Creek (160 ft)
- Upper City Center (230 ft)
- Lakeview Estates (300 ft)
- Discovery Heights (339 ft)
- Coastal Ridge (574 ft)
- Cape Dissapointment & Coast Guard (269 ft)

Reference

- Retail Service Area
- Ilwaco City Limits
- Parcels
- Surface Water
- Roads

N

0 1,000 2,000 4,000 Feet

CITY OF ILWACO

WATER SYSTEM PLAN UPDATE

FIGURE 3-3

2035 PEAK HOUR DEMAND

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Baker Bay Booster Pump Station

Intertie / Booster Pump Station

Lakeview Booster Pump Station

Indian Creek Reservoir 2 159,000 gal

Indian Creek Reservoir 1 159,000 gal

City of Ilwaco WTP

Spring Street Booster Pump Station

Coastal Ridge Booster Pump Station

Discovery Heights Reservoir 400,000 gal

City Center Booster Pump Station

City Center Reservoir 1 500,000 gal

City Center Reservoir 2 500,000 gal

Pacific Ocean

Baker Bay

Wallacut River

Bear River

Chinook River

Source: Relevant City & County Sources.

Peak Hour Pressure (psi)

- <30.00
- 30.01 - 50.00
- 50.01 - 80.00
- >80

Facilities

- Water Treatment Plant
- Intertie
- Reservoir
- Booster Pump Station
- Pressure Release Valve

Waterlines (Diameter)

- Ilwaco Water Lines

Pressure Zones

- City Center (157 ft)
- Indian Creek (160 ft)
- Upper City Center (230 ft)
- Lakeview Estates (300 ft)
- Discovery Heights (339 ft)
- Coastal Ridge (574 ft)
- Cape Dissapointment & Coast Guard (269 ft)

Reference

- Retail Service Area
- Ilwaco City Limits
- Parcels
- Surface Water
- Roads

N

0 1,000 2,000 4,000 Feet

CITY OF ILWACO

WATER SYSTEM PLAN UPDATE

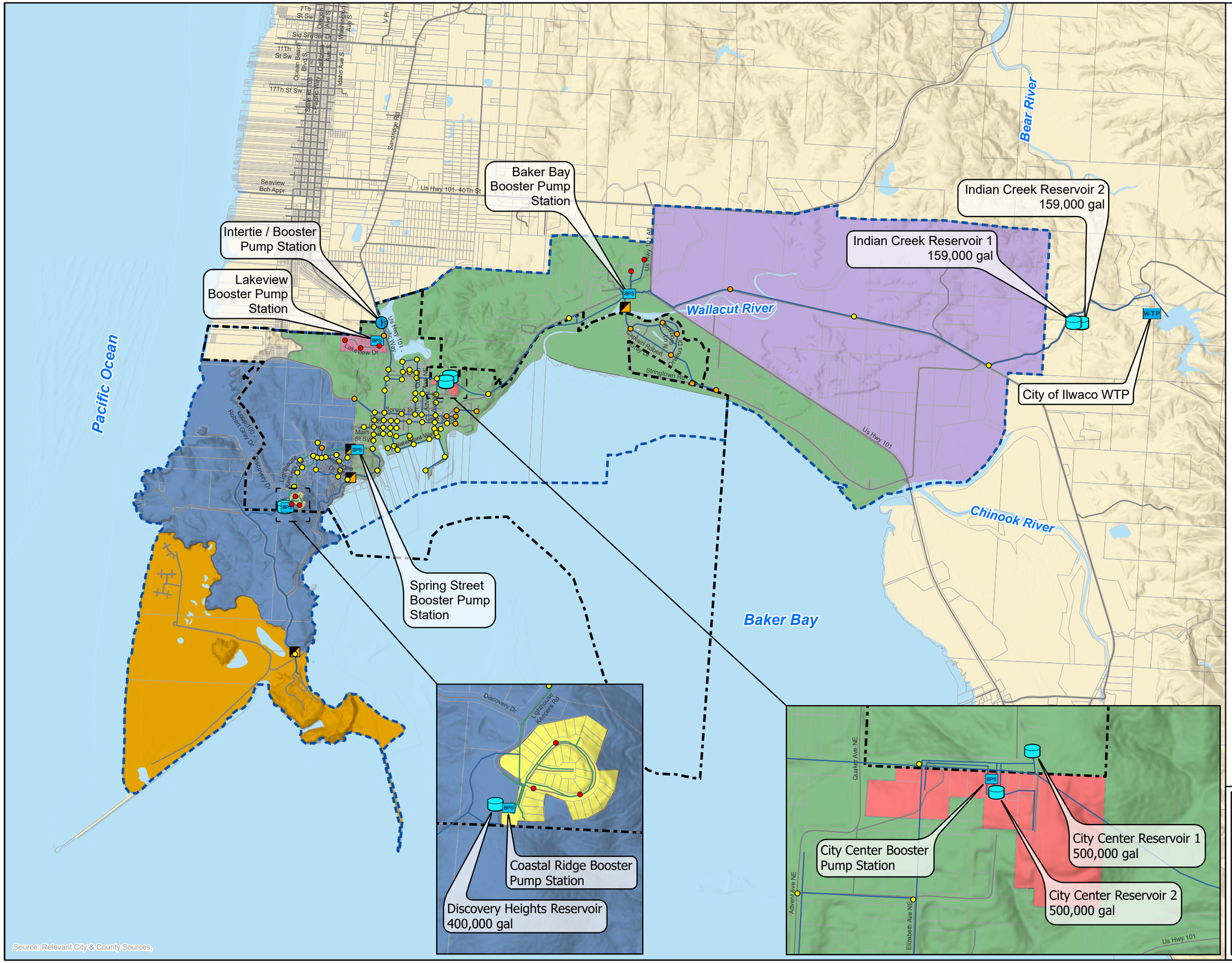
FIGURE 3-4

2045 PEAK HOUR DEMAND

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Available Fire Flow (gpm)

- <500.00
- 500 - 1,000
- 1,000 - 3,000
- >3,000

Facilities

- Water Treatment Plant
- Intertie
- Reservoir
- Booster Pump Station
- Pressure Release Valve

Waterlines (Diameter)

- Ilwaco Water Lines

Pressure Zones

- City Center (157 ft)
- Indian Creek (160 ft)
- Upper City Center (230 ft)
- Lakeview Estates (300 ft)
- Discovery Heights (339 ft)
- Coastal Ridge (574 ft)
- Cape Dissapointment & Coast Guard (269 ft)

Reference

- Retail Service Area
- Ilwaco City Limits
- Parcels
- Surface Water
- Roads

N

0 1,000 2,000 4,000 Feet

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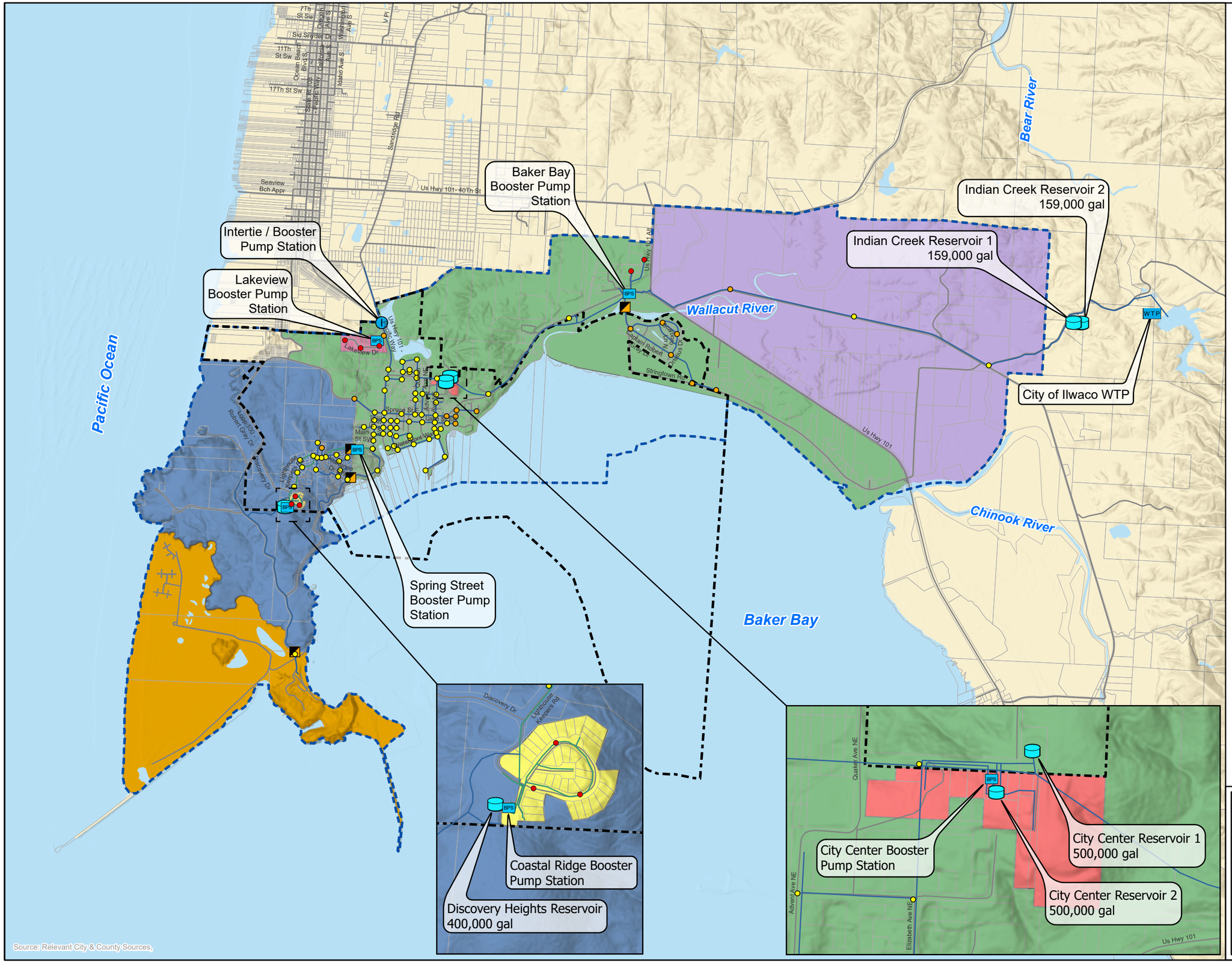
FIGURE 3-5

2024 FIRE FLOW RESULTS

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Available Fire Flow (gpm)

- <500.00
- 500 - 1,000
- 1,000 - 3,000
- >3,000

Facilities

- Water Treatment Plant
- Intertie
- Reservoir
- Booster Pump Station
- Pressure Release Valve

Waterlines (Diameter)

- Ilwaco Water Lines

Pressure Zones

- City Center (157 ft)
- Indian Creek (160 ft)
- Upper City Center (230 ft)
- Lakeview Estates (300 ft)
- Discovery Heights (339 ft)
- Coastal Ridge (574 ft)
- Cape Dissapointment & Coast Guard (269 ft)

Reference

- Retail Service Area
- Ilwaco City Limits
- Parcels
- Surface Water
- Roads

N

0 1,000 2,000 4,000 Feet

CITY OF ILWACO

WATER SYSTEM PLAN UPDATE

FIGURE 3-6

2035 FIRE FLOW RESULTS

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TABLE 3-23

Fire Flow Results – Deficiencies

Node	Location	Pressure Zone	Required Fire Flow (gpm)	2024 Fire Flow (gpm)	2045 Fire Flow (gpm)	2045 Fire Flow w/ CIPs	CIP Project No.
236	Foxglove Lane	Indian Creek	500	395	393	544	D-2
240	Foxglove Lane	Indian Creek	500	443	442	555	D-2
54	Eagle Street SW and 2nd Avenue SW	City Center	3,000	2,630	2,669	3,074	D-4
60	Howerton Avenue	City Center	3,000	2,775	2,735	3,275	D-4
62	Howerton Avenue	City Center	3,000	2,775	2,735	3,275	D-4
64	Howerton Avenue	City Center	3,000	2,825	2,798	3,348	D-4
66	Howerton Avenue	City Center	3,000	2,882	2,860	3,431	D-4
86	Howerton Avenue	City Center	3,000	2,671	2,652	3,130	D-4
358	2nd Avenue SW	City Center	3,000	2,893	2,684	3,245	D-4, DE-3
256	Lakeview Drive	Lakeview Estates	500	74	73	669	BP-2
264	Lakeview Drive	Lakeview Estates	500	74	73	663	BP-2
250	Overlook Loop	Discovery Heights	500	223	218	1,156	BP-1
252	Overlook Loop	Discovery Heights	500	223	218	1,152	BP-1
266	Overlook Loop	Discovery Heights	500	223	218	1,159	BP-1

The fire flow availability in Foxglove Lane is limited by its pipe diameter, which is 6 inches in diameter. An upgrading of piping to 8 inches correlates to fire flow above the required 500 gpm.

The fire flow availability in the City Center industrial area is limited by low pressures at high elevations in the City Center Zone which causes head losses between the reservoirs and the industrial area. Although these values are close to the required fire flow of 3,000 gpm, they are still deficient. Head losses will be reduced by looping system pipes as shown in project D-4, which includes a new connection from Cooks Hill Road to the transmission main along Highway 101. This connection will provide an additional loop for high flows from the City Center Reservoirs to the industrial area and is further outlined in the Capital Improvement Program, in Chapter 7. Additionally, looping the water line from Pearl Avenue to Elizabeth Avenue (Project DE-3) will bring the fire flow of all nodes within the Industrial area to 3,000 gpm or more.

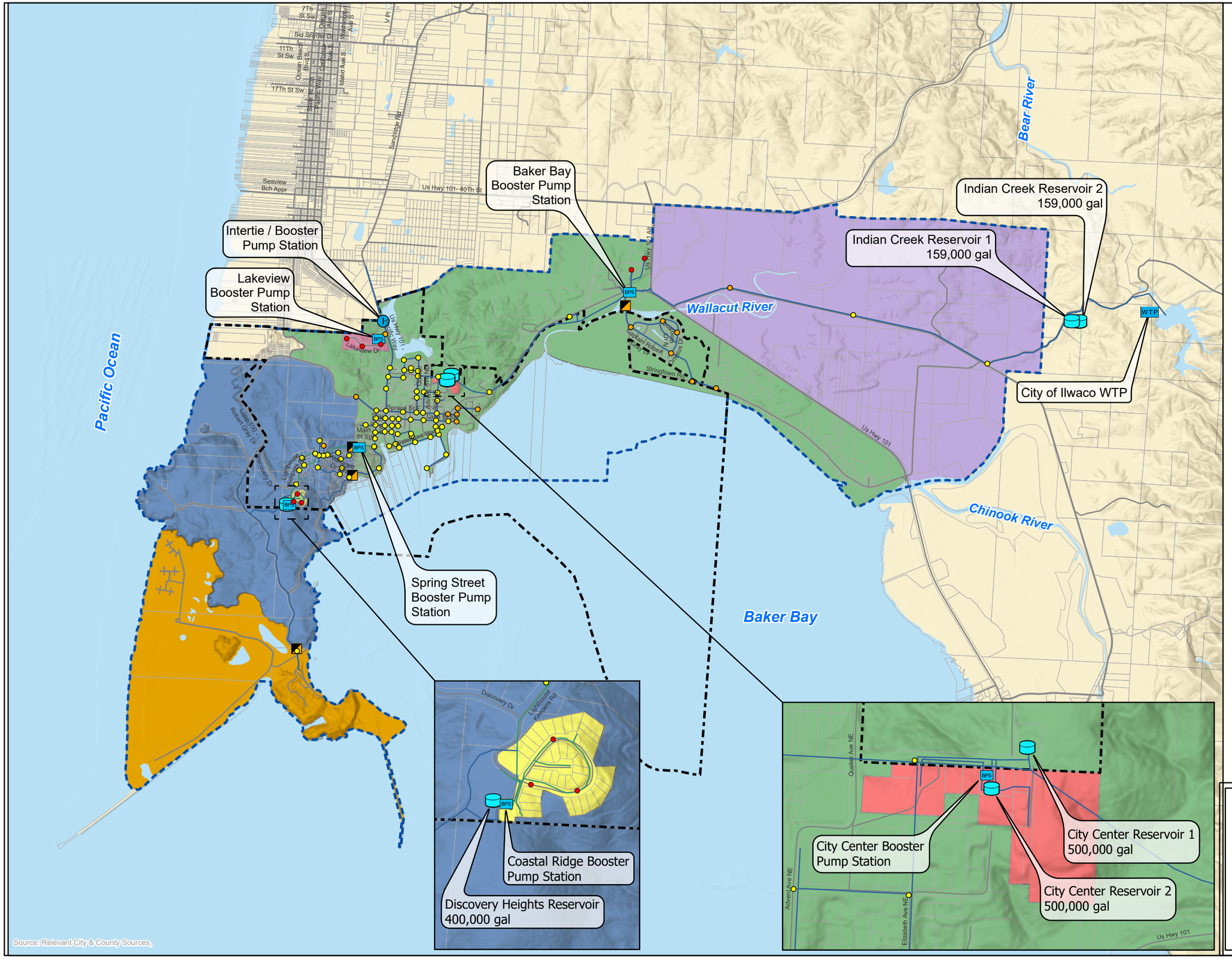
The fire flow availability in the Discovery Heights and Lakeview Estates pressure zones is limited by the zone only having one high flow pump. According to Table 8-2 in the DOH *2020 WSDM*, closed boosted zones should be able to meet the maximum day demand and fire flow, assuming the largest pump at each station is out of service. Since both of these zones only have one high-flow pump, the domestic pumps are not suitable to provide fire flow into these zones. It is recommended that the City install a second high-flow pump at the Coastal Ridge BPS site and the Lakeview BPS to provide redundancy at these zones and be in compliance with the DOH design standard. CIP projects BS-1 and BS-2 address each of these upgrades and are included in Chapter 7.

Figure 3-7 shows the available fire flows for the 2045 scenario that includes all CIP projects outlined in Chapter 7.

ASSET MANAGEMENT PLAN

Background

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 that summarizes the age, condition rating, replacement cost, and criticality of the City's major water system assets and relates these items to the planned Capital Improvement Projects previously described in this chapter. This inventory is then used to assess the adequacy of the City's Capital Improvement Program to maintain current levels of service over the long term.



Available Fire Flow (gpm)

- <500.00
- 500 - 1,000
- 1,000 - 3,000
- >3,000

Facilities

- Water Treatment Plant
- Intertie
- Reservoir
- Booster Pump Station
- Pressure Release Valve

Waterlines (Diameter)

- Ilwaco Water Lines

Pressure Zones

- City Center (157 ft)
- Indian Creek (160 ft)
- Upper City Center (230 ft)
- Lakeview Estates (300 ft)
- Discovery Heights (339 ft)
- Coastal Ridge (574 ft)
- Cape Dissapointment & Coast Guard (269 ft)

Reference

- Retail Service Area
- Ilwaco City Limits
- Parcels
- Surface Water
- Roads

N

0 1,000 2,000 4,000 Feet

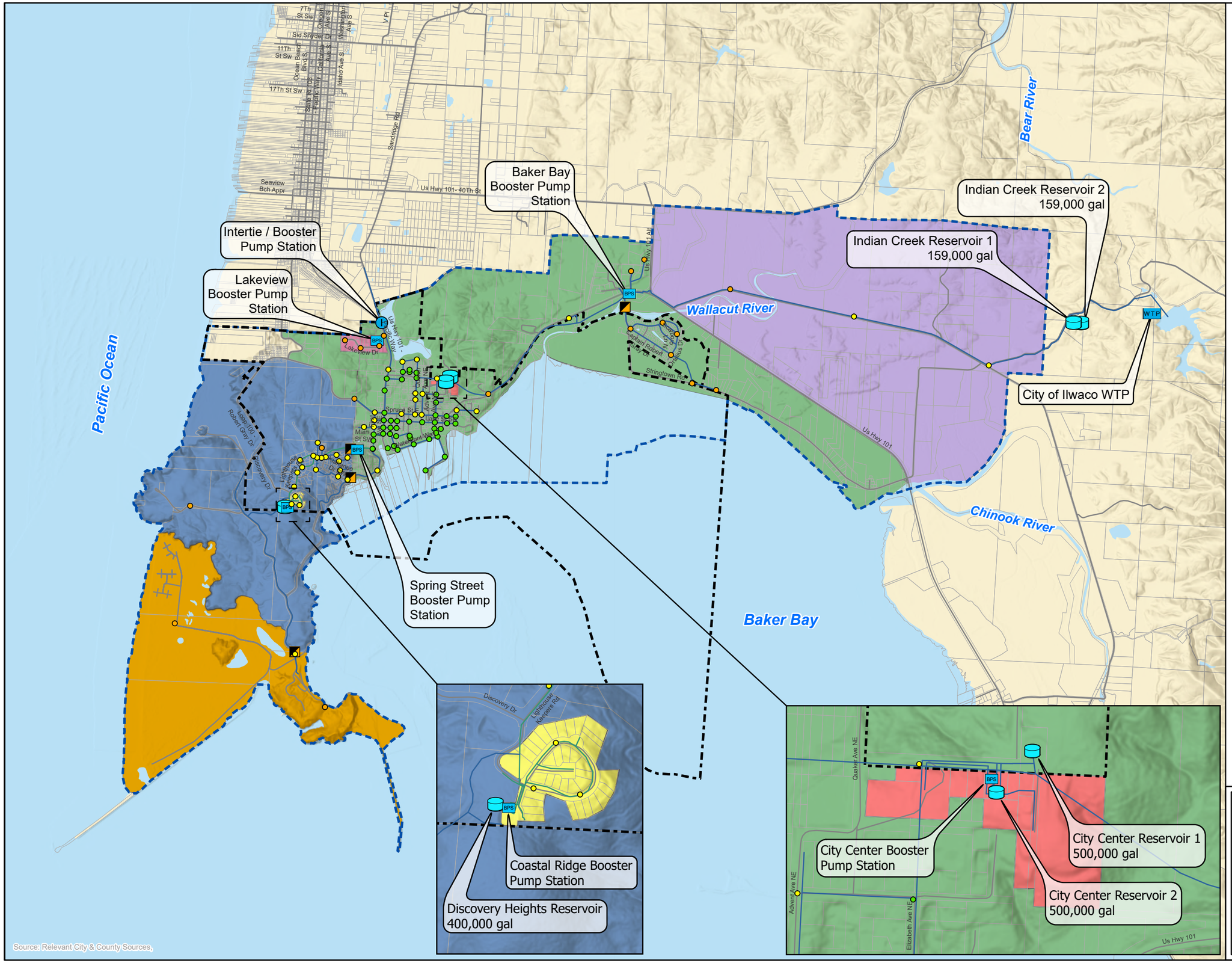
CITY OF ILWACO

WATER SYSTEM PLAN UPDATE

FIGURE 3-7

2045 FIRE FLOW RESULTS

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Available Fire Flow (gpm)

- WTP — Water Treatment Plant
- Intertie
- Reservoir
- BPS — Booster Pump Station

Facilities

- WTP — Water Treatment Plant
- Intertie
- Reservoir
- BPS — Booster Pump Station
- Pressure Release Valve

Waterlines (Diameter)

- Ilwaco Water Lines

Pressure Zones

- City Center (157 ft)
- Indian Creek (160 ft)
- Upper City Center (230 ft)
- Lakeview Estates (300 ft)
- Discovery Heights (339 ft)
- Coastal Ridge (574 ft)
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Reference

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- Ilwaco City Limits
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- Surface Water
- Roads

N

0 1,000 2,000 4,000 Feet

CITY OF ILWACO

WATER SYSTEM PLAN UPDATE

FIGURE 3-8

2045 FIRE FLOW RESULTS W/CIPs

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Assumptions

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 3-24. 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 x 1 = 1) and the highest possible Criticality being 25 (5 x 5 = 25).

TABLE 3-24

Asset Condition Ranking System

Rank	Description
1	Very Low
2	Low
3	Moderate
4	High
5	Very High

Asset Inventory

The City of Ilwaco's Asset Inventory is shown in Table 3-25. The criticality of assets and annualized replacement costs of the assets are detailed in Table 3-25. The inventory includes all major components of the City's water system.

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TABLE 3-25

Ilwaco Water System Asset Management Inventory

No.	Asset	Asset Description	Asset Type	Asset Location	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)	Related Capital Improvement Projects	Replacement Cost ($2025)[1]	Annualized Replacement Cost ($2025)
Source of Supply															
1	Impoundment Dam	Two standing intake pipes located inside dam w/24-inch steel outake pipe encased in concrete, capacity of 1.5 mgd	Source of Supply	Indian Creek Dam	1988	37	50	13	D	5	2	10	SO-1, SO-2	$2,100,000	$42,000
Reservoirs															
2	Indian Creek Reservoir	159 KG Concrete Reservoir	Storage	122 Walberg Road	1988	37	75	38	C	4	3	12	-	$650,000	$8,667
3	City Center Reservoir	500 KG Steel Reservoir	Storage	Near Whealdon Street and Mary Ann Avenue NE	1996	29	75	46	C	4	3	12	-	$120,000	$1,600
4	Discovery Heights Reservoir	400 KG Fused Glass Steel Reservoir	Storage	Near Overlook Loop and Coastal Ridge Road	2003	22	75	53	B	4	3	12	-	$110,000	$1,467
5	2nd Indian Creek Reservoir	159 KG Concrete Reservoir	Storage	122 Walberg Road	2014	11	75	64	B	4	3	12	-	$650,000	$8,667
6	2nd City Center Reservoir	500 KG Fused Glass Steel Reservoir	Storage	Near Whealdon Street and Mary Ann Avenue NE	2014	11	75	64	A	4	3	12	-	$1,200,000	$16,000
Booster Stations															
7	Discovery Heights (Coastal Ridge) Booster Station	1x1,000 gpm fire pump @ 40 hp and 2x60 gpm domestic pumps @ 5 hp	Booster Station	Near Overlook Loop and Coastal Ridge Road	2005	20	40	20	C	3	2	6	BPS-1, BPS-3	$351,000	$8,775
8	Lakeview Estates Booster Station	1x500 gpm fire pump @ 40 hp and 1x45 gpm domestic pump @ 3 hp w/chlorination system	Booster Station	Lakeview Drive	2003	22	40	18	C	3	2	6	BPS-2, BPS-3	$308,000	$7,700
9	Spring Street Booster Station	2x500 gpm pumps @ 60 hp	Booster station	Spring Street SW	2003	22	40	18	C	3	2	6	BPS-3	$308,000	$7,700
10	Baker Bay Booster Station	1x190 gpm pump @ 10 hp and 2x380gpm @ 20 hp	Booster Station	Near Stringtown Road and Highway 101	1988	37	40	3	C	3	2	6	BPS-3	$374,000	$9,350
11	Intertie Booster Station	2x400 gpm pumps w/ 2 x 15-hp motors	Booster Station	Near Sandridge Road and Highway 101	1980	45	40	-5	D	3	2	6	BPS-3	$231,000	$5,775
12	City Center Booster Station	2x30 gpm pumps @ 1.5 hp	Booster Station	Near Whealdon Street and Mary Ann Avenue NE	2021	4	40	36	A	3	2	6	BPS-3	$190,000	$4,750
Treatment Facilities															
13	Treatment Filters	2x300 gpm WesTech Trident filters and a 700-gpm Tridian TR-420A clarifier	Treatment Plant Facilities	Impoundment Dam Site	1988 and 2017	27 and 8	40	13 and 32	B	3	3	9	-	$100,000	$2,500
14	Soda Ash Pumps	1 Milton Roy diaphragm pump	Treatment Plant Facilities	Impoundment Dam Site	2017	8	10	2	B	1	3	3	G-1	$3,500	$350
15	Sodium Hypochlorite Pump	1 Grundfos disphragm pump for raw sodium hypochlorite	Treatment Plant Facilities	Impoundment Dam Site	2017	8	10	2	B	1	3	3	G-1	$3,500	$350
16	Vichem Polymer Pumps	2 LMI diaphragm pumps dosing Vichem polymer	Treatment Plant Facilities	Impoundment Dam Site	2017	8	10	2	B	1	3	3	G-1	$3,500	$350
17	Treatment Building	5,150 SF Metal Building	Treatment Plant Facilities	Impoundment Dam Site	1988	37	60	23	B	3	2	6	G-3	$2,575,000	$42,917

TABLE 3-25 – (continued)

Ilwaco Water System Asset Management Inventory

No.	Asset	Asset Description	Asset Type	Asset Location	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)	Related Capital Improvement Projects	Replacement Cost ($2025)[1]	Annualized Replacement Cost ($2025)
18	Controls	SCADA	Treatment Plant Facilities	Impoundment Dam Site	2017	8	40	32	B	3	3	9	G-1	$40,000	$1,000
Interties															
19	Intertie 1	6-inch PVC waterline equipped w/booster station	Intertie	Near Sandridge Road and Highway 101	2000	50	75	25	C	2	2	4	-	$350,000	$4,667
PRV Stations															
20	PRV Station 1	Bypassed 8-inch PRV	PRV Station	Stringtown Road	1988	37	50	13	C	2	2	4	-	$150,000	$3,000
21	PRV Station 2	8-inch PRV from Zone 339 to Zone 157	PRV Station	Spring Street SW	2003	22	50	28	C	2	2	4	-	$150,000	$3,000
22	PRV Station 3	8-inch PRV from Zone 339 to Zone 158	PRV Station	Klahanee Drive SW and Robert Gray Drive	2018	7	50	43	C	2	2	4	-	$150,000	$3,000
23	PRV Station 4	8-inch PRV from Zone 339 to Zone 269	PRV Station	Ft Canby Road and Coast Guard Road	2004	21	50	29	C	2	2	4	-	$150,000	$3,000
Miscellaneous															
24	Water Main and Appurtenances	Approximately 23,739 lineal feet of ≤6" water main and appurtenances	Water Main	City Water Service Area	Varies	1 to 60	60	10 to 59	C	1	3	3	D-1 through D-5	$3,561,000	$59,350
25	Water Main and Appurtenances	Approximately 72,416 lineal feet of ≥8" water main and appurtenances	Water Main	City Water Service Area	Varies	1 to 60	75	25 to 74	C	2	3	6	D-1 through D-5	$14,483,000	$193,107
26	Water Meters	690 Service Meters	Meter	City Water Service Area	Varies	Varies	20	Varies	C	1	2	2	G-2	$207,000	$10,350
27	Fire Hydrants	71 fire hydrants	Fire Hydrant	City Water Service Area	Varies	Varies	50	Varies	B	1	3	3	D-1 through D-5	$438,000	$8,760
28	SCADA System	PLCs and Telemetry and SCADA	SCADA	System Wide	Varies	Varies	25	Varies	C	4	4	16	G-1	$335,000	$13,400
Total ($2025)														**$22,699,500**	**$393,150**

(1) Replacement costs are based on the general type of asset and have been prepared exclusively for the purposes of this Asset Management Plan. Prior to allocating funds for any water system improvement project, it is recommended that a detailed cost estimate be prepared as part of the preliminary engineering work for that specific project

CHAPTER 4

WATER USE EFFICIENCY PROGRAM

OBJECTIVE

The objectives of this chapter are to identify the conservation and water use efficiency requirements pertaining to the City of Ilwaco (City), evaluate past conservation goals and establish new conservation goals, and describe the City's Water Use Efficiency (WUE) Program for the next 10 years.

WATER USE EFFICIENCY PLANNING REQUIREMENTS

The Washington Legislature passed the Water Use Efficiency Act of 1989 (43.20.230 RCW), which directs the Department of Health (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 and amended RCW 90.46 to require additional conservation measures. The Municipal Water Law directed DOH to develop the Water Use Efficiency (WUE) Rule, which was adopted in October 2006. The WUE Rule is outlined in the Water Use Efficiency Guidebook (Third Edition), which 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 an application for water rights. 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 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.

The fourth and most recent edition of the WUE Guidebook was released in May 2025. The WUE Rule sets stringent requirements for public water purveyors. The WUE Rule is comprised of the following seven sections:

1. WUE Requirements

2. Water Metering
3. Data Collection
4. Distribution System Leakage (DSL)
5. Water Demand Forecasting
6. WUE Goals
7. WUE Measures

WATER USE EFFICIENCY REQUIREMENTS

The WUE Guidebook establishes various 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, DSL standards, and goal setting and performance reporting.

Table 4-1 provides a summary of the WUE Rule requirements applicable to the City.

TABLE 4-1

Summary of WUE Requirements

Requirement	City Compliance
Include WUE Program in Planning Documents	✓
Set WUE Goals	✓
Submit Service Meter Installation Schedule	✓
Submit First Annual Performance Report	✓
Meet DSL Standard (based on 3-year rolling average)	
Complete Installation of All Service Meters	✓

The City has met all WUE requirements outlined above in Table 4-1 with the exception of the DSL standard. The City's DSL will be discussed later in this chapter.

WATER METERING

The WUE Rule requires all sources and customer service connections be metered by January 22, 2017. The City currently meters all sources, and all customer services, while maintaining a water meter replacement program to assure meter accuracy. The City also meters its hydrant usage and requires contractors to do so as well.

WATER USE 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 as well as in an annual performance report to DOH. Water use data is used for the following:

- 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 4-2 summarizes the water use data collection requirements.

TABLE 4-2

Summary of Water Use Data Collection

Data Type	Unit of Measure	Collection Frequency	Comments
Water Production	Gallons	Daily	Available as daily data, total by month and by year.
Interties[(1)]	Gallons	As-Needed	Interties are metered as they are used.
Estimated Unmetered Water Use	Gallons	Billing Period	Estimate and record unmetered water uses for each billing period.
Authorized Consumption	Gallons	Billing Period	The sum of Water Sold and Estimated Unmetered Water Use.
Distribution System Leakage	Gallons	Billing Period	The difference between monthly Water Production and monthly Accounted-for Water.
Percent Distribution System Leakage	Percent	Billing Period	Distribution System Leakage divided by Water Production times 100 percent (see Chapter 2). Calculated for each billing period and for each year. If the 3-year running average exceeds 10 percent, further actions are required to reduce distribution system leakage.

DISTRIBUTION SYSTEM LEAKAGE STANDARD

The WUE Rule requires that water distribution systems maintain a DSL rate of 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. The DSL for 2018 through 2023 is summarized in Table 4-3 and described below.

TABLE 4-3

Distribution System Leakage (2018 to 2023)

Year	Metered Production (MG)	Metered Consumption (MG)	Unmetered Accounted for Water (MG)	Total Accounted for Water (MG)	Distribution System Leakage (MG)	Distribution System Leakage (%)	3-Year Rolling Average
2018	88.74	50.50	2.73	53.23	35.51	40.0%	--
2019	83.38	57.73	3.02	60.76	22.62	27.1%	--
2020	65.80	46.99	3.99	50.97	14.83	22.5%	29.9%
2021	87.31	49.06	3.05	52.11	35.19	40.3%	30.0%
2022	77.20	43.94	3.26	47.20	30.01	38.9%	33.9%
2023	86.76	48.34	3.92	52.26	34.50	39.8%	39.6%

(1) From Table 2-7.

As shown above, DSL for the City of Ilwaco has varied between 22.5 and 40.3 percent since 2018. The City's 3-year rolling average DSL was 39.8 percent in 2023. Since the City does not meet the DSL standard at this time, a Water Loss Control Action Plan (WLCAP) must be adopted. This WLCAP is detailed at the conclusion of this chapter.

WATER DEMAND FORECASTING

The water demand forecast is presented in Table 2-13 and is based on historic water use data, characteristic water demand parameters and anticipated growth. A detailed discussion of the demand forecast assumptions and parameters used can be found in Chapter 2. These forecasted values will be compared to a similar forecast in which the City meets new conservation goals in Table 4-5.

WATER USE EFFICIENCY GOALS

The WUE Rule requires that water conservation goals include a measurable outcome, address water supply and/or demand characteristics, and include an implementation schedule. The goal setting process must be held through a public forum and be re-evaluated every 6 years. The WUE Rule requires that the "governing body of the public water system shall establish water use efficiency goals within 1 year of the effective date of this rule." 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." Documentation of the public meeting and adoption of the updated WUE goals, which are detailed later in this section, can be found in Appendix I.

the updated WUE goals, which are detailed later in this section, can be found in Appendix I.

This section will first evaluate the City's previous WUE goals which were outlined in the previous *2011 Water System Plan*, before outlining new goals for the next 10-year planning period.

PREVIOUS WUE GOALS

Past WUE goals established by the City's *2011 Water System Plan* included one specific demand goal and one specific supply goal. These goals will be evaluated by comparing target water use from the previous WSP to the historic water use that actually occurred. The two goals are described below.

1. Demand Side Goal: Reduce consumption by general commercial and residential users by 3 MG by 2016, excluding consumption from the Ilwaco Fish Company.

Table 4-4 shows the commercial and residential consumption required to meet the demand side goal from the previous WSP versus the actual consumption.

TABLE 4-4

2011 Demand Side Goal Results

Year	Consumption (MG)				
	Ilwaco Fish Company	**Total Commercial**	**Commercial w/o Ilwaco Fish Company**	**Residential**	**Total Residential and Commercial w/o Ilwaco Fish Company**
2010[(1)]	21.0	52.1	31.1	23.9	55.0
2016 Goal[(1)]	-	-	-	-	52.0
2023 Actual[(2)]	8.0	26.7	18.7	21.6	40.4

(1) From the *2011 Water System Plan.*
(2) Consumption by Customer Class from Table 2-6.

As shown in Table 4-4, the City was able to meet the demand side goal from the previous WSP. The previous demand goal looked to reduce general commercial and residential consumption by 0.5 MG/Y over a 6-year span. The actual decrease in total residential and commercial consumption, excluding consumption from the Ilwaco Fish Company, was slightly greater than 0.5 MG/Y.

2. Supply Side Goal: Reduce system DSL to below 10 percent.

As shown in Table 4-3, the City has not managed to reduce their system DSL to below 10 percent. The City's 2023 DSL was 39.8 percent, which is above the supply side goal.

UPDATED WUE 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 two new goals are summarized below.

1. Demand Side Goal: Reduce the average day consumption per ERU (ERU_{ADD}) by 0.5 percent per year through 2035. Table 4-5 shows the impact of meeting the reduced consumption goal.

TABLE 4-5

Water Savings with Demand Goal

Year	Projected ERUs (Excluding DSL)	No Conservation		Conservation		Annual Water Savings (MG/Y)
		ERU_{ADD}	Average Daily Consumption (gpd)[(1)]	ERU_{ADD}	Average Daily Consumption (gpd)	
2026	1,244	115	143,080	114.4	142,365	0.3
2027	1,259		144,737	113.9	143,293	0.5
2028	1,273		146,414	113.3	144,229	0.8
2029	1,288		148,111	112.7	145,171	1.1
2030	1,303		149,829	112.2	146,121	1.4
2031	1,318		151,568	111.6	147,078	1.6
2032	1,333		153,328	111.0	148,042	1.9
2033	1,349		155,110	110.5	149,013	2.2
2034	1,364		156,913	109.9	149,991	2.5
2035	1,380		158,738	109.4	150,977	2.8
Total						**15.2**

(1) From Table 2-13.

The City would save an estimated 15.2 MG of water if it were to follow through on its demand side WUE goal.

2. Supply Side Goal: Decrease the projected DSL volume by 16 percent per year through 2035 in order to bring the DSL rate below 10 percent. Water savings from the demand and supply side goals are combined in Table 4-6.

TABLE 4-6

Total Water Savings – Consumption and Supply Goals

Year	Average Day Consumption w/o WUE goals (gpd)[1]	Average Day Consumption w/WUE Goals (gpd)[1]	DSL w/o WUE Goals (gpd)[2]	DSL w/WUE Goal		Annual Water Savings (MG/Y)
				(gpd)	(%)	
2026	143,080	142,365	92,000	77,280	35.2%	5.6
2027	144,737	143,293		64,915	31.2%	10.4
2028	146,414	144,229		54,529	27.4%	14.5
2029	148,111	145,171		45,804	24.0%	17.9
2030	149,829	146,121		38,475	20.8%	20.9
2031	151,568	147,078		32,319	18.0%	23.4
2032	153,328	148,042		27,148	15.5%	25.6
2033	155,110	149,013		22,805	13.3%	27.5
2034	156,913	149,991		19,156	11.3%	29.1
2035	158,738	150,977		16,091	9.6%	30.5
Total						**205.5**

(1) From Table 4-4.
(2) From Table 2-13.

As shown in Table 4-6, by enacting both WUE goals, the City would save an estimated 205.5 MG of water over the 10-year planning period while reaching a DSL rate below 10 percent.

WATER USE EFFICIENCY MEASURES

The WUE Rule requires that water systems with between 500 and 999 service connections must implement or evaluate a minimum of four water use efficiency measures. The WUE Guidebook further states that water use efficiency measures that are required in other portions of the WUE Rule cannot be counted as measures to be selected under this requirement. Measures required in other portions of the WUE Rule include the following:

- Installation of source and service meters if meters are not already present;
- Regular calibration of meters;
- Development and implementation of a water loss control program if DSL exceeds 10 percent;
- Evaluation of water rates; and
- Evaluation of reclaimed water.

The City of Ilwaco is in compliance with all required WUE measures listed above.

The City of Ilwaco has adopted the following five supplemental WUE Measures:

- Notifying residential customers of unusually high water usage;
- Notifying multi-family customers of unusually high water usage;
- Notifying commercial/industrial customers of unusually high water usage;
- Maintain a display at select downtown events promoting water use efficiency (Appendix J);
- Include a section in the City's annual Consumer Confidence Report instructing water customers in leak detection techniques.

EVALUATION OF EXISTING MEASURES

Many of the measures selected for continued implementation require little additional funding, such as including consumption history in bills and including information in inserts and online. The City will track the finances associated with each measure and compare it to water saved to evaluate the effectiveness of each measure. If these measures do not provide enough savings to meet goals, additional measures will be considered.

PERFORMANCE REPORTING

The City must submit a performance report to DOH by July 1 each year. This annual report must include:

- Total source production and customer consumption;
- Distribution system leakage in percentage and volume; and
- Description of current WUE goals, schedule and progress towards meeting goals.

DOH has developed an online reporting form that must be used by water systems to file their annual report. Previous years' WUE annual performance reports are also available on the DOH website.

The City has been in compliance with these annual reporting requirements.

WATER LOSS CONTROL ACTION PLAN

In 2023, the City's DSL was 39.8 percent with a 3-year rolling average of 39.6 percent. Both values are above the DSL standard of 10 percent. As a result, the City must implement a Water Loss Control Action Plan. The following elements are included in the WLCAP:

- The water loss control methods include pipe replacement to reduce leakage and replacing faulty water meters. The City will continue to replace aging and leaky pipes and faulty water meters.

- The City will work to reach a DSL below 10 percent by 2035. A more detailed schedule for reaching the DSL standard is presented in Table 4-5.

- A leak detection survey will be included in the Capital Improvements Program every two years to find and repair any significant sources of leakage. Additionally, the City is in the process of installing new meters that will track and notify the City of leaks on the customer side of the meter.

- The City is currently planning a meter replacement project (Project G-2, Chapter 7) for residential and commercial meters.

- The City's Capital Improvement Program, which is detailed in Chapter 7, outlines future meter replacement and pipe replacement programs. Aging and undersized pipes can be at increased risk of leakage and projects to replace these pipes are included in the City's CIP budget. A continuous meter replacement program will also keep the maximum meter age within an acceptable range. Meters showing signs of faulty readings will be prioritized for replacement.

- There are no anticipated technical or financial concerns that could prevent the City from complying with the standard. The City's financial projections, which include specific line items for CIP projects, can be found in Chapter 8.

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 to protect the water supply and the health of water system customers. This chapter has been prepared to fulfill the watershed control program requirements for a surface water system, in accordance with WAC 246-290-668.

WATERSHED DESCRIPTION

The City of Ilwaco obtains its water from the impoundment of Indian Creek, a tributary of the Bear River. Indian Creek Dam was formed by the construction of an earthen dam built in 1988. The dam is located approximately 5,500 feet upstream from the confluence of Indian Creek and Bear River and approximately 6 miles northeast of the City of Ilwaco. The remote location of the watershed and land management practices implemented by the City have helped preserve the quality of this resource.

The City's drinking water intake is located behind the dam. Raw water from the impoundment flows by gravity to the water treatment plant. The water is filtered, disinfected using hypochlorite, and routed to a storage tank before flowing to the City's distribution system. The Indian Creek treatment facility currently has a production capacity of 2.0 mgd and water rights for 1.5 mgd.

LOCATION AND SIZE

The location of the Indian Creek watershed and drainage basin are shown on Figure 5-1 while Figure 5-2 details the ownership. The drainage basin located in Sections 27, 28, 29, 33, and 34 of Township 10N, Range 10W and Section 3 Township 9N, Range 10W in Pacific County consists of approximately 843 acres. The terrain of the drainage basin consists of wooded slopes. The adjacent drainage basins to the north and east discharge to small creeks tributary to the Bear River and the drainage basins to the west discharge to small creeks tributary to the Chinook River.

LAND USE AND OWNERSHIP

The drainage basin for the Indian Creek impoundment is approximately 843 acres. In 2023, the City of Ilwaco successfully acquired 793 of the 843 acres that make up the watershed. The remainder of the watershed is owned by Weyerhaeuser Company and Hawaii ERS Timberland LLC. The parcel ownership inside the watershed's drainage basin is summarized in Table 5-1

TABLE 5-1

Properties Within the Watershed

Owner	Parcel Number(s)	Total Area (Acre)	Contact Address
City of Ilwaco	10102914003, 10102822001, 10102837000, 10103322002, 10103312003, 10103422001, 10103429000, 10102732001,	793	P.O. Box 548 Ilwaco, WA 98624
Weyerhaeuser Timber Holdings, Inc. 220 Occidental Avenue South Seattle, WA 98104	10103313000, 10103211000, 10103428000	20	220 Occidental Avenue South, Seattle, WA 98104
Hawaii ERS Timberland LLC 203 SE Park Plaza Drive Vancouver, WA 98684	10102940000, 10103320000	30	203 SE Park Plaza Drive, Suite 270 Vancouver, WA 98684

City of Ilwaco

The 793 acres of the drainage basin owned by the City of Ilwaco and are mainly wooded areas that are managed by the City as protective areas for the City's watershed.

Weyerhaeuser Timber Holdings, Inc

Weyerhaeuser Timber Holdings, Inc owns approximately 20 acres of timberland in the southern edge of the City's watershed. From discussions with the City, no logging activities have occurred within the watershed.

Hawaii ERS Timberland LLC

Hawaii ERS Timberland LLC owns approximately 30 acres of timberland in the Western edge of the City's watershed. From discussions with the City, no logging activities have occurred within the watershed.

Mineral Rights

The previous owners of the watershed retained the mineral rights to the property when land ownership transferred to the City of Ilwaco.

Indian Creek Watershed

Reference

Ilwaco City Limits

Retail Service Area

Parcel

Streams

Water Body

N

0 1,0002,000 4,000

Feet

CITY OF ILWACO

WATER SYSTEM PLAN UPDATE

FIGURE 5-1

WATERSHED

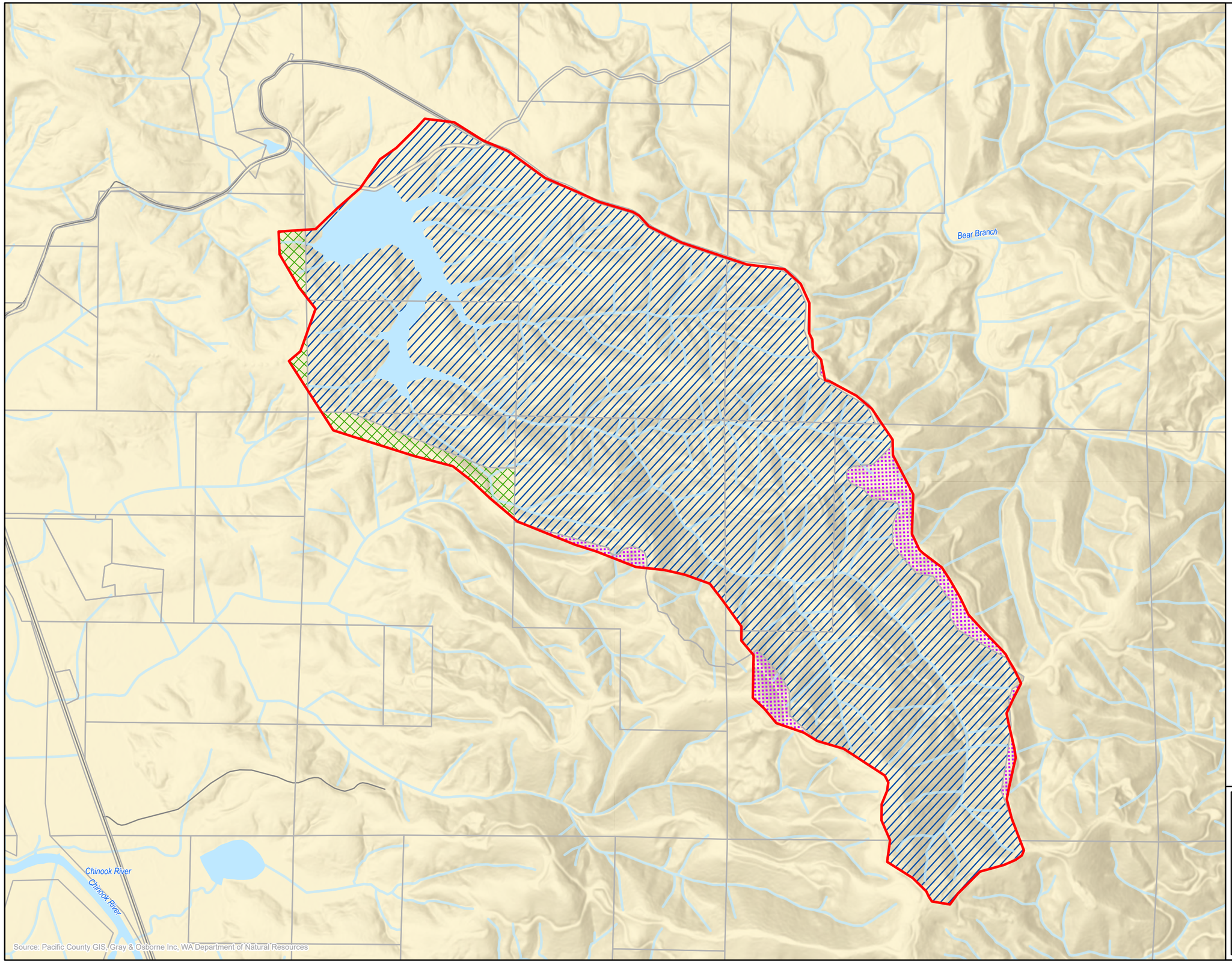
Gray & Osborne, Inc.

CONSULTING ENGINEERS

Source: Relevant City & County Sources,

Export Date: 8/27/2025

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Indian Creek Watershed Parcels
- City of Ilwaco
- Hawaii ERS Timberland LLC
- Weyerhaeuser Timber Holdings, Inc.
- Indian Creek Watershed

Reference
- Parcel
- Water Body
- Stream

N

0 500 1,000 2,000 Feet

CITY OF ILWACO

WATER SYSTEM PLAN UPDATE

FIGURE 5-2

WATERSHED PARCEL OWNERSHIP

Gray & Osborne, Inc.
CONSULTING ENGINEERS

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ROADS AND TRAILS

Walberg Road, a County road, provides limited access to the Indian Creek Watershed. The gravel road begins at Chinook Valley Road and continues east to the Water Treatment Plant. A private road continues southeast along the ridge that delineates the watershed. Logging activities and recreational users of properties located outside of the watershed use this road for access. Several old logging roads located within the watershed have been abandoned and use by non-City staff is prohibited. All former logging roads within the City owned watershed are gated and have been allowed return to a vegetated state. City staff walk the abandoned roads around the perimeter of the impoundment to patrol the area once a week.

HYDROLOGY

According to the U.S. Climate Normals, a data search from the National Centers for Environmental Information, the mean annual precipitation measured at Long Beach Experimental Station between 1991 and 2020 averaged approximately 78.51 inches per year with approximately 31.95 inches accumulating during winter months.

The 843-acre drainage basin receives approximately 6,173 acre-feet, or 2 billion gallons of rainfall per year. Approximately 232 acre-feet, or 75.5 million gallons of precipitation falls directly onto the 35 acres of impoundment water surface.

The City has regularly recorded daily water levels at the impoundment dam since October 2015. These levels are recorded to track seasonal variation in water level over time. The historic elevation of the water level between October 2015 and August 2025 is shown on Figure 5-3 displays each measurement taken to show a trend throughout the historic period, Figure 5-4 displays the maximum, minimum, and average water level taken for each year, while Figure 5-5 displays the maximum, minimum, and average water level for each month over the period of 2015 to 2025. It should be noted that the City did not record data July 2019. The elevation of the treatment plant's intake has been included to these figures to show to show how submerged it has been historically.

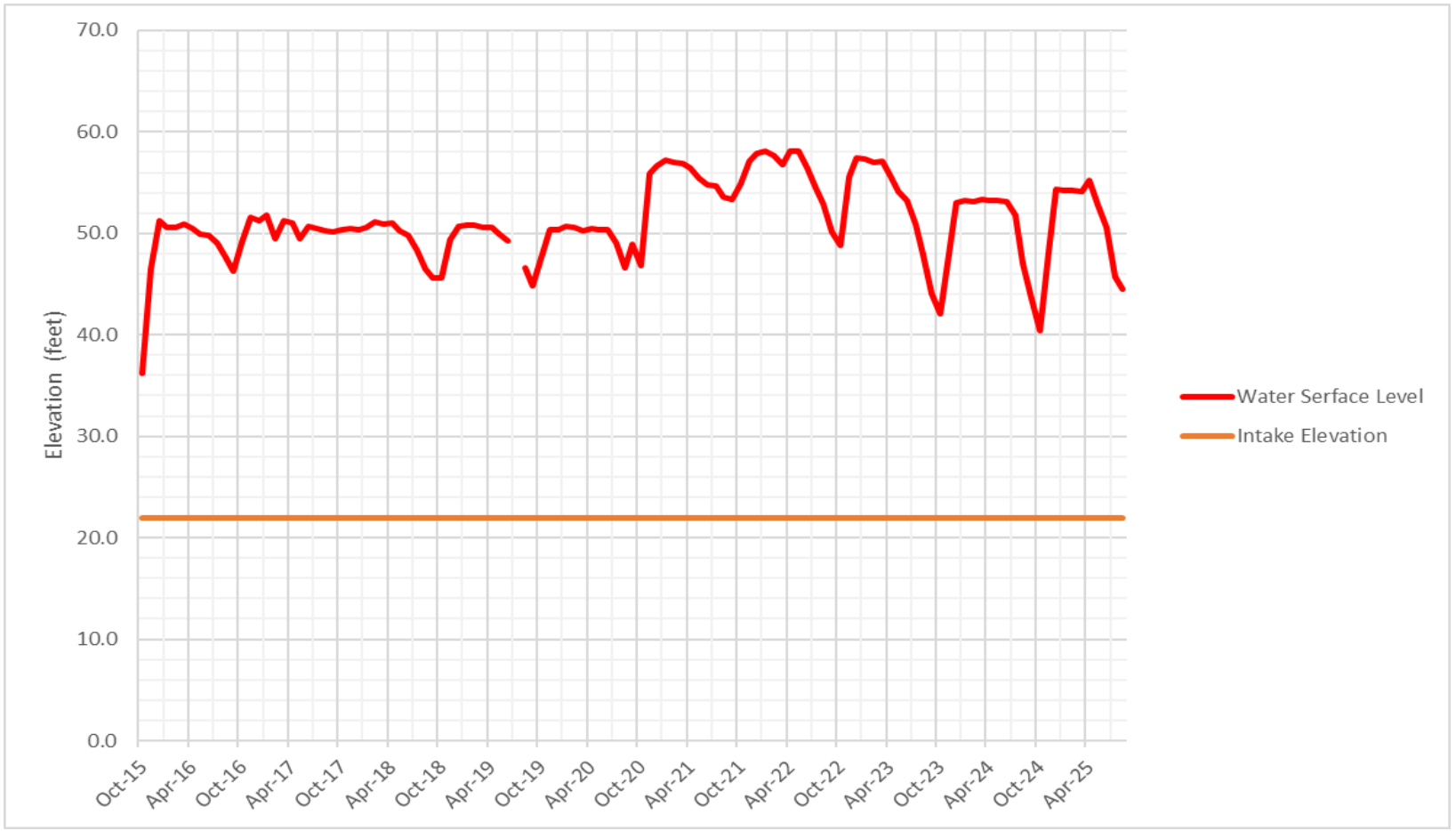


FIGURE 5-3

Impoundment Dam Water Surface Levels

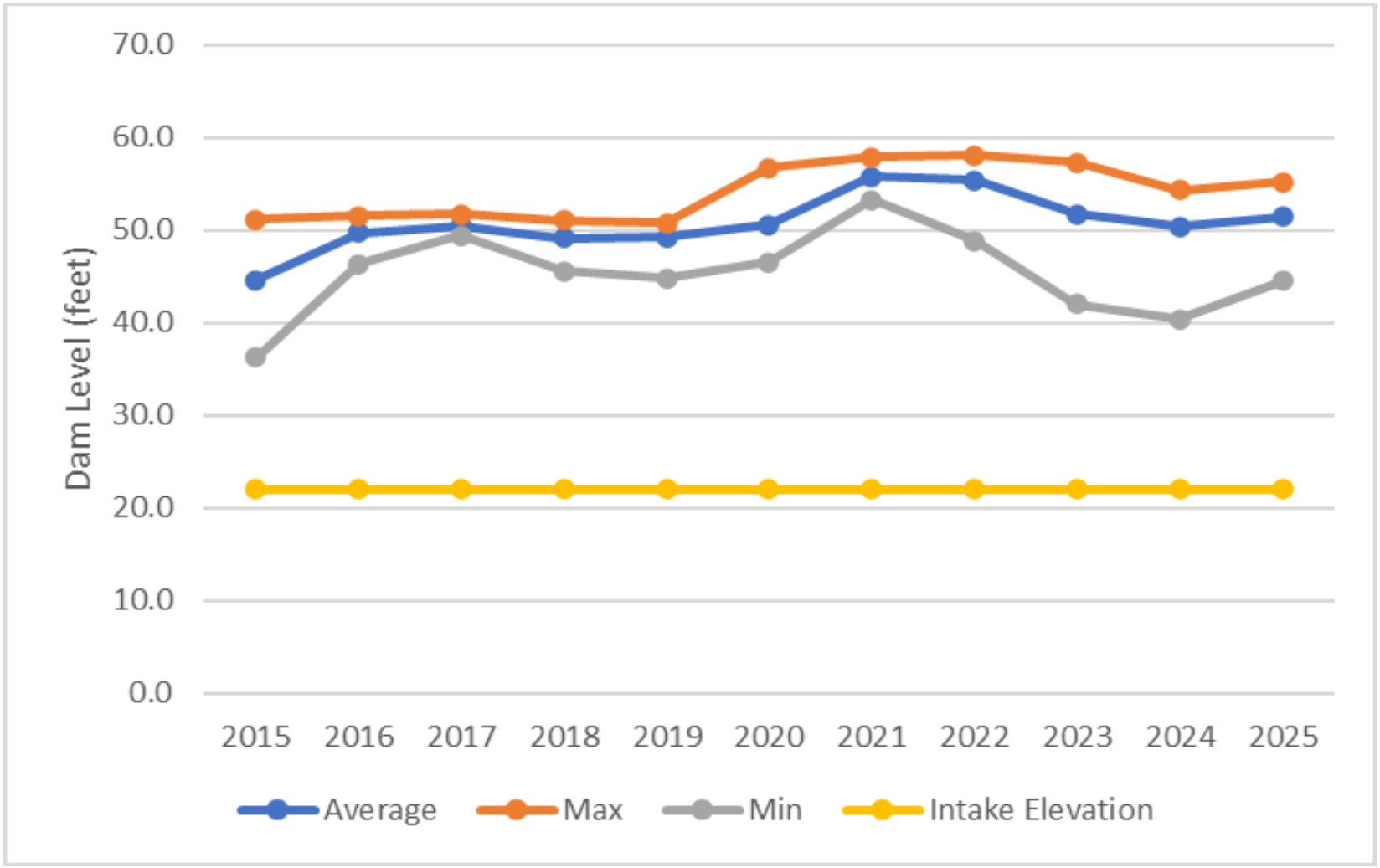


FIGURE 5-4

Impoundment Dam Maximum, Minimum, and Average Yearly Water Surface Levels

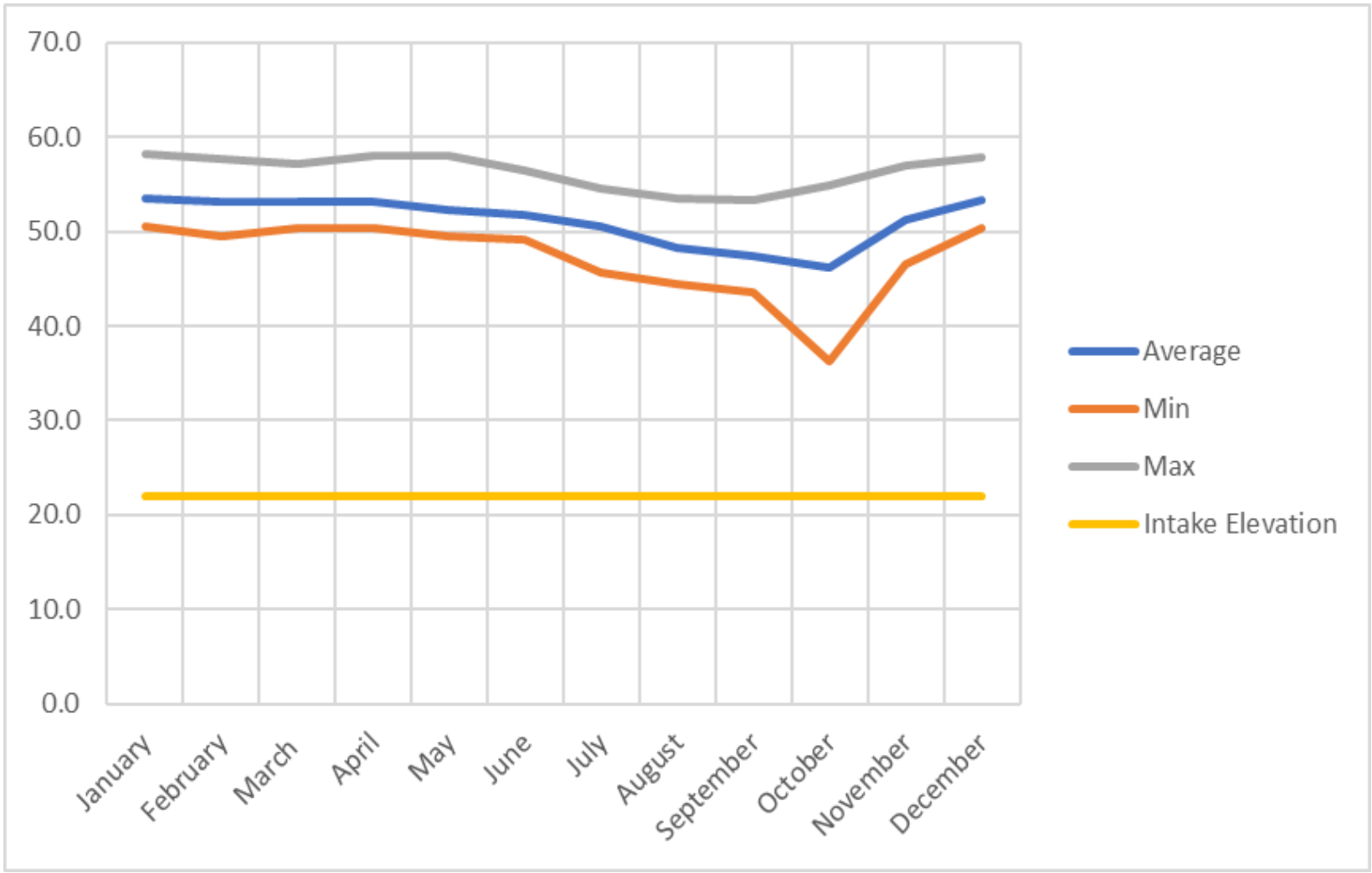


FIGURE 5-5

Impoundment Dam Maximum, Minimum, and Average Monthly Water Surface Levels

As shown in Figure 5-3, before 2020, the water levels have remained relatively steady, but after the water levels saw more extreme highs and lows. Figure 5-4 shows that the last 3 years have had the lowest water levels since 2015. Figure 5-5, shows how water levels are lower between January and October and refill rapidly later in October to December. These are still much above the intake elevation and thus show that the City still has plenty of source water to supply its needs.

WATER QUALITY RISK ASSESSMENT

The water quality within the watershed control area has shown significant quantities of iron and organics in the source water. A detailed analysis of the City's source water quality can be found in Chapter 3 of this Water System Plan.

CURRENT WATERSHED CONTROL PLAN

Currently, the City of Ilwaco has policies and informal procedures in place to provide protection of the watershed. The remote location of the watershed has its benefits and disadvantages. The remote location of the watershed provides a buffer against potential detrimental activities to the watershed. In the same vein, the remote location also makes it more difficult to monitor and manage the watershed.

The City has obtained satisfactory water supply from Indian Creek since 1989. There has been no degradation of the water supply since the City of Ilwaco has started using it as a source of supply. Previous logging practices within the watershed do not appear to have caused lasting damage to the area. Land use practices in the watershed set forth by the City and the State have done an adequate job of protection. Additionally, the City has been able to purchase the majority of the land within the watershed.

There are no major activities within the watershed. The City does not allow recreational activities, road building, transportation or sanitation within the watershed. However, certain activities may occur within the watershed of which the City is not aware. These activities may include hunting, firefighting and wildlife management.

Timber land owners within the watershed must follow the best management practices for timber harvesting contained in Title 222 WAC. City staff contacts any new property owners that own timber rights or property in or adjacent to the watershed to determine their plans for management of the individual properties and to request that the City be notified prior to any activity that may affect the City's watershed.

WATERSHED CONTROL ACTIONS

The City is committed to protecting the watershed from potential harmful activities. City water system operators patrol the perimeter of the impoundment on a weekly basis to look for signs of intrusion or damage to the area surrounding the impoundment. The main access to the watershed off of the private road that forms the east and south

boundary of the watershed is gated to prevent access to the watershed. "No Trespassing" signs are posted around the perimeter of the watershed.

The City will continue the current actions it takes to protect the watershed and look to find ways to increase its watershed protection. The following is a list of actions the City will take in order to ensure the future protection of the Indian Creek watershed:

- **Increase Knowledge of Watershed Activities**

  Over the past 10 years, the ownership of the land surrounding the watershed has changed hands. The City owns the majority of the watershed as shown in Figure 5-2. The City will keep up to date on who owns the small portions of the watershed and the areas on the perimeter of the watershed. Each time the land ownership is changed, the City will notify the land owner to discuss their plans for the property and the possible impacts they may have on the watershed. Additionally, the City sends these letters annually. This Letter is included in Appendix J.

  The City will request that the county will provide notification of any planning activities or building permits that are occurring within the watershed.

- **Secure Access to Drainage Basin**

  Access to the City's treatment facility and the Indian Creek Dam is currently secured and locked at the entrance. "No Trespassing" signs are posted throughout the perimeter of the City's watershed perimeter.

  Additionally, the City has one gate placed on Walberg road, after the water treatment plant to secure access to the drainage basin.

- **Wildlife Program**

  In the past, beaver activity has been identified at the headwaters of Indian Creek and just below the Indian Creek Dam. Pacific County actively traps and removes beavers from the watershed.

- **Monitor Drainage Basin**

  A member of the City staff travels to the treatment plant once a day. City staff will patrol the watershed perimeter and access roads once per week. The City will continue to monitor the watershed. All City staff that are responsible for monitoring activities in the watershed will be knowledgeable about the watershed boundaries, access, and the potential impacts that various activities can have on the watershed.

- **Erosion Prevention**

  Entities that perform logging or road building within or near the watershed area must use Best Management Practices contained in the Forest Practices regulations, Title 222 WAC, to prevent erosion and sediment transport when performing these activities. The City will reseed or replant any area within the watershed, which are damaged by forest fires.

EMERGENCY RESPONSE

If an emergency concerning the watershed should occur, such as a spill or forest fire within the watershed, the following individuals or agencies will be contacted immediately.

Pacific County Sheriff Dispatch.....911 or (360) 642-9403

City of Ilwaco Fire Department.....911 or (360) 642-2316

Washington State Department of Health

Division of Drinking Water .....(360) 236-3100
.....or (800) 521-0323

Water Quality Superintendent

City Hall.....(360) 642-3145
Water Treatment Plant .....(360) 777-8330

Long Beach City Hall .....(360) 642-4421

Department of Natural Resources

Report A Forest Fire Hotline.....(800) 562-6010

CHAPTER 6

OPERATION AND MAINTENANCE

OBJECTIVE

The objective of this chapter is to provide an evaluation of the City's operation and maintenance (O&M) program and its ability to assure satisfactory management of the water system operations in accordance with WAC 246-290.

The O&M Program includes the following elements:

- Water System Management and Personnel
- Operator Certification
- System Operation and Control
- Comprehensive Monitoring Plan
- Emergency Response Program
- Safety Procedures
- Cross-Connection Control Program
- Customer Complaint Response Program
- Recordkeeping and Reporting
- O&M Improvements

The following comments are presented as an assessment of the adequacy of each section of the City's Operation and Management Program.

ORGANIZATION

The City of Ilwaco (City) water system is operated by the City's Water Department, which is under the direction of the City's Mayor. The Water Department has two employees. Other City staff assist with water system maintenance and operation as needed.

CHAIN OF COMMAND

During emergency responses, the water system chain of command will follow that of normal operation, with the Mayor serving as the immediately responsible person. If the Mayor is unavailable, the Mayor Pro Tempore will be responsible for emergency response.

CERTIFICATION REQUIREMENTS

Waterworks Operator Certification, specified in WAC 248-55, requires larger public water systems in Washington State to retain in their employ individuals who are certified, by examinations, as competent in water supply operations 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.

Under the current certification requirements of the DOH, the City must provide three mandatory certification positions for its water system, a Water Distribution Manager Level 1 (WDM 1), a Water Treatment Plant Operator Level 3 (WTPO 3), and a Cross Connection Control Specialist Level 1 (CCS 1). The DOH also requires that personnel with supporting certifications be available for each of the three mandatory certification positions. The current level of operator certification for each certified City employee is presented below.

TABLE 6-1

City Staff Certification Levels

Name	Position	WDM	WTPO	CCS
Shane Grant	Supervisor	2	3	1
Eli Sheaffer	Operator	-	2	1

PROFESSIONAL GROWTH REQUIREMENTS

In order to promote and maintain expertise for various grades of operator certification, Washington State requires that all certified operators complete at least three Continuing Education Units (CEUs) within each 3-year period. Programs sponsored by both the Washington Environmental Training Center (WETRC) and the American Waterworks Association's (AWWA) Pacific Northwest Subsection are two frequently used CEU sources utilized by City employees. The City regularly budgets for operator training in the annual budget.

JOB RETENTION PLAN

The City of Ilwaco is committed to hiring and retaining water treatment plant operators who are professional, dedicated and ethical. The City informally follows a job retention program with the goal of hiring and retaining top-quality operators.

The City recognizes that employee retention is important to ensure continuity at the water treatment plant and that a job must be appealing to the employees they want to retain.

In order to ensure job retention, the City surveys current employees to discover issues that employees perceive with their job. By conducting employee surveys, the City gathers information that is helpful in developing the job retention plan and also lets employees know that the City is interested and concerned about their welfare. The survey can be anonymous or verbally conducted at the discretion of the mayor

The City will conduct exit interviews for departing key employees. The exit interviews will be conducted promptly after an employee has turned in their notice to sever employment.

The strategies the City employs to ensure retention of key employees include:

- Retention Strategy 1: Provide work that is meaningful, challenging, and offers training and development opportunities.
- Retention Strategy 2: Provide management that assists and supports staff.
- Retention Strategy 3: Demonstrate awareness of life beyond the workplace and life in the workplace.
- Retention Strategy 4: Provide an array of core benefits, including a pay grade/step program.

SYSTEM OPERATION AND CONTROL

IDENTIFICATION OF MAJOR SYSTEM COMPONENTS

Identification of the major system components is included in Chapters 1 and 3. The City supplies water to its customers with the use of the following major system components:

- Source of Supply:
    - Indian Creek
- Treatment Systems:
    - Water Treatment Plant
- Five Water Storage Reservoirs
- Five Booster Stations
- 16 miles of transmission and distribution piping serving seven pressure zones

STANDARD OPERATING PROCEDURES

The City's Standard Operating Procedures (SOPs) for use in water system operations is stored at the Water Treatment Plant. These SOPs cover normal filter operations, emergency responses, emergency contacts, treatment technique violations, public notifications, PLC settings, and water quality sampling procedures.

ROUTINE AND PREVENTATIVE MAINTENANCE

The planning and performance of routine and preventative maintenance for the components of the City's water system represent important tasks in the reliable delivery of water to the service area. The most cost-effective method for maintaining a water system is to develop a planned Preventative Maintenance (PM) program. A planned PM program allows the City to determine the schedule for maintenance activities, so as to minimize the total maintenance cost.

Developing a PM program involves defining the tasks to be performed, determining the frequency of each task, and assigning City personnel for the completion of the tasks. The program allows the City to preserve the value of the physical infrastructure of the water system and provide a safe, reliable water supply to the service area.

MAINTENANCE OF MAJOR SYSTEM COMPONENTS

Routine maintenance tasks for the City's major system components are presented in Table 6-2. For each pump station and reservoir, the table also provides a description, previously performed maintenance, and planned maintenance.

TABLE 6-2

Preventative Maintenance Schedule

Name	Activity	Frequency
Source Intake	Monitor raw water intake	As necessary
	Water Quality Samples	As necessary
	Monitor Reservoir Levels	Daily
	Dam Inspection	Daily
Treatment Plant	Check Backwash Cycles	Daily
	Adjusting Chemical Feed Systems	Daily
	General Plant Cleaning and Upkeep	Daily
Reservoirs	Interior Cleaning and Painting	Every 5 years
	Exterior Cleaning and Paining	As necessary
	Clean site of debris	Monthly

TABLE 6-2 – (continued)

Preventative Maintenance Schedule

Name	Activity	Frequency
Booster Stations	Inspect pump house	Monthly
	Flush pump	Semi-annually
Distribution Mains	Flush	Annually
Isolation Valves	Close and Open	Annually
Control Valves	Calibrate	Every 5 years
WTP Generator	Start generator	Auto starts once a month
Hydrants	Exercise hydrants	biannually

MATERIALS INVENTORY

A key element of any effective PM program is an accurate inventory of parts, materials, and tools, including the location of each, which the City does. The City uses several suppliers for water system components, depending on what they need, price of the item, and location of the supplier. Additionally, the City has a mutual aid agreement with the City of Long Beach for public utilities, including traffic control, fire suppression, and potable water supply assistance.

EMERGENCY RESPONSE PROGRAM

The operation of the water system under emergency conditions is an important responsibility of the City staff. Emergency response procedures will be rehearsed and reviewed by all personnel. Staff members will be aware of emergency procedure changes and the location of emergency contact information. Detailed emergency response procedures are also being included in the City's new Standard Operating Procedures.

EMERGENCY CONTACT LIST

Pacific County Sheriff Dispatch	911 or (360) 642-9404
City of Ilwaco Fire Department	(360) 642-3188
Washington State Department of Health	
Division of Drinking Water	(360) 236-3030
	(800) 521-0323
Water Quality Superintendent	
City Hall	(360) 642-3145
Water Treatment Plant	(360) 777-8330
Long Beach City Hall	(360) 642-4421
Pacific County Emergency Management	(360) 875-9338

STAFF NOTIFICATION

A procedure for quickly notifying all City staff, customers, other utilities, and if necessary, the local health department and DOH, of a water system related emergency is a necessary component of an Emergency Response Program. The City keeps a list of staff contact information.

PUBLIC NOTIFICATION

In response to certain water system emergencies, it may be necessary to notify the public of drinking water quality concerns. WAC 246-290-320 indicates the follow-up actions that must be taken in the event of water quality emergencies. The public notification requirements of WAC 246-290-320 refer to the Environmental Protection Agency's (EPA's) Public Notification (PN) Rule, which is codified in the Code of Federal Regulations (CFR) beginning at section 40 CFR 141.201. In addition to notifying its own customers, the City must notify any wholesale customers of water quality emergencies. The public notifications must provide specific health effects language provided by EPA.

The EPA PN Rule categorizes drinking water situations and violations into three tiers, Tier 1, Tier 2, and Tier 3. The categories are summarized in the following paragraphs.

Tier 1 includes situations or violations that pose a potential for immediate human health risk. This could include fecal coliform detection or a nitrate MCL violation. Water suppliers have 24 hours to notify people who may drink the water about the situation.

Tier 2 includes situations or violations that do not pose an immediate health risk but still require prompt public notification. Tier 2 includes most MCL violations, other than acute bacteriological and nitrate MCL violations. Tier 2 situations and violations require DOH consultation within 48 hours and public notification as soon as practical but within 30 days of learning of the violation.

Tier 3 includes situations or violations that do not have a direct impact on human health. Tier 3 includes most monitoring violations, exceedance of the fluoride MCL, and the detection of unregulated contaminants. Tier 3 situations and violations require DOH consultation within 48 hours and public notification as soon as practical but within 1 year of learning of the violation. These notifications can be combined with the purveyor's annual water quality report. In the event that public notification is required during an emergency, the City maintains a list of both television and radio resources that can be provided with news releases regarding the situation.

Sample public notification forms that will be used by the City if needed are included in Appendix L.

EMERGENCY RESPONSE PROCEDURES

The City provides guidelines for the general assessment of an emergency situation. The first order of business is to assess whether or not an Incident Operations Center (IOC) will be established. An IOC is probably not necessary under the following conditions:

- A single event has occurred
- A small number of similar events have occurred
- The event has already peaked or ended

Once a general assessment of the situation has been completed, the Emergency Response Plan provides "decision trees" outlining procedures for emergency situations such as severe weather events, earthquakes, power failure, and water contamination.

EMERGENCY RESPONSE PLAN

It is important to estimate the degree in which system facilities may be vulnerable to various types of emergency situations in order to identify system weaknesses. The following sections provide information regarding which facilities would be vulnerable to various types of emergency events and recommended actions that City staff could take to help mitigate the problem.

Water Main Break

Water main breaks occur due to a number of factors such as the age of the pipe, soil conditions, the temperature of the water or air, pipe corrosion, and ground movement. In the event that a water main does break, the City will isolate broken sections as they are located, using system valves, and repair the main. Depending on the severity of the break, the City will notify all users that have an interruption of service, and arrange an alternate water source if necessary. Should a large drop in service pressure occur throughout the water system City staff should refer to DOH Publication 331-338 – Responding to a Pressure Loss Event. Both Documents can be found in Appendix M.

Water Shortage

A water shortage for the City's system could occur if adequate supply is not available from either the City's WTP or from the intertie with the City of Long Beach. In the event of a water shortage, the City will rely on standby storage to serve the system until supply can be provided. The public will be notified and asked to conserve water to maximize the period of standby storage availability. If needed, Ilwaco Municipal Code 13.04.090 gives the City the authority to restrict water use as necessary.

Bacteriological Presence Detection Procedure

Notification procedures for notifying system customers, the local health department, and DOH of water quality emergencies are an important component of responding the detection of bacteriological presence in the water system. Many public water systems will occasionally detect positive coliform samples, often 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. WAC 246-290-320 requires water utilities to follow specific procedures in the event coliform bacteria are detected in the water system. Refer to DOH publication 331-187 Follow-up to an Unsatisfactory Routine Coliform Sample for procedures to follow in the event of an unsatisfactory coliform test.

VOC/SOC Detection Procedures

Volatile organic chemicals (VOC) and synthetic organic chemicals (SOC) samples are routinely taken from supply sources. VOC and SOC tests include numerous different chemicals. VOCs and SOCs are generally not detected in supply sources. Therefore, any detection of VOCs or SOCs may warrant follow-up investigation even if it does not exceed an MCL. If routine VOC or SOC samples detect one or more chemicals, additional samples may be taken specifically for that chemical or possibly for a surrogate such as Total Organic Carbon if it reduces follow-up chemical testing costs. Follow-up procedures in the event of VOC or SOC detection are specified in WAC 246-290-320 (6). Follow-up actions may vary depending upon the specific chemical detected and the level at which it is detected. The DOH area representative should be contacted to coordinate follow-up sampling and appropriate responses.

Contamination of the Water Supply

Contamination of the water supply may occur due to such occurrences as main breaks or pollution from an isolated source. Table 6-3 presents the emergency response procedures for contamination of the water supply.

TABLE 6-3

Emergency Response Procedures for Contamination of the Water Supply

Water System Component	Recommended Actions
Transmission and Distribution System	Close valves as required to isolate the source of contamination. Repair and/or otherwise remove source of contamination. Flush previously contaminated section and test until free of contamination prior to resumption of use.
Storage Facilities	Isolate contaminated reservoir from the distribution system and decide on method of disinfection. Consider draining, cleaning, and disinfecting reservoir if water is determined to be unsuitable for consumption. Disinfect reservoir with chlorine in accordance with AWWA standards. Take bacteriological samples and return to service when results are satisfactory.
Booster Stations	Close valves as required to isolate the source of contamination. Repair and/or otherwise remove source of pollution. Flush previously contaminated section and test until free of contamination prior to resumption of use.

Treatment Technique Violations

A water system has a treatment technique violation, as identified in WAC 246-290-632, when a waterborne disease outbreak occurs or, for a purveyor providing filtration of a surface water source, when the filtration or disinfection performance requirements are not met. For the City's system, the failure to meet filtration or disinfection performance requirements would be shown by high turbidity or low chlorine residuals. As previously mentioned, turbidity and chlorine residual are continuously monitored by the City's SCADA system, and the WTP's finish water pumps shut down when these parameters are not within the appropriate range. Treatment technique violations require DOH consultation as soon as practically possible but within 24 hours of learning of the violation and require Tier 2 public notification unless elevated to Tier 1 by DOH.

Power Failure

Various types of weather can cause loss of power. In order to alleviate the effects of a power outage, the City has several auxiliary generators at its disposal. Table 6-4 presents the potential effects of a lengthy power failure on the water system components.

TABLE 6-4

Emergency Response Procedures for a Power Failure

Water System Component	Potential Effects	Recommended Actions
Transmission and Distribution System	Pressure loss in closed zones, causing possible contamination of the water supply.	Hook up booster pump stations to generator if available.
Storage Facilities	Telemetry system may be inoperable.	Manually check reservoir levels.
Booster Stations	Booster stations will be inoperable without auxiliary power.	Operate auxiliary generators at booster stations.

Severe Earthquake

A severe earthquake may have a substantial impact on the City's water system. In order to help mitigate the effects of an earthquake, the City will take seismic events into consideration when designing future reservoirs. In 2022, a seismic vault was installed to protect the water in the city center reservoirs in the event of an earthquake. 6-5 presents potential effects of a severe earthquake on the water system components.

TABLE 6-5

Emergency Response Procedures for an Earthquake

Water System Component	Potential Effects	Recommended Actions
Transmission and Distribution System	Transmission and distribution system mains may be broken and City staff transportation for monitoring systems and making repairs may be limited.	Isolate broken sections as they are located and repair them.
Storage Facilities	Reservoirs may be leaking or structurally damaged.	Check each reservoir for structural damage or cracks and leaks. Seal and drain as required.
Booster Stations	Booster stations may be structurally damaged or mechanical damage to pumps may have occurred.	Check booster stations and shut down pumps as required.

Severe Snowstorm

A severe snowstorm will limit motor vehicle traffic, including the transportation of City personnel. Table 6-6 provides the emergency response procedures for a severe snowstorm.

TABLE 6-6

Emergency Response Procedures for a Severe Snowstorm

Water System Component	Potential Effects	Recommended Actions
Transmission and Distribution System	City staff transportation for monitoring system and making repairs may be limited.	Contact county or state highway department to expedite plowing of problem areas. Keep chains or other snow gear for maintenance equipment on hand. Keep valve locations current and available to maintenance personnel.
Storage Facilities	No immediate effect, snow may prevent access.	Clear snow from access roads.
Booster Stations	No immediate effect, snow may prevent access.	Clear snow from access roads.

Major Fire

An extensive fire may result in low distribution system pressures and drawing down of the City's reservoirs. Table 6-7 presents the emergency response procedures for a fire.

TABLE 6-7

Emergency Response Procedures for a Fire

Water System Component	Potential Effects	Recommended Actions
Transmission and Distribution System	Low pressure may result in the extremities of the distribution system depending on the extent of the fire demand.	No action.
Storage Facilities	Drawdown will occur with increased demand.	Monitor reservoir levels.
Booster Stations	Additional pumps will be called on.	No action.

Forest Fire

Forest fires are a threat to water quality as they reduce the forest cover that prevents erosion, thus allowing additional runoff and sedimentation to streams and lakes. As the City's main source comes from the Indian Creek Dam, this could be a major concern for the City if forest fires reach that area. The Department of Natural Resources (DNR) is the responsible agency for fire control on public and private lands. Currently, DNR utilizes diammonium phosphate as a fire retardant, but is not allowed to spray near streams, lakes, or other waters of the state. Table 6-8 presents the emergency response procedures for a forest fire.

TABLE 6-8

Emergency Response Procedures for a Fire

Water System Component	Potential Effects	Recommended Actions
Source	Water Quality Concerns	Notify DNR. Monitor location and size of fire, visually inspect raw water impoundments. Monitor raw water turbidity at the water treatment plant. The raw water source may need to be taken out of service.
Transmission and Distribution System	Low pressure may result in the extremities of the distribution system depending on the extent of the fire demand.	No action.
Storage Facilities	Drawdown will occur with increased demand.	Monitor reservoir levels.
Booster Stations	Additional pumps will be called on.	No action.

Flooding

Heavy snowmelt and/or rains have the potential to cause flooding and landslides in the City. Table 6-9 presents the emergency response procedures for flooding.

TABLE 6-9

Emergency Response Procedures for Flooding

Water System Component	Potential Effects	Recommended Actions
Transmission and Distribution System	Transmission and distribution mains may be affected by landslides or high water levels. City staff transportation for monitoring system and making repairs may be limited.	Take more frequent bacteriological tests to assure water quality. Observe conditions at bridges and prepare to close off washed out pipes if necessary.
Storage Facilities	None.	None.
Booster Stations	None.	None.

Tsunami

Ilwaco is in a high-risk tsunami (tidal wave) zone. In the event of a major offshore earthquake, a tsunami could follow. If the earthquake is local, a tsunami could follow within minutes. More distant offshore earthquakes may allow for a few or several hours of warning before a tsunami strikes.

A large tsunami could cause widespread damage to the water system. The City is fortunate that the water treatment plant, its reservoirs, and the majority of its booster pump stations are outside of the Tsunami Hazard Areas, as shown in Figure 1-4. The remainder of the system, however, remains very vulnerable, like much of the City's downtown area. This includes homes, businesses, and City hall.

A tsunami could cause water main breaks. If, after a tsunami, water flow rates to the City are extreme, it may be necessary to shut off water supply to the City until water main breaks can be isolated.

CONTINGENCY OPERATIONAL PLAN

A contingency operational plan is necessary for operation of the system when normal operating procedures are not available. The following sections provide information regarding alternate modes of operation for system facilities.

Source of Supply

The City provides all of its own water supply. In the event that the City cannot provide its own supply, it has an emergency intertie with the City of Long Beach. The intertie is located on Sandridge Road at the City limits. The intertie is normally closed and does have a meter to track usage.

Transmission Facilities

In the event of a transmission main failure, it is possible to close off the main without a serious interruption of water service. However, some residents along the segment may be without water service until repairs could be completed. In the event that repairs will take more than 8 to 12 hours, temporary emergency service lines could be placed above ground and directly connected to each customer's service meter.

Booster Stations

The City's booster stations do not have auxiliary generators on site. The City Center, Indian Creek, and Discovery Heights Zones can be served by reservoir storage during power outages. However, the Lakeview Estates, Coastal Ridge, and the Upper City Center Zones are closed zones and will therefore lose pressure during power outages if the booster stations are not operated with portable generators. The City will monitor the situations in these zones during prolonged power outages and respond accordingly.

Storage Facilities

Since the City's reservoirs primarily provide supply for peak demand periods, if one were removed from service during average demand conditions, it would not cause significant problems within the water system.

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. The City is currently in the process of updating its Cross-Connection Control Program. The current Cross-Connection Control Program is provided in Appendix E. The City currently has two cross connection control specialists, Eli Sheaffer and Shane Grant. Additionally, City has an inventory of cross-connection control devices in its water system and sends out letters to its water customers regarding the testing of their cross-connection control devices.

The City was able to maintain nearly 100 percent testing compliance in 2025, and the customers not in compliance have continued to be notified to test their devices.

RECORDKEEPING AND REPORTING

The City keeps water system records for water quantity purchased and sold, water quality, and cross-connection data at the City's office. Bacterial analysis results are kept for a minimum of 5 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 tenth 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 by-products 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 AND MAINTENANCE DEFICIENCIES

The City currently maintains its standard operating procedures across multiple documents, which has the potential to create confusion. It may be beneficial to consolidate these procedures to enhance clarity and consistency. Additionally, the City is working towards updating its Emergency Response Plan, which shall be updated to inform new and existing employees of detailed responses to emergency situations.

CHAPTER 7

CAPITAL IMPROVEMENT PROGRAM

INTRODUCTION

This chapter presents the City of Ilwaco (City) Capital Improvement Program (CIP) for the 10- and 20-year planning periods. Preliminary project cost estimates for the projects described in this chapter are provided in Appendix N while Figure 7-1 shows the locations of proposed source, storage, distribution, and general improvements.

This chapter also includes the schedule for the City's 10-year water system capital improvements program. These projects are scheduled and prioritized on the basis of capacity limitations, water quality concerns, growth, regulatory requirements, component reliability, system benefit, and financial priority. When the Water System Plan is updated after 10 years, the projects presented for the 20-year planning period should be reevaluated and scheduled for the subsequent 10-year planning period, as necessary.

Over the next 10 years, other projects may arise that are not identified as part of the City's CIP. Such projects may be deemed necessary for ensuring water quality, preserving emergency water supply, accommodating transportation improvements proposed by other agencies, taking advantage of cost saving opportunities with another agency or City department, or addressing unforeseen problems within the City's water system. Budgetary constraints can lead to the delayed completion of certain projects that require the CIP to be rescheduled. The City retains the authority to reschedule proposed projects and to expand or reduce the scope of proposed projects, as best determined by the City Council. As the proposed completion date for the project approaches, each capital improvement project should be re-evaluated to consider the most recent planning efforts.

CAPITAL IMPROVEMENT PROGRAM

Table 7-1 summarizes the proposed capital improvement projects for the 10-year and 20-year planning periods and project locations are shown on Figure 7-1. All costs discussed in this Chapter are in July 2025 dollars, which corresponds to an Engineering News Record (ENR) Construction Cost Index (CCI) of 15,238 for the Seattle metropolitan area. Each project is discussed further in the following sections. All project costs contain a 20 percent contingency and a 30 percent engineering and administration cost factors with the exception of SO-2, as the engineering design has already been completed.

The CIP projects are categorized as follows:

- Source Improvements (SO);
- Storage Improvements (ST);

- Distribution System Improvements (D);
- Developer Extension Improvements (DE); and
- General Improvements (G)

SOURCE IMPROVEMENTS

SO-1: Floating Intake Replacement (2031)
Estimated Project Cost: $1,500,000

The City's current intake structure in the Indian Creek impoundment has historically let to water quality concerns and has had several maintenance issues over its lifespan, making it a difficult intake source to operate. This project will see the construction of a new floating intake in the impoundment. Included in this project is the new floating intake, a pump station that will be placed at the top of the dam, and an outlet pipe that will have connections to the infiltration pond and the treatment plant. Also included will be the abandonment of the existing intake.

SO-2: Impoundment Dam Drainage Improvements (2030)
Estimated Project Cost: $562,000

In 2024, the Dam Safety Office (DSO) inspected Indian Creek Dam and produced a periodic inspection report. The report stated that the existing drainage mechanisms in the left abutment of the impoundment dam is insufficient and that the City needs to install an engineered drain system to ensure that erosion of the embankment and/or native slope along the left abutment does not occur. This project is currently in the design stage and proposes 1,170 linear feet (LF) of 6-inch perforated HDPE pipe along the left abutment that drains out to an existing outfall.

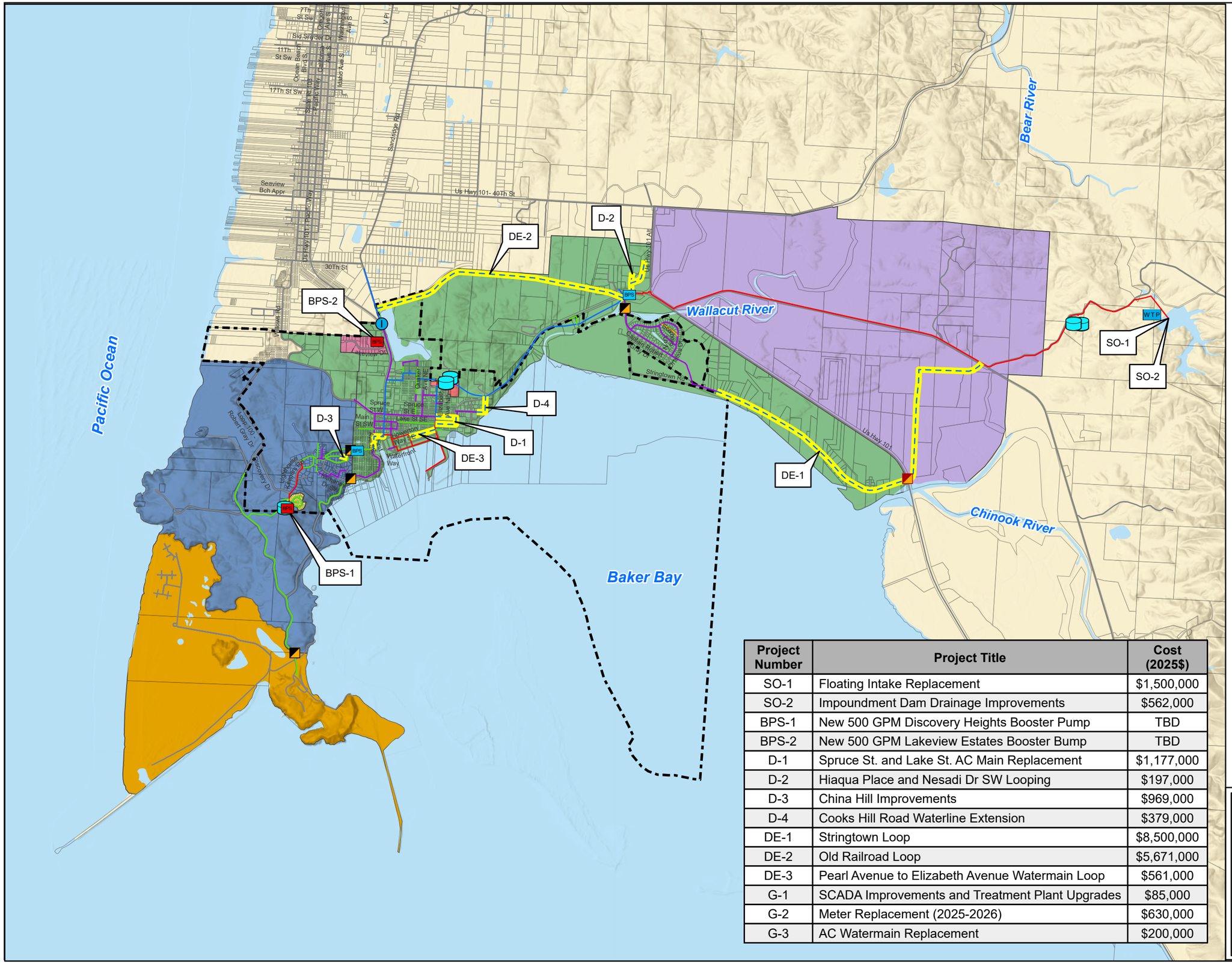
STORAGE IMPROVEMENTS

Chapter 3 has indicated that the City has no storage deficiencies through the 20-year planning horizon. All existing reservoirs are also in good physical condition, with the steel City Center Reservoir having recently been recoated in 2022. There are currently no storage improvements necessary for the water system.

BOOSTER PUMP STATION IMPROVEMENTS

BPS-1: New 500 gpm Discovery Heights Booster Pump and Building (Beyond 2035)
Estimated Cost: $379,000

The Discovery Heights booster pump station currently has one 1,000-gpm pump and two 60-gpm pumps. According to the Washington State Department of Health's (DOH) June 2020 *Water System Design Manual (WSDM)*, a booster pump station serving a closed zone should be able to supply both maximum day demand (MDD) and fire flow with the largest pump out of service. The Discovery Heights booster pump station currently does



Project Number	Project Title	Cost (2025$)
SO-1	Floating Intake Replacement	$1,500,000
SO-2	Impoundment Dam Drainage Improvements	$562,000
BPS-1	New 500 GPM Discovery Heights Booster Pump	TBD
BPS-2	New 500 GPM Lakeview Estates Booster Bump	TBD
D-1	Spruce St. and Lake St. AC Main Replacement	$1,177,000
D-2	Hiaqua Place and Nesadi Dr SW Looping	$197,000
D-3	China Hill Improvements	$969,000
D-4	Cooks Hill Road Waterline Extension	$379,000
DE-1	Stringtown Loop	$8,500,000
DE-2	Old Railroad Loop	$5,671,000
DE-3	Pearl Avenue to Elizabeth Avenue Watermain Loop	$561,000
G-1	SCADA Improvements and Treatment Plant Upgrades	$85,000
G-2	Meter Replacement (2025-2026)	$630,000
G-3	AC Watermain Replacement	$200,000

Facility
- Water Treatment Plant
- Intertie
- Reservoir
- Booster Pump Station
- Pressure Release Valve

Future Facility
- BPS
- PRV
- Future Water Line

Waterlines (Diameter)
- 2-inch
- 4-inch
- 6-inch
- 8-inch
- 10-inch
- 12-inch
- 16-inch

Pressure Zones
- City Center (157 ft)
- Indian Creek (160 ft)
- Upper City Center (230 ft)
- Lakeview Estates (300 ft)
- Discovery Heights (339 ft)
- Coastal Ridge (574 ft)
- Cape Dissapointment & Coast Guard (269 ft)

Reference
- Ilwaco City Limits
- Parcels
- Surface Water
- Roads

N

0 1,000 2,000 4,000 Feet

CITY OF ILWACO

WATER SYSTEM PLAN UPDATE

FIGURE 7-1

CAPITAL IMPROVEMENT PLAN

Gray & Osborne, Inc.
CONSULTING ENGINEERS

not meet this requirement. This project constructs a new concrete masonry unit (CMU) building that will include the new 500-gpm pump and electrical upgrades as needed.

BPS-2: New 500 gpm Lakeview Estates Booster Pump and Building (Beyond 2035)
Estimated Cost: $379,000

The Lakeview Estates booster pump station currently has one 500-gpm pump and one 45-gpm pump. According to the DOH *WSDM*, a closed system booster pump station should be able to both MDD and fire flow simultaneously with the largest pump out of service. The Lakeview Estates booster pump station currently does not meet this requirement. This project constructs a new concrete masonry unit (CMU) building that will include the new 500-gpm pump and electrical upgrades as needed.

BPS-3: Backup Power Generator Installations (Beyond 2035)
Estimated Cost: $610,000

Five of the six booster pump stations in the City's water system do not have backup power on site. The sixth station, the Baker Bay BPS, has backup power available in the form of a portable power generator. However, it is not currently operational due to a part that cannot be obtained for the control board. This project is for the installation of a backup power generator at every booster pump station in the system. This includes five permanent generators and one portable generator for the Intertie BPS.

DISTRIBUTION SYSTEM IMPROVEMENTS

The distribution projects will provide the system with increased reliability, system pressures, and fire flows. As indicated in Chapter 3, the City is currently deficient in its capability to provide fire flow and in its ability to maintain 30 psi throughout the distribution system under peak hour flows.

D-1: Spruce Street and Lake Street AC Main Replacement (2033)
Estimated Project Cost: $1,177,000

The existing watermain on Spruce Street and Lake Street from the Ilwaco community park to Elizabeth Avenue is currently comprised of 6-inch AC water main. This project involves replacing and upsize 1,800 LF of this water main with 8-inch DI water main. This project will both replace AC main and improve fire flow to the Port of Ilwaco.

D-2: China Hill Improvements (Beyond 2035)
Estimated Project Cost: $969,000

The China Hill subdivision is currently served by 3-inch and 1-1/2-inch-diameter waterlines. This pipe diameter is smaller than existing minimum standards. The City plans to replace 1,800 LF of these waterlines with 8-inch DI waterlines.

D-3: Hiaqua Place and Nesadi Drive SW Looping (Beyond 2035)
Estimated Project Cost: $197,000

Hiaqua Place and Nesadi Drive are roads that branch off of Klahanee Drive that create a loop. The existing 8-inch water main on these streets do not connect. The project involves the addition of 250 LF of 8-inch DI water main to connect the loop. This loop will improve fire flow and water quality for these services.

D-4: Cooks Hill Road Waterline Extension (Beyond 2035)
Estimated Project Cost: $379,000

The existing dead-end waterline serving Cooks Hill Road provides marginal fire flows to this area and contributes to substandard fire flows in the commercial/industrial area in the City Center Zone. The City plans to install 590 LF of 8-inch DI pipe from the water main on Highway 101 to Cooks Road. This project will increase available fire flow to Cook's Hill Road and improve fire flow to the commercial/industrial area in the City Center Zone.

D-5: AC Water Main Replacement (2028, 2031+)
Estimated Project Cost: $200,000

The City currently has a large quantity of asbestos concrete water main inventoried in their system. Beginning in 2028, the City will dedicate $200,000 triennially towards replacing AC main. AC main replacement projects will be coordinated annually with scheduled overlay, sewer, and water projects in order to maximize the beneficial use of these funds. The City will not put money towards this if they already have a CIP that replaces $200,000 worth of AC water main in that three-year span.

DEVELOPER EXTENSIONS AND LOCAL IMPROVEMENT DISTRICTS

DE-1: Stringtown Loop
Estimated Project Cost: $8,500,000

This developer funded extension would install 15,000 LF of 12-inch water main to complete a loop along Stringtown Road and Chinook Dike Road connecting the existing piping in the Vandalia area to the transmission main from the Indian Creek Water Treatment Plant. A tee for this connection was installed on the transmission main at Chinook Dike Road during the original construction. This loop will allow the City to serve properties farther east along Stringtown Road and will resolve the existing fire flow deficiency at the end of the dead-end main east of the Vandalia area. A PRV station along this line will be required to isolate the Indian Creek and City Center Zones and keep the Baker Bay Booster Station discharge from flowing back into the transmission main.

DE-2: Old Railroad Loop
Estimated Project Cost: $5,671,000

This developer funded extension would install 10,000 LF of 12-inch water main to complete a loop around Black Lake along the old railroad grade that ran north of the lake. This loop will increase the redundancy and reliability of the City's transmission system and will allow the City to serve properties northeast of the City. This project will significantly increase the capacity of the Intertie Booster Station by decreasing head losses between the booster stations and the reservoirs. The project will also slightly increase the capacity of the Baker Bay Booster Station by decreasing head losses. The loop will also provide a redundant transmission main to the Highway 101 transmission main should it need to be taken out of service for maintenance.

DE-3: Pearl Avenue to Elizabeth Avenue Water Main Loop
Estimated Project Cost: $561,000

This developer funded extension would install 960 LF of 12-inch DI water main to complete a loop from Pearl Avenue SE to Elizabeth Avenue SE. This loop will increase the redundancy and reliability of the City's transmission system around the port area.

GENERAL IMPROVEMENTS

G-1: SCADA Improvements (2028)
Estimated Project Cost: $335,000

The City is in the process of replacing its entire SCADA system and hardware as it is outdated and needs upgrading from its current RUGID system. This project involves replacing the entire SCADA system and hardware at all the booster pump stations, the Indian Creek Reservoir, and at the water treatment plant. This project also includes the replacement of outdated chemical feed pumps at the treatment plant allowing these replacement components to communicate more effectively with the new SCADA system.

G-2: Meter Replacement (2025)
Estimated Project Cost: $630,000

The City is currently preparing to replace all of its service meters in its retail service area. The purpose of this project is to replace aging meters that show signs of faulty readings. An estimated 631 total 5/8-inch meters and 35 total meters 1 inch or larger are anticipated to be replaced.

G-3: Water Treatment Plant Building Refurbishment (Beyond 2035)
Estimated Project Cost: $855,000

The City's existing water treatment plant metal building is closing in on 50 years old and is needing repairs. The City reported a water seepage from the roof and along the base of the building in several areas. In addition, there is some rusting and corrosion to the inside frame of the building and along and above the drip edge of the gutters. This project aims to extend the life span of the building by refurbishing necessary parts of the building.

CIP PRIORITIZATION AND SCHEDULE

The City intends to prioritize scheduling capital improvement projects based on the following criteria:

1. Emphasizing projects that have been identified as capacity limitation in Chapter 3's Capacity Analysis;

2. Improve present and future level of service, maintain overall system capacity to adequately support projected growth, and address fire flow deficiencies identified in Chapters 3;

3. Replace or refurbish aging pipe that is at or near the end of its useful life in an effort to control distribution system leakage; and

4. Coordinate with other City capital projects such as sewer, overlay, and roadway improvements to incorporate water system improvements and take advantage of opportunities for cost savings/sharing.

Table 7-1 provides a summary of the capital improvements and a timetable for their completion. For projects which included multiple alternatives the more expensive option is included for scheduling purposes. All construction costs are presented July 2025 dollars.

TABLE 7-1

Capital Improvement Program Schedule

Project ID	Project Description	Projected Construction Year	Project Cost (2025 Dollars)
G-2	Meter Replacement	2025	$630,000
G-1	SCADA Improvements	2028	$335,000
D-5	AC Water Main Replacement	2028, 2031+	$200,000
SO-2	Impoundment Dam Drainage Improvements	2028	$562,000
SO-1	Floating Intake Replacement	2031	$1,500,000
D-1	Spruce Street and Lake Street AC Main Replacement	2033	$1,177,000
Total 0 to 10-Year Planning Horizon Cost			**$4,604,000**
BPS-1	New 500 gpm Discovery Heights Booster Pump	TBD	$379,000
BPS-2	New 500 gpm Lakeview Estates Booster Pump and Building	TBD	$379,000
BPS-3	Backup Power Generator Installations	TBD	$610,000
D-2	China Hill Improvements	TBD	$969,000
D-3	Hiaqua Place and Nesadi Drive SW Looping	TBD	$197,000
D-4	Cooks Hill Road Waterline Extension	TBD	$379,000
G-3	Water Treatment Plant Building Refurbishment	TBD	$855,000
Total 0 to 20-Year Planning Horizon Cost			**$7,204,000**

CHAPTER 8

FINANCIAL ANALYSIS

This chapter discusses the City of Ilwaco's (City) existing rate and fee structure as well as historical revenue and expenditure for the water funds before presenting financial projects for the same water funds that can adequately support operation and maintenance and the capital improvement schedule outlined in Chapter 7's Capital Improvement Program. The financial projections take into account potential rate increases, inflation, and personal as well as capital projects. Potential funding sources are touch on briefly before the recommendation section which concludes this chapter.

FINANCIAL STATUS OF EXISTING WATER UTILITY

CURRENT WATER RATES

Water rates for the City of Ilwaco are defined in the Ilwaco Municipal Code Chapter 13.04. The City charges for water service on a monthly basis. Water service rates consist of a monthly base charge that is dependent on the meter size along with a water rate charged per 100 cubic feet (CF) based on meter readings every month. The City charges a higher rate after monthly consumption surpasses 20,000 CF. Table 8-1 lists the City's base and volume rates.

TABLE 8-1

2025 Water Rate Schedule[1]

Meter Size	Base Rate	Volume Rate Below 20,000 CF (per 100 CF usage)[2]	Volume Rate Above 20,000 CF (per 100 CF usage)[2]
5/8"	$38.25	$5.88	$12.13
1"	$63.88		
1-1/4"	$95.63		
1-1/2"	$127.37		
2"	$203.87		
3"	$382.50		
4"	$637.63		
6"	$2,174.87		

(1) The City charges a rate of $18.57 towards fire sprinklers on a per connection, per month charge. The City also charges a commercial itinerary unit charge that is $3.50 per Unit, per month. These are in addition to the base and volume rates.

(2) Water services outside of the city limits carries a 50 percent surcharge.

CURRENT SYSTEM DEVELOPMENT FEES

The City's system development fees (also known as connection charges or general facilities charges (GFCs)) are defined in the Ilwaco Municipal Code Chapter 13.04. These charges are applicable only to new customers connecting to the system and are intended to repay existing customers for facilities already installed and to provide funds for constructing new facilities. Table 8-2 lists system development fees.

TABLE 8-2

Water System Development Fees

Connection Type	Rate
Water Connection – Inside City Limits	$3,000
Water Connection – Outside City Limits	$4,500
Fire Sprinkler Connection	$1,800

HISTORICAL REVENUE AND EXPENSES

The City operates three separate funds: the Water Fund (401), the Water/Sewer Bond Redemption Fund (403), and the Water/Sewer Bond Reserve Fund (404). These funds combined are used to fund water utility operations, maintenance, and capital improvements.

The Water Fund (401) is the Water Operations Fund. It draws revenue from water bills and pays the water utility's operations and maintenance expenses. Revenue from the Water Fund is transferred to other Funds to pay for debt services on water capital improvements.

The Water/Sewer Bond Redemption Fund (403) is funded through interfund transfers from the Water Fund and Sewer Fund. This fund is required by most funding sources as there is a stipulation that the debt payments for loans will be made from the redemption fund and not the water fund itself. For water capital improvements, funds from the Water Fund are transferred to the Water/Sewer Bond Redemption Fund to pay those debt service amounts off. The revenues received from the Water Fund and Sewer Fund are always equal to debt service expenditures, leaving the bond redemption fund with no reserves at the end of each year.

The Water/Sewer Bond Reserve Fund (404) is another individual fund the City uses to build a reserve for the final payment of a loan. Some loans the City receives for water capital improvements requires the City to transfer an amount equal to a tenth of the final debt payment into the bond reserve fund annually for ten years. This fund is used to make the final payment on debt services for water capital improvements. This fund receives revenue through interfund transfers from the Water Fund and the Sewer Fund.

For the purposes of summarizing the City's total water revenues and expenditures, the Water Fund (401) revenues and expenditures are summarized. The transfers to the Water/Sewer Bond Redemption Fund (403) and the Water/Sewer Bond Reserve Fund (404) will be combined and put into the debt service expense line item as these interfund transfers from the Water Fund are used to fund water capital improvements explicitly. Table 8-3 summarizes the historical Water Fund revenues and expenses.

TABLE 8-3

Historical Water Fund Revenue and Expenses

	2018	2019	2020	2021	2022	2023	2024
Operating Revenue (401 Water Fund)							
Water Sales	$656,157	$633,294	$592,073	$859,627	$852,070	$895,051	$865,451
Connection Fees	$17,450	$7,481	$35,038	$7,500	$37,005	$27,810	$32,490
Misc. Service Charges	$18,355	$19,671	$4,315	$5,724	$10,966	$12,167	$14,188
Investment Interest	$6,460	$8,673	$2,638	$300	$3,977	$6,727	$7,129
Loans	$320,960	$355,744	$0	$22,899	$1,339,101	$0	$0
Grants	$0	$1,803	$15,057	$548,013	$649,363	$262,229	$67,375
Total Revenue	**$1,019,381**	**$1,026,666**	**$649,120**	**$1,444,063**	**$2,892,482**	**$1,203,983**	**$986,632**
Operating Expenses (401 Water Fund)							
Employee Salary and Benefits	$236,316	$252,252	$246,677	$320,758	$320,262	$283,580	$297,300
System Maintenance	$97,804	$118,582	$119,188	$106,600	$121,979	$164,088	$120,270
Utilities	$26,779	$25,907	$23,845	$25,771	$26,416	$29,000	$27,244
Office Supplies and Costs	$8,663	$7,756	$13,933	$13,939	$16,123	$26,551	$29,990
Tools & Equipment	$13,333	$23,483	$2,047	$6,467	$48	$0	$0
Travel	$2,682	$2,006	$321	$1,171	$965	$387	$1,263
Communications	$6,134	$5,914	$4,412	$4,462	$4,829	$4,572	$4,589
Outsource costs	$49,816	$95,922	$112,239	$26,743	$41,565	$75,245	$33,262
Insurance	$28,438	$30,876	$32,836	$32,773	$34,906	$41,782	$51,289
Fees and Taxes	$45,226	$44,244	$40,384	$58,102	$49,548	$57,028	$56,514
Water System Plan Update	$0	$0	$0	$0	$0	$0	$26,009
Misc.	$1,488	$3,139	$3,978	$695	$156	$504	$285
Transfers to 001 and 408	$15,250	$15,250	$15,250	$15,250	$15,250	$15,250	$80,250
Debt Service (via 403 and 404 Funds)	$104,131	$152,607	$154,244	$152,500	$153,560	$176,619	$174,641
Improvement Projects	$414,475	$328,709	$41,478	$194,329	$804,109	$153,575	$117,730
Capital Outlay - Equipment	$0	$0	$15,750	$0	$0	$47,340	$10,488
Grants and Loans	$0	$0	$0	$544,918	$1,235,970	$162,273	$0
Total Expenses	**$1,050,536**	**$1,106,648**	**$826,582**	**$1,504,480**	**$2,825,688**	**$1,237,795**	**$1,031,126**
Starting/Year End Balance (401 Water Fund)							
Starting Balance	**$393,858**	**$362,703**	**$282,722**	**$105,259**	**$44,843**	**$111,637**	**$77,825**
Year End Balance	**$362,703**	**$282,722**	**$105,259**	**$44,843**	**$111,637**	**$77,825**	**$33,331**

FORECASTED FINANCIAL ANALYSIS

FORECAST FACTORS

Various projection factors are used to project future expenses and revenues as shown in Table 8-4. These factors will be used to develop year-over-year cost increases for the Water Fund Projects.

TABLE 8-4

Summary of Projection Development Factors

Factors	Annual Percentage Increase
Salary and Benefits	4.00%
General Inflation	3.50%
Water Use Growth Rate	Varies (refer to Table 2-12)
Loan Parameters	20-year loan @ 3% interest rate w/payments starting year after proposed construction date
General Rate Increase and General Facilities Charges	2026, 2028, 2030: 7.50% 2027, 2029: 3.50% 2030: 3.00% 2033: 1.00%
Minimum Fund Balance (achieved by 2030)	$300,000

It is worth noting that the general water rate increases are aggressive. The City's Water Fund end of year balance in 2024 was approximately $33,000. For long-term stability, the City must have a higher minimum fund balance that can fund their operations and maintenance for a short-term period in case an unexpected financial situation was to ever occur. For the purposes of these projections, 300,000 corresponds to roughly 4 months of operation and maintenance expenses for the City's water system. The financial projections also do not anticipate any grants as these have not yet been secured; however, the City will pursue such funding. A discussion on funding sources will follow the financial forecasts and recommendation section.

PROJECTED REVENUES AND EXPENDITURES

Revenue

Future revenues have been projected based on a review of the historical financial data provided by the city, in conjunction with the forecast factors summarized in Table 8-4.

Water sales, the largest revenue stream for the Water Fund, are expected to increase at the same rate as the City growth rate (approximately 1.16 percent annually) to capture the corresponding increase of water consumption. Water sales will also be influenced by the rate increases outline in Table 8-4. GFCs are projected to increase at the same rate as general water rate increases, as shown in Table 8-4.

Expenditures

Future expenses have been projected based on a review of the historical financial data provided by the City, in conjunction with the forecast factors given in Table 8-4.

When projected the Water Fund expenditures, salaries and benefits are forecasted at a rate of 4 percent a year while tools, office and operating supplies, vehicles and equipment, miscellaneous expenditures, and professional services will increase at 3.5 percent annually to capture inflation. The government taxes will continue to be approximately 15 percent of the water sales, while the debt service will follow the existing debt service schedule provided by the City in addition to the projected debt service given in Table 8-5.

Table 8-5 displays the capital improvement projects planned for the next 10 years and the projected construction cost that take into account the anticipated inflation at the schedule construction year. More information on the City's Capital Improvement Program (CIP) and schedule can be found in Chapter 7.

Table 8-6 summarizes the projected revenues, expenditures, and start- and end-of-year balances in the City's Water Fund.

TABLE 8-5

Capital Improvement Schedule Expenses[1][2]

CIP	Description	2025 Cost	Year to Construct	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
G-2[3]	Meter Replacement	$620,000	2025	$620,000	-	-	-	-	-	-	-	-	-	-
G-3	AC Water Main Replacement	$200,000	2028, 2031	-	-	-	$200,000	-	-	$200,000	-	-	-	-
G-1[4]	SCADA Improvements and Treatment Upgrades	$335,000	2028	-	-	-	$371,400	-	-	-	-	-	-	-
SO-2[5]	Impoundment Dam Drainage Improvements	$562,000	2030	-	-	-	-	-	$667,500	-	-	-	-	-
SO-1[6]	Floating Intake Replacement	$1,500,000	2032	-	-	-	-	-	-	-	$1,908,400	-	-	-
D-1[7]	Spruce Street and Lake Street AC Main Replacement and Upsizing	$1,177,000	2034	-	-	-	-	-	-	-	-	-	$1,604,100	-
Total				**$620,000**	**$0**	**$0**	**$571,400**	**$0**	**$667,500**	**$200,000**	**$1,908,400**	**$0**	**$1,604,100**	**$0**

(1) Reflect project schedule established in Table 7-1.
(2) 3.5 percent annual inflation applied to costs summarized in Table 8-4.
(3) The City received a grant that covers the full cost of the meter replacement CIP.
(4) Anticipated to be funded with a loan described in Table 8-4. Adds $24,964 annually to the debt service.
(5) Anticipated to be funded with a loan described in Table 8-4. Adds $44,866 annually to the debt service.
(6) Anticipated to be funded with a loan described in Table 8-4. Adds $123,939 annually to the debt service.
(7) Anticipated to be funded with a loan described in Table 8-4. Adds $104,178 annually to the debt service.

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TABLE 8-6

Forecasted Water Fund Revenue and Expenses

Year	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
Annual Rate Increase	**-**	**7.50%**	**3.50%**	**7.50%**	**3.50%**	**7.50%**	**3.00%**	**0.00%**	**1.00%**	**0.00%**	**0.00%**
Operating Revenue (401 Water Fund)											
Water Sales	$875,460	$952,011	$996,741	$1,083,911	$1,134,853	$1,234,117	$1,285,893	$1,300,825	$1,329,098	$1,344,549	$1,360,188
Connection Fees	$23,811	$25,893	$27,110	$29,481	$30,867	$33,566	$34,975	$35,381	$36,150	$36,570	$36,995
Misc. Service Charges	$12,339	$13,418	$14,048	$15,277	$15,995	$17,394	$18,124	$18,334	$18,733	$18,950	$19,171
Investment Interest	$5,309	$5,494	$5,687	$5,886	$6,092	$6,305	$6,526	$6,754	$6,990	$7,235	$7,488
Loans and Grants	$620,000	$125,000	$0	$371,400	$0	$667,500	$0	$1,908,400	$0	$1,604,100	$0
Total Revenue	**$1,536,919**	**$1,121,817**	**$1,043,586**	**$1,505,955**	**$1,187,806**	**$1,958,883**	**$1,345,517**	**$3,269,694**	**$1,390,971**	**$3,011,404**	**$1,423,842**
Operating Expenses (401 Water Fund)											
Employee Salary and Benefits	$309,192	$321,560	$334,422	$347,799	$361,711	$376,179	$391,226	$406,875	$423,150	$440,076	$457,679
System Maintenance	$125,458	$129,849	$134,394	$139,098	$143,966	$149,005	$154,220	$159,618	$165,205	$170,987	$176,971
Utilities	$27,348	$28,305	$29,296	$30,321	$31,383	$32,481	$33,618	$34,794	$36,012	$37,273	$38,577
Office Supplies & Costs	$17,293	$17,898	$18,524	$19,173	$19,844	$20,538	$21,257	$22,001	$22,771	$23,568	$24,393
Tools & Equipment	$6,709	$6,944	$7,187	$7,439	$7,699	$7,969	$8,248	$8,536	$8,835	$9,144	$9,464
Travel	$1,300	$1,346	$1,393	$1,442	$1,492	$1,544	$1,599	$1,654	$1,712	$1,772	$1,834
Communications	$5,162	$5,343	$5,530	$5,723	$5,924	$6,131	$6,346	$6,568	$6,798	$7,036	$7,282
Outsource costs	$64,287	$66,537	$68,866	$71,276	$73,771	$76,353	$79,025	$81,791	$84,654	$87,617	$90,684
Insurance	$37,393	$38,702	$40,057	$41,459	$42,910	$44,411	$45,966	$47,575	$49,240	$50,963	$52,747
Fees and Taxes	$131,319	$142,802	$149,511	$162,587	$170,228	$185,118	$192,884	$195,124	$199,365	$201,682	$204,028
Leak Detection	$0	$0	$4,000	$0	$0	$4,000	$0	$0	$4,000	$0	$0
Rate Study	$0	$125,000	$0	$0	$0	$0	$0	$0	$0	$0	$0
Water System Plan Update	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$141,060
Misc.	$1,515	$1,568	$1,623	$1,679	$1,738	$1,799	$1,862	$1,927	$1,995	$2,064	$2,137
Debt Service (via 403 and 404 Fund	$198,801	$180,149	$176,345	$172,726	$196,156	$194,621	$237,954	$236,420	$363,160	$341,150	$405,450
Improvement Projects	$620,000	$0	$0	$571,400	$0	$667,500	$200,000	$1,908,400	$0	$1,604,100	$0
Capital Outlay - Equipment	$0	$15,000	$0	$15,000	$0	$15,000	$0	$15,000	$0	$15,000	$0
Total Expenses	**$1,545,778**	**$1,060,357**	**$1,001,148**	**$1,587,122**	**$1,056,821**	**$1,782,651**	**$1,374,204**	**$3,126,284**	**$1,366,896**	**$2,992,434**	**$1,612,307**
Starting/Year End Balance (401 Water Fund)											
Starting Balance	**$33,331**	**$24,472**	**$65,286**	**$107,725**	**$26,558**	**$157,542**	**$333,775**	**$305,087**	**$448,498**	**$472,572**	**$491,543**
Year End Balance	**$24,472**	**$65,286**	**$107,725**	**$26,558**	**$157,542**	**$333,775**	**$305,087**	**$448,498**	**$472,572**	**$491,543**	**$303,078**

AVAILABLE CAPITAL PROJECT FUNDING SOURCES

This section describes several funding sources available to the City without reference to any specific project, including information on the following, which were considered by the City:

Loans: Public Works Trust Fund Loan
Drinking Water State Revolving Fund
USDA Rural Development (RD)
Community Economic Revitalization Board

Bonds: Revenue Bonds

PUBLIC WORKS TRUST FUND

The Public Works Trust Fund (PWTF) is a revolving loan fund designed to help local governments finance needed public works projects through low-interest loans and technical assistance. The PWTF, established in 1985 by the legislature, offers loans below market rates, payable over periods ranging up to 20 years.

Interest rates are 0.5 percent, 1.0 percent, or 2.0 percent, with the lower rates providing an incentive for a higher financial share. For the local community to qualify for a 2.0-percent loan, it must provide a minimum of 5 percent of the project's costs. A 10-percent local share qualifies the applicant for a 1.0 percent interest rate and a 15-percent local share qualifies for a 0.5-percent loan. 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 adapt the 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 were historically offered only for the 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.

An applicant can apply to the construction program for up to $10,000,000 per biennium. Applications for the construction program are due in May of each year, with funds available approximately 1 year later. Preconstruction loans are limited to $1,000,000 per biennium and can be submitted throughout the year. A preconstruction application must be submitted to the Public Works Board on or before the 15th of each month. The Board meets on a monthly basis and makes the award decisions at that time. Preconstruction funds are available as soon as the contracts can be issued.

DRINKING WATER STATE REVOLVING FUND (DWSRF)

The State provides loan funding for water system projects through the DWSRF program. Health and safety projects receive the highest rankings and are more likely to receive funding. Water main projects, even those intended for fire flow improvements, typically do not receive a ranking high enough to receive 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 domestic and industrial waters systems, sanitary and storm sewers, port facilities, and telecommunications.

Typically, CERB provides loans in the amount of $1 million and, where applicable, grants in the amount of $300,000. The interest rate is tied to the current cost of a 10-year bond 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 associated with the project. Applications must be submitted 45 days prior to a regularly scheduled CERB Meeting, which typically meets in January, March, July, and November.

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.

DEVELOPER FINANCING

Developers may fund the construction of extensions to the water system to property within new plats. The developer extensions are turned over to the City for operation and maintenance when completed.

It may be necessary, in some cases, to require the developer to construct more facilities or improvements beyond those required by the development in order to provide sufficient capacity within the water system to serve the development area. The City may, by policy, reimburse the Developer through either direct outlay, latecomer charges, or reimbursement agreements for the additional cost of facilities, including increased size of pipelines over those required to serve the property under development. Compensation for oversizing is usually considered when it is necessary to construct a pipe larger than eight inches in diameter in a residential area to comply with the intent of the City's comprehensive plan, with an eye toward future development that may be served by the oversized main. Construction of any pipe in commercial or industrial areas that is larger than the size required to serve the development should also be considered as an oversized line and therefore may be eligible for compensation. Developer reimbursement (latecomer) agreements are structured to allow developers to receive payment over a specified time period from other future connections made to the developer-financed improvements.

RECOMMENDATIONS

The forecasts for the Water Funds highlight the need for additional funds in order for the City to meet its operation, maintenance, and CIP commitments. As a result, it is recommended that the City approach this from two positions: rate increases and capital project funding sources. The City is performing a rate study to determine how to adjust water rates in a targeted manner that can adequately support the water system's needs. The study may look at changes in GFCs, customer class base rates, and/or block rate structures and will create a long-term and in-depth financial plan for the City's water funds. Additional grants and loans will also be pursued.

APPENDIX A

DOH FORMS

Washington State Department of Health
Division of Environmental Health
Office of Drinking Water

WATER FACILITIES INVENTORY (WFI) FORM

ONE FORM PER SYSTEM

Quarter: 1
Updated: 12/18/2023
Printed: 7/2/2024
WFI Printed For: On-Demand
Submission Reason: Pop/Connect Update

RETURN TO: Central Services - WFI, PO Box 47822, Olympia, WA, 98504-7822 or email wfi@doh.wa.gov

1. SYSTEM ID NO.	2. SYSTEM NAME	3. COUNTY	4. GROUP	5. TYPE
35500 2	ILWACO WATER DEPARTMENT CITY OF	PACIFIC	A	Comm

6. PRIMARY CONTACT NAME & MAILING ADDRESS

SHANE D. GRANT [OPERATOR]
PO BOX 548
ILWACO, WA 98624

7. OWNER NAME & MAILING ADDRESS

ILWACO WATER DEPARTMENT
MIKE CASSINELLI
PO BOX 548
ILWACO, WA 98624
MAYOR

STREET ADDRESS IF DIFFERENT FROM ABOVE

ATTN
ADDRESS 120 WALBERG RD
CITY CHINOOK STATE WA ZIP 98614

STREET ADDRESS IF DIFFERENT FROM ABOVE

ATTN
ADDRESS 120 FIRST AVE N
CITY ILWACO STATE WA ZIP 98624

9. 24 HOUR PRIMARY CONTACT INFORMATION

Primary Contact Daytime Phone: (360) 777-8330
Primary Contact Mobile/Cell Phone: (360) 580-0361
Primary Contact Evening Phone: (xxx)-xxx-xxxx
Fax:
E-mail: sxxxxxxxxxt@ilwaco-wa.gov

10. OWNER CONTACT INFORMATION

Owner Daytime Phone: (360) 642-3145
Owner Mobile/Cell Phone: (503) 970-1284
Owner Evening Phone:
Fax:
E-mail: txxxxxxxr@ilwaco-wa.gov

11. SATELLITE MANAGEMENT AGENCY - SMA (check only one)

- [x] Not applicable (Skip to #12)
- [ ] Owned and Managed
- [ ] Managed Only
- [ ] Owned Only

SMA NAME: _____ SMA Number:

12. WATER SYSTEM CHARACTERISTICS (mark all that apply)

- [ ] Agricultural
- [x] Commercial / Business
- [ ] Day Care
- [x] Food Service/Food Permit
- [ ] 1,000 or more person event for 2 or more days per year
- [x] Hospital/Clinic
- [x] Industrial
- [x] Licensed Residential Facility
- [x] Lodging
- [x] Recreational / RV Park
- [x] Residential
- [x] School
- [ ] Temporary Farm Worker
- [x] Other (church, fire station, etc.): _____

13. WATER SYSTEM OWNERSHIP (mark only one)

- [ ] Association
- [x] City / Town
- [ ] County
- [ ] Federal
- [ ] Investor
- [ ] Private
- [ ] Special District
- [ ] State

14. STORAGE CAPACITY (gallons)

2,028,000

15	16 SOURCE NAME	17 INTERTIE	18 SOURCE CATEGORY									19 USE			20	21 TREATMENT						22 DEPTH	23	24 SOURCE LOCATION			
Source Number	LIST UTILITY'S NAME FOR SOURCE AND WELL TAG ID NUMBER. Example: WELL #1 XYZ456 IF SOURCE IS PURCHASED OR INTERTIED, LIST SELLER'S NAME Example: SEATTLE	INTERTIE SYSTEM ID NUMBER	WELL	WELL FIELD	WELL IN A WELL FIELD	SPRING	SPRING FIELD	SPRING IN SPRINGFIELD	SEA WATER	SURFACE WATER	RANNEY / INF. GALLERY	OTHER	PERMANENT	SEASONAL	EMERGENCY	SOURCE METERED	NONE	CHLORINATION	FILTRATION	FLUORIDATION	IRRADIATION (UV)	OTHER	DEPTH TO FIRST OPEN TERVAL IN FEET	CAPACITY (GALLONS PER MINUTE)	1/4, 1/4 SECTION	SECTION NUMBER	TOWNSHIP	RANGE
S01	InAct 03/19/1995 BLACK LAKE									X					X			X	X			X		660	NE NE	33	10N	11W
S02	48000/LONG BEACH	48000 M													X	Y		X	X					600	NE NE	14	10N	11W
S03	INDIAN CREEK									X			X			Y		X	X			X		700	NW SW	28	10N	10W

WATER FACILITIES INVENTORY (WFI) FORM - Continued

1. SYSTEM ID NO.	2. SYSTEM NAME	3. COUNTY	4. GROUP	5. TYPE
35500 2	ILWACO WATER DEPARTMENT CITY OF	PACIFIC	A	Comm

	ACTIVE SERVICE CONNECTIONS	DOH USE ONLY! CALCULATED ACTIVE CONNECTIONS	DOH USE ONLY! APPROVED CONNECTIONS
25. SINGLE FAMILY RESIDENCES (How many of the following do you have?)		594	Unspecified
A. Full Time Single Family Residences (Occupied 180 days or more per year)	560		
B. Part Time Single Family Residences (Occupied less than 180 days per year)	10		
26. MULTI-FAMILY RESIDENTIAL BUILDINGS (How many of the following do you have?)			
A. Apartment Buildings, condos, duplexes, barracks, dorms	4		
B. Full Time Residential Units in the Apartments, Condos, Duplexes, Dorms that are occupied more than 180 days/year	24		
C. Part Time Residential Units in the Apartments, Condos, Duplexes, Dorms that are occupied less than 180 days/year	0		
27. NON-RESIDENTIAL CONNECTIONS (How many of the following do you have?)			
A. Recreational Services and/or Transient Accommodations (Campsites, RV sites, hotel/motel/overnight units)	0	0	
B. Institutional, Commercial/Business, School, Day Care, Industrial Services, etc.	109	109	
28. TOTAL SERVICE CONNECTIONS		703	

29. FULL-TIME RESIDENTIAL POPULATION

A. How many residents are served by this system 180 or more days per year? 1412

30. PART-TIME RESIDENTIAL POPULATION	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
A. How many part-time residents are present each month?						20	20	20	20			
B. How many days per month are they present?						30	31	31	30			

31. TEMPORARY & TRANSIENT USERS	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
A. How many total visitors, attendees, travelers, campers, patients or customers have access to the water system each month?	600	600	1500	1800	2700	4500	9000	10500	6000	3000	1500	600
B. How many days per month is water accessible to the public?	30	28	30	30	30	30	30	30	30	30	30	30

32. REGULAR NON-RESIDENTIAL USERS	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
A. If you have schools, daycares, or businesses connected to your water system, how many students, daycare children and/or employees are present each month that are NOT already included in the residential population?	1125	1125	1125	1125	1125	693	693	693	1125	1125	1125	1125
B. How many days per month are they present?	31	30	31	30	31	30	31	31	30	31	30	31

33. ROUTINE COLIFORM SCHEDULE	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
	3	3	3	3	3	2	2	2	3	3	3	3

34. NITRATE SCHEDULE	QUARTERLY	ANNUALLY	ONCE EVERY 3 YEARS
(One Sample per source by time period)			

35. Reason for Submitting WFI:

☐ Update - Change ☐ Update - No Change ☐ Inactivate ☐ Re-Activate ☐ Name Change ☐ New System ☐ Other _____

36. I certify that the information stated on this WFI form is correct to the best of my knowledge.

SIGNATURE: _____ **DATE:** _____

PRINT NAME: _____ **TITLE:** _____

Washington State Department of Health
Division of Environmental Health
Office of Drinking Water

Water Facilities Inventory (WFI)

Report Create Date:	7/2/2024		
Water System Id(s):	35500		
Print Data on Distribution Page:	Yes		
Print Copies For:	DOH Copy		
Water System Name:	ALL		
County:	-- Any --		
Region:	ALL		
Group:	ALL		
Type:	ALL		
Permit Renewal Quarter:	ALL		
Water System Is New:	ALL		
Water System Status:	ALL		
Water Status Date From:	ALL	**To**	ALL
Water System Update Date	ALL	**To**	ALL
Owner Number:	ALL		
SMA Number:	ALL		
SMA Name:	ALL		
Active Connection Count From:	ALL	**To:**	ALL
Approved Connection Count	ALL	**To:**	ALL
Full-Time Population From:	ALL	**To:**	ALL
Water System Expanding	ALL		
Source Type:	ALL		
Source Use:	ALL		
WFI Printed For:	On-Demand		

APPENDIX B

AGREEMENTS

"EXHIBIT- P"

When Recorded. Return to:

Randall B. Printz
Landerholm, Memovich, Lansverk
& Whitesides. P.S.
P.O. Box 1086
Vancouver, WA 98666-1086

ABOVE SPACE RESERVED FOR RECORDING INFORMATION

DEVELOPMENT AGREEMENT

PARTIES: MSW VENTURE, LLC, hereinafter referred to as "MSW"

and

City of Ilwaco, hereinafter referred to as "City"

EFFECTIVE DATE: May 27, 2003.

RECITALS:

WHEREAS, MSW owns approximately 350 acres of contiguous real property located in the City of Ilwaco, Washington, adjacent to and immediately East and South of State Loop 100, and lying generally North and West of the Sa-Ha-Lee Subdivision, and which is more particularly described in Exhibit A and incorporated by reference herein; and

WHEREAS, the property is zoned R-3 under the City's zoning regulations; and

WHEREAS, MSW wishes to develop residential and commercial uses on the site, including a golf course; and

WHEREAS, such development will provide the City with additional tax revenues, transportation and utility improvements, creation of jobs, and unique housing alternatives for area residents; and

WHEREAS, MSW and the City wish to have the site developed in a manner that provides long-term predictability, efficiency and integration; and

WHEREAS, the City and MSW desire to maximize the ability to efficiently plan for and provide for urban services and capital facilities in furtherance of the City's Comprehensive Plan Goals and Policies; and the City's Capital Facilities Plan; and

WHEREAS, as part of its Preliminary Plat and Master Plan Application, MSW has prepared and submitted to the City a Narrative describing the proposed future uses of the property; and

WHEREAS, this Narrative also describes the projected intensity of the uses as well as the Master Plan's projected utilization of urban services, i.e., water, sewer, transportation at full buildout. This Narrative is attached hereto as Exhibit "B" and is incorporated by reference herein; and

WHEREAS, it is the City's and MSW's desire to establish, on a long-term basis, the standards under which the MSW property shall develop; and

WHEREAS, such integrated planning is consistent with and encouraged by the Growth Management Act; and

WHEREAS, RCW 36.70B.170 provides authority for a city to enter into a development agreement; and,

WHEREAS, RCW 36.70B.170 provides:

> The Legislature finds that the lack of certainty of the approval of development projects can result in a waste of public and private resources, escalate housing costs for consumers and discourage the commitment to comprehensive planning which would make maximum efficient use of resources at the least economic cost to the public. Assurance to a development project applicant that upon government approval the project may proceed in accordance with existing policies and regulations, and subject to conditions of approval, all is set forth in a development agreement, will strengthen the public planning process, encourage private participation and comprehensive planning, and reduce the economic cost of development;

AND whereas, the City of Ilwaco has held a public hearing, received evidence and determined that entering into this Agreement is in the public's best interest;

In consideration of the above recitals, the Parties agree that the following standards shall apply to development of the site:

1. Absent amendment of this Development Agreement by mutual agreement between the City and MSW, the standards provided for herein shall apply to and govern the development of the property.

2. So long as the future development of the property and implementation of the Master Plan is substantially consistent with the Master Plan Narrative, attached hereto as Exhibit

"A"; said future development shall be governed and regulated under the Land Use, Development and Environmental Regulations in effect on the 14th day of April, 2003. Substantially consistent "shall mean that impacts from future development shall not exceed those proposed and analyzed in the Master Plan Narrative by more than fifteen percent.

3. In conjunction with its Preliminary Plat and Master Plan Applications, the Applicant has provided a Transportation Analysis, which has been reviewed by the Washington State Department of Transportation and the City. Based upon that analysis, review, and comment from WSDOT and others, the City has imposed upon the Applicant as a condition of their requested approvals, measures to mitigate the transportation impacts of their development. The Applicant shall provide that mitigation in the time and manner provided for in its Preliminary Plat Approval (obtained commensurate with this Development Agreement). No further transportation analysis, mitigation or transportation related fees will be required for individual pad, or parcel development or further platting upon the site, so long as the development of the site is substantially consistent with Exhibit "A". Any proposed development upon the site which is not substantially consistent with Exhibit "A" shall be required to go through additional transportation review and approval by the City.

4. The City acknowledges that MSW has constructed water facilities, including a large water reservoir on its site that has a capacity in excess of that needed by the full build out of MSW's property as contemplated in Exhibit "A". MSW has constructed these improvements in advance of, and in anticipation of its future full build out. It is recognized by the parties that it may take ten to fifteen years, or longer, to achieve such future build out. Because of MSW's willingness to comprehensively plan its utility needs, construct facilities in advance of its need, and to create capacity in excess of its own need, the City shall reserve for a period of fifteen (15) years, four hundred fifty Equivalent Residential Units (450 ERU's) of water storage capacity in the water reservoir on MSW's property.

5. In the event any controversy or claim arises under this Agreement, the prevailing party shall be entitled to its reasonable costs, disbursements and attorney fees, together with all expenses, which it may reasonably incur in taking such action.

6. Failure by either Party at any time to require performance by the other Party of any of the provisions hereof shall in no way affect the Parties' rights hereunder to enforce the same, nor shall any waiver by the Party of the breach hereof be held to be a waiver of any succeeding breach or a waiver of this nonwaiver clause.

7. This Agreement shall be construed with and governed by the laws of the State of Washington. The Parties agree to venue in Pacific County, State of Washington.

8. If any portion of this Agreement shall be invalid or unenforceable to any extent, the validity of the remaining provisions shall not be affected thereby.

9. This Agreement and its covenants, conditions and terms shall be assignable by the Parties and shall extend to, and be binding upon, and inure to the benefit of all of the Parties' successors and assigns.

10. Each of the recitals contained herein are intended to be, and are incorporated a covenants between the Parties and shall be so construed.

11. This Agreement may only be amended by mutual agreement of the Parties.

CITY OF ILWACO, WASHINGTON

By _____
Title MAYOR

MSW VENTURE, LLC

By _____
Title Member

STATE OF WASHINGTON)
) ss.
County of Pacific)

I certify that I know or have satisfactory evidence that Ed Leonard is the person who appeared before me, and said person acknowledged that he signed this instrument, on oath stated that he was authorized to execute the instrument and acknowledged it as the Mayor of the City of Ilwaco, Washington, to be the free and voluntary act of such party for the uses and purposes mentioned in the instrument.

Dated: September 15, 2004

LORNA J. BATT
NOTARY PUBLIC
STATE OF WASHINGTON
COMMISSION EXP. JUNE 1, 2005

Lorna J. Batt
Notary Public in and for the State of Washington, residing at Ilwaco, WA.
My appointment expires: 6-1-2005

STATE OF WASHINGTON)
) ss.
County of Clark)

I certify that I know or have satisfactory evidence that Richard Marshall is the person who appeared before me, and said person acknowledged that he signed this instrument, on oath stated that he was authorized to execute the instrument and acknowledged it as the member of MSW Venture, LLC, to be the free and voluntary act of such party for the uses and purposes mentioned in the instrument.

Dated: September 15, 2004

LORNA J. BATT
NOTARY PUBLIC
STATE OF WASHINGTON
COMMISSION EXP. JUNE 1, 2005

Lorna J. Batt
Notary Public in and for the State of Washington, residing at Ilwaco, WA.
My appointment expires: 6-1-2005

INTERRUPTABLE WATER SUPPLY AGREEMENT
CITIES OF ILWACO AND LONG BEACH

WHEREAS, the Cities of Ilwaco and Long Beach entered into a Water Service Contract in 1978 providing for the sale of water between the two cities.

WHEREAS, there occasionally exists the ability for the City of Ilwaco to produce a greater volume of water than is necessary to meet the City of Ilwaco's demands, and there occasionally exists the ability for the City of Long Beach to produce a greater volume of water than is necessary to meet the City of long Beach's demands.

WHEREAS, under these circumstances, surplus water from one City could be sold to the other City if the need arises, on an interruptible basis, and the sale cost would be based on water treatment plant operator wages and benefits, water treatment plant chemicals, and electrical costs, plus 15% for administration.

IT IS AGREED BETWEEN LONG BEACH AND ILWACO AS FOLLOWS:

1. Ilwaco agrees to supply water, with prior notification, to Long Beach, on an interruptible basis, at a rate of $.70 per hundred cubic feet, through the existing water intertie located on Highway 101. The City of Ilwaco has sole discretion regarding the ability to supply water, on an interruptible basis, to the City of Long Beach.

2. Long Beach agrees to supply water, with prior notification, to Ilwaco on an interruptible basis, at a rate of $.70 per hundred cubic feet, through the existing water intertie located on Highway 101. The City of Long Beach has sole discretion regarding the ability to supply water, on an interruptible basis, to the City of Ilwaco.

3. Basis of interruptible supply water charge. This interruptible supply water charge is based on the actual costs for water treatment plant operator wages and benefits, electricity, and treatment chemicals. Because the supply is interruptible, other costs which may be associated with a guaranteed water supply have not been included, including water treatment plant maintenance, equipment, phone, depreciation, water treatment plant debt service, and water transmission system debt service.

4. Revisions to Agreement. Revisions to this Agreement may be periodically required. Commencing on March 1 of each year, either party may request a review for the purpose of negotiating amendments to this agreement. Both parties shall honor such requests and enter into bargaining in good faith.

5. Revision of Interruptible Supply Water Rate. On March 1 of each year, the interruptible supply water rate may be amended at the request of either party. The basis of the charge for sale from Ilwaco to Long Beach shall be the previous year costs of Ilwaco Water Treatment Plant operator wages and benefits, Ilwaco Water Treatment Plant and booster station electricity, and Water Treatment Plant chemical costs, divided by the total volume of water produced at the Ilwaco Water Treatment Plant plus an additional 15% for administration. The basis of the charge for sale from Long Beach to Ilwaco shall be the previous year costs of Long Beach Water Treatment Plant operator wages and benefits, Long Beach Water Treatment Plant electricity, and Long Beach Water Treatment Plant, plus an additional 15% for administration.

6. Billing. Billing shall e made on an annual basis.

7. Duration. This agreement shall be perpetual unless terminated as provided for below.

8. Termination. This agreement shall be terminated upon thirty (30) days written notice by either party.

9. Effective Date. This agreement shall become effective immediately.

Dated this 15th day of August, 2000

Mayor, City of Ilwaco

Mayor, City of Long Beach

Attest:

Clerk, City of Ilwaco

Clerk, City of Long Beach

September 5, 2003

Mr. Mark Toy
Washington State Department of Health
1112 SE Quince Street, P.O. Box 47890
Olympia, Washington, 98504-7890

RE: City of Long Beach Water Availability for City of Ilwaco

Dear Mr. Toy:

First, I enjoyed meeting with you last month regarding the performance of the City's water plant. We discussed the opportunity to obtain funding for a feasibility study for the analysis of merging the Long Beach and Ilwaco water treatment plant operation and administration. Mayor Jacobson and Councilman Unruh (charged with utility division oversight) both agree this is a worthwhile endeavor. Therefore it is my intent to send you a project proposal next week.

However, to assist our neighboring city, the City of Long Beach presently has the ability to provide approximately 500,000 gallons of supplemental water daily. Please understand that this statement is not a commitment to do so, as that requires the concurrence of the Mayor and City Council.

We look forward to working with you and your department to improve both the quality and quantity of municipal water services on the Long Beach Peninsula. Should you have any questions or comments please contact me at (360) 642-4421 or e-mail at nabiel@centurytel.net.

Best regards,

Nabiel Shawa
City Administrator

3-7-2002

INTERLOCAL AGREEMENT
between
Washington State Parks and Recreation Commission
and
City of Ilwaco, Washington

THIS AGREEMENT is made and entered into by and between the Washington State Parks and Recreation Commission, hereinafter referred to as "Parks", and the City of Ilwaco, hereinafter referred to as the "City".

IT IS THE PURPOSE OF THIS AGREEMENT to set forth the terms and conditions to be followed by Parks and the City for the completion of Fort Canby State Park Sewer and Water System Improvement Project, the long-term operation and maintenance of these improvements and the provision of water and sewer services to Parks by the City.

RECITALS

The City currently provides water service to Fort Canby State Park, which is owned and operated by Parks, per the City Water System Plan, 1997. Parks now desires increased pressure and adequate fire flow to Fort Canby State Park as required by Washington State regulatory standards.

Parks currently treats wastewater generated by Fort Canby State Park and the Coast Guard Station at Cape Disappointment at a wastewater treatment plant located within Fort Canby State Park.

Parks has completed the *"Fort Canby State Park Water and Sewer Feasibility Study, June 2001"* which makes recommendations for improvements to the water and sewer systems for Fort Canby State Park.

Parks has a long-standing practice of seeking municipal water and sewer services where available and practical. Parks has previously entered into an agreement with the City to pay a proportionate share of costs for the City to update its Comprehensive Plan.

The City of Ilwaco Wastewater Facility Plan, 1994, identified potential service to Fort Canby State Park. The City and Parks have received verbal notice from the Washington State Department of Ecology that a revised compliance order is being prepared that will release

COPY

see also L-10 easement

capacity in the City's wastewater treatment plant adequate to meet Parks' and the Coast Guard's needs. Formal written notice from the Department of Ecology is expected prior to formal allocation of Equivalent Residential Units (ERU) to Parks and prior to construction of the sewer system improvements by Parks.

Parks has received funding, subject to the conditions of Section 324, Washington State Substitute Senate Bill 6155, enacted on June 26, 2001 and attached hereto as Exhibit "A", adequate to construct improvements as agreed to by the City and Parks.

Timely performance and completion of the project is essential to Parks and the City. Parks and the City may incur serious and substantial damages if the project is delayed or not completed.

The Southwest Washington Coastal Erosion Project, conducted jointly by the Coast Guard and the Department of Ecology, in its February 16, 1999, report to Parks entitled "*Shoreline Change at Fort Canby State Park*" concluded that the ongoing progression of coastal erosion in the area of Fort Canby State Park will result in bridging of the primary dune by the year 2009, which in turn will likely result in the flooding of lowland areas, including the existing wastewater treatment plant of Fort Canby State Park.

STATEMENT OF OBLIGATIONS

Parks and the City mutually agree that each party will have the following obligations as to design, construction, operation and maintenance of water and sewer improvements.

Parks and the City mutually agree:

1. That the charge for connection to the City wastewater treatment plant will be the rate in effect at the time of purchase of ERU capacity; the connection charge shall be based on the annual average wastewater flow, estimated not to exceed 19,200 gallons per day (80 ERU's) and the number of ERU's shall be determined by dividing the annual average wastewater flow by 100 gallons per day per capita, the Department of Ecology recommended wastewater flow for planning purposes (*Criteria for Sewage Works Design, 1998*) and the average household size in Ilwaco of 2.4 people per residence (*OFM, 1991*), therefore, the number of

ERU's is equal to the average annual flow divided by 240 gallons; additional connection charges shall be assessed if Parks exceeds 80 ERU's, the additional connection charges shall be based on a biannual evaluation of Park's actual ERU's and will be at the rate in effect during the evaluation period;

2. That sewer service usage and monthly sewer service charges, in terms of ERU's, will be determined not less than biannually, beginning June 30, 2003, based upon average annual actual meter readings of wastewater flow from Fort Canby State Park and an ERU equal to 240 gallons per day; that Parks shall be required to pay for and install flow meter(s) as necessary to measure wastewater flow for the purposes of determining ERU's; and that Parks shall also install Biological Oxygen Demand (BOD) and Total Suspended Solids (TSS) monitoring equipment as needed to determine waste strength of effluent delivered to the City's wastewater treatment plant for treatment; a BOD surcharge shall be assessed if such a surcharge is established for all commercial customers by City of Ilwaco ordinance or as may be otherwise agreed to by the City and Parks, as long as sanitary sewer service, consistent with all applicable state and local regulations for said service, are provided;

June 30 05 is next evaluation

3. To encourage joint use of facilities, where practical, by the several properties in the water and sewer service area on such terms and conditions as are acceptable to the involved parties so long as MSW Ventures, LLC, or its successors, (hereinafter "MSW"), submits all plans, permit applications and other applicable documentation to the City for approval within sixty (60) days of the Department of Ecology's revised compliance order releasing ERU capacity to serve Parks and Coast Guard requirements, or May 15, 2002, whichever is later, and to the Washington State Department of Health and the Department of Ecology within thirty (30) days of approval by the City; and that off-site fabrication of the water reservoir to be constructed and installed by MSW begins by November 30, 2002;
4. That if portions of the system improvements needed to serve Fort Canby State Park are constructed by MSW and turned over to and accepted by the City for ownership, operation and maintenance, and all other conditions of paragraph 4, Park's Obligations, are satisfied,

? did we do this?

Parks will, within thirty (30) days of the City's written notice to Parks of receipt and acceptance of such water and sewer system improvements, pay to the City $923,000 to reserve to Parks the future right to access and utilize these improvements; and if such payment is made by Parks, no connection or "latecomers" fee shall be due from Parks upon connection to and utilization of these improvements by Parks.

Parks' Obligations:

1. To design and construct all water and sewer system improvements on Parks' property and on all public properties and/or all public rights-of-way up to a point of connection at MSW's south property line necessary to provide the services addressed by this Agreement;
2. To coordinate construction with the City's Utility Department and the City's Engineer at the point of connection with MSW's south property line over whose property water and sewer system improvements may be built by MSW to ensure proper alignment, connection, fittings, pipe and specifications;
3. That water and sewer system improvements will be designed and constructed in accordance with the alternatives outlined in Chapter 6 "*Recommended Alternative And Financing*" of the *Fort Canby Water And Sewer Feasibility Study*, attached hereto as Exhibit "B", and the "*City of Ilwaco Conditions and Standards – Utility and Roadway Construction*," portions of which are attached hereto as Exhibit "C"[1];
4. That Parks will pay the City $923,000 to reserve to Parks the future right to access and utilize improvements constructed by MSW, or within the boundaries of MSW property, if and only if (1) the City holds legally sufficient, suitable rights-of-way or easements, that are beneficial and acceptable to Parks, and which allow Parks to access and utilize improvements constructed by MSW; (2) the improvements will provide adequate services to Parks and are built to City standards; (3) the improvements are available for connection by Parks no later than June 30, 2003; and (4) the ownership of the improvements have been transferred to the

[1] Note: Recommended and alternative routes for the water and sewer facilities are as shown graphically on Figures 6,7,10, and 11, attached as Exhibit D to this Agreement.

City ; and if such payment is made by Parks, no connection or "latecomers" fee shall be due from Parks upon connection to and utilization of these improvements by Parks;

5. That Parks will not be required to design, construct and/or pay for a water storage reservoir or system improvements larger than that needed to specifically serve the needs of Fort Canby State Park, as identified in the *Fort Canby Water And Sewer Feasibility Study*;
6. That construction of the improvements shall be done to the City's standards, specifications, and requirements, and that during construction of the improvements the City shall have inspection and construction approval for all portions of the water and sewer systems within the bounds of properties or rights-of-way owned or managed by the City, or within Parks' property where the water and sewer improvements may eventually be turned over to the City for operation and maintenance;
7. That Parks shall be responsible for all funding, design, bidding, permitting, and construction of the water and sewer system improvements to City standards and specifications, except that Parks shall have no responsibility whatsoever for funding, design, bidding, permitting or construction of those portions designed or constructed by third parties (including private parties such as MSW), including all bidding and management of professional, design and construction contracts, as well as overall management of the project;
8. That Parks shall be solely responsible for performance of environmental studies and environmental permit acquisition as required to gain regulatory agency approvals for construction of the improvements except those portions designed or constructed by third parties (including private parties such as MSW);
9. That upon completion of the sewer and water system improvements, Parks will retain ownership, maintenance, and operational responsibilities for all water and sewer system components within the boundaries of Fort Canby State Park on Parks' side of the water meter and main entrance sewer pump and North Head sewer pump station that serve only Parks facilities (main campground, Beards Hollow, North Head area, and any relocated or newly constructed park facilities);

10. To transfer to the City ownership of the water and sewer system improvements, including the main pump stations, force mains, water lines, and appurtenant facilities which are off-site of Park's property or that serve parties other than Parks, including all applicable and transferable warranties, guarantees, training obligations, and related items; transfer of ownership to the City under this paragraph shall include all improvements up to and including connection point of the Coast Guard water and/or sewer facilities;
11. To provide to the City the necessary easements and permits for operation and maintenance of the water and sewer system improvements within Parks' property which are transferred to City ownership; ? Have we pd this ?
12. To pay to the City the amount of $280,000 ($3,500 per ERU times 80 ERU's), based upon currently applicable connection charge rate, as established by City of Ilwaco Ordinance 612, attached hereto as Exhibit "E"; payment or presentation of a purchase order for said connection charge shall be made by Parks within ten (10) business days following receipt by Parks of written notice by the City of availability of the required eighty (80) ERU's, but in no event shall payment be made later than sixty (60) days after receipt of written notice;
13. To pay to the City a monthly sewer service fee for the average annual ERU's, as determined in Paragraph 2, Page 3, in an amount equal to the current service charge per ERU levied against all commercial customers as established by City of Ilwaco Ordinance 648, attached hereto as Exhibit "F", or as may be adjusted by the City Council for all commercial customers from time to time or as may be otherwise mutually agreed to by the City and Parks, as long as sanitary sewer service, consistent with all applicable state and local regulations for said service, are provided;

ERU = 240 gal/day

14. To pay to the City a monthly water service fee equal to the current service charge, based upon usage meter readings and water rates, as established by City of Ilwaco Ordinance 647, attached hereto as Exhibit "G", or as may be adjusted by the City Council for all commercial customers from time to time, as long as water service, consistent with all applicable state and local regulations for said service, are provided;

15. To reimburse the City the actual and reasonable costs incurred by the City for staff time, engineering time and other expenses relating to the design revision and construction inspection of improvements designed and constructed by Parks.

The City's Obligations:

1. To review all plans and specifications prior to construction in a timely manner but no later than 30 days after receipt provided that such plans and specifications are acceptable to the City and to inspect, and approve or reject, all construction within 24 hours of notification by Parks or Parks' contractors;
2. That the routing and location for water and sewer improvements identified as "recommended alternatives" in Chapter 6 "*Recommended Alternative And Financing*" of the *Fort Canby Water And Sewer Feasibility Study*, attached hereto as Exhibit "B", are acceptable to the City;
3. To accept full ownership and liability for the operation and maintenance of all improvements upon transfer by Parks and acceptance by the City, with the understanding that all applicable and transferable warranties, guarantees, training obligations, and related items will also be transferred to the City, however, Parks and the City shall remain liable for their own acts and omissions occurring prior to the date of transfer by Parks and acceptance by the City;
4. To complete all facility and operational improvements to the City's wastewater treatment plant, as required by the Department of Ecology as a regulatory approval condition to extend wastewater treatment service to Parks, no later than September 30, 2002;
5. To approve, by the City Council, all comprehensive plan updates as required for extension and/or expansion of water and sewer services to Parks no later than July 30, 2002;
6. To allocate to Parks eighty (80) ERU's or an annual average of 19,200 gallons per day reserved capacity from the City's existing two-cell wastewater treatment plant and to notify Parks in writing, immediately upon written release of capacity by the Department of Ecology, of the City's intent to allocate and sell to Parks a total of eighty (80) ERU's or an

annual average of 19,200 gallons per day reserved capacity within the City's existing two-cell wastewater treatment plant;

7. That the ERU allocation to Parks and the Coast Guard is valid until December 31, 2005, or December 31 of the year the City completes construction of the third cell to the City's wastewater treatment plant, whichever is later; should Parks not make final connection to the City's wastewater treatment plant by that date, the City shall have the right of first refusal to buy back from Parks any or all of the eighty (80) ERU's allocated to Parks at the per ERU price previously paid to the City by Parks, and should the City choose not to purchase all the ERU's, Parks shall have the right to negotiate a price and sell any remaining ERU's to a third party approved by the City, which such approval shall not be unreasonably withheld by the City;
8. To allocate to the United States Coast Guard an additional estimated thirty-five (35) ERU's (above the eighty (80) ERU's to be allocated to Parks) or an annual average of 8,400 gallons per day reserved capacity within the City's existing two-cell wastewater treatment plant and to notify the Coast Guard and Parks in writing of the release of said capacity by the Department of Ecology and availability for purchase by the Coast Guard; the per ERU fee to be paid by the Coast Guard, the actual number of ERU's to be utilized by the Coast Guard and any other terms and conditions of the Coast Guard's use of the City's services shall be negotiated directly between the City and the Coast Guard;
9. Except in the case of emergency, routine maintenance, and act of God, to provide regular and uninterrupted water, sewer, and wastewater treatment services to Parks in an amount no less than agreed upon herein for as long as Parks has a requirement for such services;
10. That connection of other parties or properties to be served by portions of the water and sewer improvements on Parks' property or property under Parks' control transferred to the City by Parks shall require the advance written concurrence of Parks and compliance by the City with the provisions of RCW 35.91 and the terms outlined under Section 324 of Washington State Substitute Senate Bill 6155, enacted June 26, 2001 and attached hereto as Exhibit "A";

11. That, in no case, shall the connection of other parties to these improvements result in a reduction of pressure, flow capacity, or other quality of service measures to Parks or Fort Canby State Park;
12. To make all reasonable efforts within the limit of its authority to collect fees from third parties (including private parties) for use of water and/or sewer systems improvements constructed by Parks, in addition to the normal connection fees currently charged by City ordinance from such parties to be served by portions of the City water and/or sewer systems transferred to the City by Parks, and to reimburse to the State of Washington, Public Works Assistance Account, at rates proportional to third party use; and to otherwise comply with the provisions of RCW 35.91 and Section 324 of Washington State Substitute Senate Bill 6155, enacted June 26, 2001, regarding the use by third parties of improvements constructed by Parks;
13. To enforce the standards and conditions of the "*City of Ilwaco Conditions and Standards – Utility and Roadway Construction*" in administering any extensions of City water and sewer system by MSW which will affect service to Parks and to require security acceptable to the City by May 15, 2002, from MSW, in the amount of (1) the full cost of the fabrication, construction and installation of the water reservoir to be installed by MSW; and (2) $200,000, which amount represents (a) the full cost of the water pipe between the reservoir and MSW's south property line connection to Parks' constructed improvements; and (b) the full increased cost of enhanced water system improvements, in excess of those required by Parks, to be constructed MSW; provided that in the case that the performance of MSW shall not be completed by June 30, 2003, the City will use the posted security to ensure the required improvements are completed; provided that as to subpart (1), the City may release the security under the following schedule: one-third (1/3) when the reservoir is ordered, one-third (1/3) when the reservoir is delivered to the site, and one-third (1/3) when the reservoir is installed; and as to subpart (2), the City may release the security according to the following schedule: upon completion of twenty (20) percent of the construction (excluding the

reservoir) the City may release ten (10) percent of the security, thereafter the security may be released as follows:

Completion	Release
30%	20%
40%	30%
50%	40%
60%	50%
70%	60%
80%	70%
90%	80%
100%	remaining security released upon acceptance and receipt by the City

14. To require MSW or its successors to place all easements over property owned or controlled by MSW and for the construction, maintenance, operation, repair and reconstruction of the improvements, including sewer pipe, mains, and pump stations, if any, and water pipe, mains, pump stations, if any, and reservoir, into an escrow to be held pending completion of the improvements by MSW; the easements shall be delivered to the City when the improvements are transferred to and accepted by the City, or sooner upon the occurrence of the enumerated events outlined in the Joint Escrow Instructions between MSW and the City.

PERIOD OF PERFORMANCE

This Agreement shall commence immediately upon execution by both parties, and may be terminated as provided herein.

INDEPENDENT CAPACITY

The employees or agents of each party who are engaged in the performance of this Agreement shall continue to be employees or agents of that party and shall not be considered for any purpose to be employees or agents of the other party.

AGREEMENT ALTERATIONS AND AMENDMENTS

This Agreement may be amended by mutual agreement of the parties. Such amendments shall not be binding unless they are in writing and signed by personnel authorized to bind each of the parties.

TERMINATION

Either party may give a Notice of Intent to terminate this Agreement or portions thereof by providing thirty (30) days written notification upon the occurrence of one or more of the following events:

1. Failure of the City to allocate to Parks 80 ERU's and to the Coast Guard 35 ERU's in the City's existing two-cell wastewater treatment plant by July 1, 2002;
2. Failure of MSW to complete construction and transfer to the City of water and sewer improvements which will affect service to Parks or are necessary for Parks' water and sewer system by June 30, 2003;
3. Failure of MSW to submit all required plans, permit applications and other applicable documentation for the construction of sewer and water improvements from MSW's south property line to the City's connection to the City for approval within sixty (60) days of the Department of Ecology's revised compliance order releasing ERU capacity to serve Parks' and the Coast Guard's requirements, or May 15, 2002, whichever is later, and/or to the Department of Health and/or the Department of Ecology within thirty (30) days of approval by the City; or failure to begin off-site fabrication of the water reservoir by November 30, 2002; or failure to begin onsite construction of the water and sewer improvements by March 30, 2003;
4. Failure of the City to enter into a Water and Sewer Reimbursement Agreement with MSW by March 1, 2002, or failure of delivery of the required security and easements into escrow for MSW constructed improvements by May 15, 2002;
5. Failure of the City to complete all facility and operational improvements to the City's wastewater treatment plant required by this Agreement by September 30, 2002;

6. Failure of the City Council to approve all comprehensive plan updates as required for extension and/or expansion of water and sewer services to Parks by July 30, 2002;
7. Any other failures, deficiencies or breaches of this Agreement that materially affects the party's benefits contained in this Agreement.

The written notice shall state specifically the basis on which the party seeks termination. Upon receipt of written Notice of Termination, the receiving party shall have thirty (30) days to cure the reason for termination. The Notice of Termination shall be effective only if the occurrence giving rise to the Notice is not cured within thirty (30) days.

SAVINGS

In the event funding from state, federal or other sources is withdrawn, reduced or limited by fifty (50) percent or more of the original 2001 appropriation after the effective date of this Agreement and prior to completion of improvements by Parks, Parks may terminate this Agreement, without notice, subject to renegotiation under any new funding limitations or conditions. In the event state, local or federal approvals for any work to be performed by Parks is not received in a timely manner, including if any such approval is challenged in an administrative, legislative or judicial forum, Parks may terminate this Agreement without notice, provided that such termination may not occur earlier than March 30, 2003, subject to renegotiation to accommodate state, local or federal approval requirements. If termination occurs pursuant to this clause, the City is not obligated to refund any payment made by Parks for ERU's, but at its option may buy back from Parks any or all ERU's previously purchased by Parks as provided in paragraph 7, City's Obligations.

DAMAGES

Any delay or failure in performance by either party shall not constitute a default hereunder if and to the extent the cause for such delay or failure of performance was unforeseeable and beyond control of the party. The aggrieved party shall be entitled to damages from the other party if the cost or time of the aggrieved party's performance is changed due to the fault or negligence of the other party and the aggrieved party incurs additional expenses or suffers a loss as a result thereof.

Both parties shall make all reasonable efforts to prevent and mitigate the effects of any delay regardless of cause.

DISPUTES

In the event that a dispute arises under this Agreement, it shall be determined by a Dispute Board in the following manner: Each party to this Agreement shall appoint one member to the Dispute Board. The members so appointed shall jointly appoint an additional member to the Dispute Board. The Dispute Board shall review the facts, contract terms and applicable statutes and rules and make a determination of the dispute. The determination of the Dispute Board may be appealed to the Cowlitz County Superior Court.

GOVERNANCE

This contract is entered into pursuant to and under the authority granted by the laws of the state of Washington and any applicable federal laws. The provisions of this Agreement shall be construed to conform to those laws. In the event of an inconsistency in the terms of this Agreement, or between its terms and any applicable statute or rule, the inconsistency shall be resolved by giving precedence in the following order:

a. applicable state and federal statutes and rules;

b. statement of work; and

c. any other provisions of the Agreement, including Exhibits incorporated by reference.

ASSIGNMENT

The work to be provided under this Agreement, and any claim arising thereunder, is not assignable or delegable by either party in whole or in part, without the express prior written consent of the other party, which consent shall not be unreasonably withheld.

WAIVER

A failure by either party to exercise its rights under this Agreement shall not preclude that party from subsequent exercise of such rights and shall not constitute a waiver of any other rights

under this Agreement unless stated to be such in a writing signed by an authorized representative of the party and attached to the original Agreement.

SEVERABILITY

If any provision of this Agreement or any provision of any document incorporated by reference shall be held invalid, such invalidity shall not affect the other provisions of this Agreement which can be given effect without the invalid provision, if such remainder conforms to the requirements of applicable law and the fundamental purpose of this Agreement, and to this end the provisions of this Agreement are declared to be severable.

ALL WRITINGS CONTAINED HEREIN

This Agreement, including all Exhibits which by this reference are incorporated herein, contains all the terms and conditions agreed upon by the parties. No other understandings, oral or otherwise, regarding the subject matter of this Agreement shall be deemed to exist or to bind any of the parties hereto.

CONTRACT MANAGEMENT

The program manager for each of the parties shall be responsible for and shall be the contact person for all communications and billings regarding the performance of this Agreement.

The Program Manager for Parks responsible for items regarding this Agreement is:

Andrew E Gerst, Jr. PE,
Facilities Engineering Manager
P.O.Box 42650
7150 Cleanwater Lane
Olympia, WA 98504-2650
(360) 902-8624

The Program Manager(s) for the City responsible for items regarding this Agreement is:

Edward W. Leonard
Mayor
City of Ilwaco
120 First Avenue North
P.O. Box 548
Ilwaco, WA 98624
(360) 642-3145

and

Dave Nelson
City Attorney
1516 Hudson Street, Suite 205
Longview, WA 98632
(360) 425-9400

IN WITNESS WHEREOF, the parties have executed this Agreement:

Washington Parks and
Recreation Commission

By: _____

Title: ASSISTANT DIR.

Date: 3/7/02

City of Ilwaco

By: _____

Title: MAYOR

Date: 03/01/2002

Approved as to form only
this 1st day of March, 2002

_____
Assistant Attorney General
Attorney for the State Parks and Recreation Commission

Approved as to form only
this 5th day of March, 2002

_____
David A. Nelson
Nelson Law Firm, PLLC
Attorney for the City of Ilwaco

AFTER RECORDING MAIL TO:
Lands Program
Washington State Parks & Recreation Commission
P.O. Box 42650
Olympia, WA 98504-2650

Document Titles (s)

1. WATER AND SEWER EASEMENT

Reference numbers of related documents:

None.

Grantor(s):

1. STATE OF WASHINGTON, WASHINGTON STATE PARKS AND RECREATION COMMISSION

Grantee(s):

1. CITY OF ILWACO

Legal Description:

A right-of-way that is ten (10) feet in width, being five (5) feet on either side of the water and sewer lines as constructed, located entirely within Cape Disappointment State Park, in Sections 5 and 9, Township 9 North, Range 11 West, W.M., Pacific county, WA, as shown in Exhibit A of easement document.

Assessor's Property Tax Parcel Account Number(s):

None. Portion of 09110550001
09110550002

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STATE OF WASHINGTON
PARKS AND RECREATION COMMISSION
Rex Derr, Director

Cape Disappointment State Park
Water & Sewer Easement and Agreement #2004-04-693

THIS AGREEMENT is made between the State of Washington, acting through the WASHINGTON STATE PARKS AND RECREATION COMMISSION, as grantor (hereafter "State") and the City of Ilwaco, (hereafter "Grantee").

AUTHORITY

State is acting under those authorities granted to State and described under RCW 79A.05.070, and Washington State Parks and Recreation Commission action of May 3, 2001. The easement granted hereunder is granted subject to and conditioned upon the following terms, conditions and covenants which Grantee hereby promises to observe and perform faithfully and fully (collectively, the "Agreement").

1.0 EASEMENT

1.1 Conveyance. State, for the consideration described in Section 1.3 below, hereby conveys and quit claims to Grantee a non-exclusive, non-divisible easement over a parcel of land in Pacific County legally described and shown as set forth in Exhibit A (hereafter "Easement Area"), together with the right of ingress and egress over and across existing roads. This Easement is being conveyed pursuant to that Interlocal Agreement between State and Grantee, dated March 7, 2002.

1.2 Term. The easement shall be perpetual unless terminated as set forth hereafter.

1.3 Consideration. State and Grantee recognize the mutual benefits of the Facilities as consideration for the easement granted herein.

1.4 Appurtenant Easement. The easement granted herein shall be deemed appurtenant to Grantee's water and sewer systems.

1.5 Title/Disclaimer. The rights granted herein are subject to permits, leases, licenses and easements, if any, heretofore granted by State affecting the property subject to this Agreement

2.0 PURPOSE AND SCOPE OF EASEMENT

2.1 Permitted Use. The easement granted pursuant to this Agreement is for the purpose of and is limited to operating, maintaining, repairing, replacing, and using the water and sewer system improvements as described in the March 7, 2002

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Interlocal Agreement between State and Grantee, including the main pump stations (main entrance and North Head), force mains, water lines, meters, and appurtenant facilities and improvements ("Facilities" herein) subject to Grantee obtaining and at all times possessing all applicable federal, state and local permits. Grantee may not expand, change or modify the purpose or scope of the easement granted herein without State's prior written consent, which shall be at its sole discretion and shall be subject to applicable fees according to State's fee schedule. Any unauthorized use of the Easement Area shall be considered a material breach of this Agreement and may be the basis for termination pursuant to paragraph 6.10 Material Breach or Default. No use will be deemed authorized unless approved in advance in writing by State.

2.2 Tree Removal. Any trees or timber to be cut or removed by Grantee from the Easement Area shall be disclosed in advance to State and shall not be cut or removed until State grants its prior written consent. If Grantee cuts or removes trees or timber, timber subsequently grown shall belong to State.

2.3 Grantee's Use and Activities. Grantee shall exercise its rights under this Agreement so as to minimize, and avoid if reasonably possible, interference with State's use of the Easement Area and adjoining park property for park purposes. Grantee shall at all times conduct its activities on the Easement Area so as not to interfere with, obstruct or endanger the public or State's operations or facilities.

3.0 RESERVATIONS

3.1 Reservations to State. State reserves all ownership of the Easement Area and resources thereon (including timber) and the right of use for any purpose including, but not limited to, the right to remove resources within the Easement Area; the right at all times to cross and re-cross the Easement Area at any place on grade or otherwise; and the right to use, maintain, patrol, reconstruct or repair the Easement Area so long as any such action by State does not unreasonably interfere with Grantee's rights. Control of park gates, roads and lands shall remain with State at all times. State may grant to third parties any and all rights reserved, including easements and leases, so long as any such right granted to any third party, or the exercise thereof, does not unreasonably interfere with the Grantee's rights. In the event State elects to exercise rights provided by this reservation, including future grants to third parties, State shall give written notice to Grantee of such election.

3.2 Use of Area by State. Grantee has been advised and is aware that (a) State is using or intends to use the Easement Area and adjoining park property for recreational park purposes; (b) new park facilities may be constructed in addition to or in replacement of such facilities already existing; and (c) construction of such new facilities may require the installation of roads and other fixtures or improvements over, upon, across and under the Easement Area, and, in addition,

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may require the location of structures with permanent foundations within the Easement Area.

Nothing herein prevents or precludes State from undertaking construction, installation and use of the Easement Area and adjoining park property. The State shall only be liable to Grantee for any damage to or destruction of Grantee's Facilities directly caused by State's use of the Easement Area, adjoining park property, or State's facilities on the Easement Area or adjoining park property to the extent that the damage or destruction results solely from State's failure to exercise reasonable care not to damage or destroy Grantee's Facilities.

4.0 INSURANCE, WASTE AND ENVIRONMENTAL LIABILITY

4.1 Insurance. Grantee's liability coverage is provided through its membership in the Associated Washington Cities Risk Management Service Agency. The current policy period is January 1, 2004 to December 31, 2004, and the policy is automatically renewed annually. The Risk Management Service Agency provides a $250,000,000 per occurrence limit of insurance, with the Grantee carrying a deductible of $1000 per occurrence. Coverages include bodily injury, personal injury, property damage, errors and omissions and advertising injury.

4.2 Waste. Grantee shall not cause or permit any filling activity to occur in or on the Easement Area, except as approved in advance in writing by State. Grantee shall not deposit refuse, garbage, or other waste matter in or on the Easement Area.

4.3 Hazardous Substances. Grantee shall not, without State's prior written consent, use, store, generate, process, transport, handle, treat, release, or dispose of any hazardous substance or other pollutants in or on the Easement Area. The term hazardous substance means any substance or material as those terms are now or are hereafter defined or regulated under any federal, state, or local law including but not limited to the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA, 42 U.S.C. 9601 et. seq.), or the Washington Model Toxic Control Act (MTCA, RCW 70.105D). Grantee shall immediately notify State if Grantee becomes aware of any release or threatened release of a hazardous substance or other pollutant on the Easement Area or adjoining property. If a release of hazardous substance or other pollutant occurs in, on, under, adjacent to or above the Easement Area or adjacent property arising out of any action of Grantee, its contractors, subcontractors, invitees, agents, employees, licensees, or permitees, Grantee shall, at Grantee's sole expense, promptly take all actions necessary or advisable to clean up, contain, and remove the hazardous substance or other pollutant in accordance with applicable laws. Any cleanup shall be performed in a manner approved in advance in writing by State, except in emergency situations Grantee may take reasonable and appropriate actions without advance approval.

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5.0 CONSTRUCTION, OPERATION AND MAINTENANCE

5.1 Plan of Development. At least thirty (30) days prior to any new development or the reconstruction of any and all Facilities, Grantee shall submit a completed Plan of Development (PoD) to State for its written approval and verification. State's approval will be contingent upon acceptance of the PoD by the Capital Development Program, Parks Development Service Center. The PoD shall include, without limitation, the following:

a. Map showing areas to be developed, location of Facilities and location of utility and other easements;
b. Land clearing, leveling and erosion control plans;
c. Specific physical characteristics, technical specifications and components of Facilities;
d. Schedule of completion dates for Facilities components; and
e. Detailed description of activities to be conducted in the Easement Area.

No construction, reconstruction or development of any kind may take place within the Easement Area prior to State's written approval of the PoD and verification that Grantee has obtained all applicable permits. State will notify Grantee in writing of its verification of permits and approval of the PoD. Nothing in this Agreement shall be deemed to impose any duty or obligation on State to determine the adequacy or sufficiency of Grantee's PoD or to ascertain whether Grantee's construction is in conformance with the PoD and Facilities Specifications approved by State.

During construction and maintenance, Grantee shall minimize soil erosion and damage to soil. Grantee's equipment shall not be operated when ground conditions are such that excessive soil damage or erosion will occur.

In case of incomplete improvements or development, Grantee shall restore the Easement Area to its original condition, if State determines it to be in the best interest for managing the Easement Area.

5.2 Unauthorized Improvements. All improvements not included in the Permitted Use of the Easement Area, or as otherwise approved in advance in writing by State, are prohibited and may be cause for termination under paragraph 6.10 Breach or Default. Improvements placed within the Easement Area without State's prior written consent shall immediately become the property of State or at State's option, may be required to be removed by Grantee at Grantee's sole cost.

5.3 Facilities Specifications. Grantee shall so place, protect, and bury the Facilities as to allow the unobstructed movement of any equipment or materials across the surface of the Easement Area and shall install the Facilities at such depth as to not interfere with State's normal and usual use of the Easement Area. Grantee shall



mark the location of the buried Facilities as required by the applicable regulatory and permitting authorities or as directed by State.

If Grantee fails to place or bury the Facilities according to the Facilities Specifications or as otherwise approved in writing by State, Grantee shall hold State harmless from any and all damage to the Facilities. Further, Grantee shall indemnify, defend and hold harmless State against all claims or liabilities resulting directly or indirectly from Grantee's failure to properly place or bury the Facilities per the Facilities Specifications and other requirements contained in this Agreement. State may require Grantee to relocate the Facilities in the event that they interfere with State's pre-existing use of the park.

State reserves the right to inspect the "open trench" during construction to ensure compliance with the Plan of Development, permits and Facilities Specifications. Grantee shall take precautionary measures necessary to ensure the safety of park visitors during construction.

5.4 Damage. Grantee, when exercising the rights granted herein, shall repair or cause to be repaired, at its sole cost and expense, all damage to improvements on State lands occasioned by it, which is in excess of that which it would cause through normal and prudent exercise of such rights.

5.5 Restoration. Upon completion of the work authorized herein, Grantee shall immediately restore the surface of the Easement Area as required by State.

5.6 Survey Markers. Grantee shall not destroy or disturb any survey markers (including but not limited to corner markers, witness objects, or line markers) without State's prior written approval. Markers that must necessarily be disturbed or destroyed during construction shall be adequately referenced and replaced in accordance with all applicable laws of the state of Washington, including but not limited to RCW 58.24, and all State regulations pertaining to preservation of such markers. Grantee shall re-establish such markers using a licensed land surveyor or public official as prescribed by law according to U.S. General Land Office standards at Grantee's sole cost.

5.7 Response to an Emergency. Nothing contained herein shall prevent Grantee from responding to an emergency relating to the Facilities on the Easement Area, provided Grantee immediately provide written notice to State of said action.

5.8 Aerial Application. The aerial application of pesticides, insecticides and herbicides is prohibited.

5.9 Wetlands. Grantee shall not cause damage to or conduct any filling of any wetlands without the proper written authorization from the appropriate government agency and without receiving prior written approval from State.

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5.10 Survey. It is understood that at the time of this easement, Grantee is taking ownership and control of the Facilities as constructed by State. If Grantee relocates any Facilities pursuant to this Agreement, Grantee shall provide State with a survey showing the location of each of the Facilities on the Easement Area as they are installed.

5.11 Work Standards. All work performed by Grantee shall be in accordance with the Plan of Development submitted to and approved by State and shall be completed in a careful and workmanlike manner to State's satisfaction, free of claims or liens. Upon completion of construction, and upon completion of any subsequent work performed by Grantee, Grantee shall remove all debris and restore the surface of the Easement Area as nearly as possible to the condition in which it was at the commencement of work.

5.12 Removal of Improvements and Equipment. All Facilities which remain upon the Easement Area sixty (60) days from the termination or forfeiture of this Agreement, shall become the property of State and be considered a part of the land upon which they are located; provided, however, that any time within sixty (60) days after the termination or forfeiture of this Agreement, Grantee shall be entitled to remove the Facilities; or, State may require Grantee to remove the Facilities, at Grantee's cost. All tools, equipment and other property not permanently affixed upon the land by Grantee shall remain Grantee's property but shall be removed within sixty (60) days after the termination or forfeiture of this Agreement.

5.13 Inspectors. State may appoint one or more representatives to serve as inspectors to oversee work performed by Grantee in the Easement Area. Grantee shall not carry on any work unless it has given such notice thereof as State has requested so as to allow for the presence of State's inspectors. Grantee and its contractors and subcontractors shall promptly and fully comply with all orders and directions of State's inspectors, including without limitation, cessation of work, and Grantee's construction contracts shall so provide. Grantee shall promptly pay State's charge for such inspectors, including salary, lodging and travel expenses.

5.14 Archaeology. In the event archaeological, cultural or historic resources are found or unearthed during any work or construction, Grantee shall comply with the provisions of RCW 27.44 and RCW 27.53 and the rules of the Office of Archaeological and Historic Preservation. Upon discovery of any such resources, Grantee shall stop work and notify State.

5.15 Appearance of the Property. Grantee shall keep all above-ground Facilities within the Easement Area in a neat, clean, sanitary and safe condition, and shall keep the Facilities in good condition, except only for reasonable wear and tear. The above-ground Facilities shall be maintained by Grantee to a standard consistent with the

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facilities and structures owned by the State within Cape Disappointment State Park, including the color and quality of the paint thereon.

5.16 Monitoring. Grantee shall test and monitor the Facilities required by the appropriate regulatory authority. Test results shall be submitted to State at State's request. State reserves the right to perform testing at any time on any portion of the Facilities system.

6.0 GENERAL TERMS AND CONDITIONS

6.1 Compliance with Laws and Regulations. Grantee shall comply with all applicable laws, including all federal, state, county and municipal laws, ordinances, and regulations in effect, both current and future, for the design, construction, maintenance, operation or improvement of the Facilities and use of the Easement Area. Grantee shall so comply in a timely manner and at its sole expense.

6.2 Ownership and Maintenance of Facilities. The Facilities authorized herein shall be continuously owned and maintained by Grantee at Grantee's sole expense.

6.3 Assignment. This Agreement, or any of the rights granted herein, shall not be assigned without the State's prior written consent, except that the rights granted herein may be used by any employee, contractor, or representative of Grantee while engaged in Grantee's operations. In processing a request for assignment, State shall charge Grantee its administrative costs and require additional compensation for any additional use or user. In the event the State consents to the assignment of Grantee's interest in this Agreement, the State reserves the right to unilaterally amend, or terminate and replace, this Agreement to accommodate any change in circumstances, conditions or parties. These rights are in addition to and not a limitation upon State's discretionary authority under this Section.

6.4 Successors. The rights and obligations of the parties shall inure to the benefit of and be binding upon their respective successors and assigns.

6.5 Forfeiture. In the event that any portion of the Easement Area is not used by Grantee for the purpose for which it was granted within a period of two (2) years from the day and year first above written, Grantee's rights within the Easement Area shall revert to State, and the Easement Area shall be freed from the easement as fully and completely as if this Agreement had not been entered into; provided, however, an extension of time may be granted upon written request prior to the expiration date of said two (2) year period and upon such additional terms and conditions as may be specified by State; such terms and conditions shall include State's right to modify the consideration due State which shall include, but not be limited to, additional charges for administrative costs and appreciation of land and valuable material.

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Should Grantee cease to use the Easement Area for the purposes specified herein for a period of two (2) years, it shall notify State of such nonuse; and the rights granted herein shall revert to State.

6.6 Termination. In the event that this Agreement is terminated for any reason, Grantee's rights within the Easement Area shall immediately revert to State, and the Easement Area shall be freed from the easement as fully and completely as if this Agreement had not been entered into.

6.7 Indemnity. Grantee shall indemnify, defend with counsel acceptable to State, and hold harmless State, its employees, officers, and agents from any and all liability, damages, expenses, causes of action, suits, claims, costs, fees (including reasonable attorney's fees), penalties, or judgments, of any nature whatsoever, arising out of the use, occupation, or control of the Easement Area by Grantee, its contractors, subcontractors, agents, employees, or franchisees, including but not limited to the use, storage, generation, processing, transportation, handling, disposal, release, or threatened release of any hazardous substance or materials. To the extent that RCW 4.24.115 applies, Grantee shall not be required to indemnify State from State's sole or concurrent negligence. This indemnification shall survive the forfeiture or termination of this Agreement.

6.8 Advance By State. If State advances or pays any cost or expense for or on behalf of Grantee, Grantee shall reimburse State the amount paid and shall pay interest on such amount at the rate of one percent (1%) per month, or fraction thereof, until paid.

6.9 Attorney Fees and Venue. In the event either party is required to incur attorney fees and costs to enforce any obligations under the terms of this agreement, in addition to any other relief to which either party may be entitled, the prevailing party shall be entitled to an award of costs and reasonable attorney fees. Venue for any action shall be in Pacific County Superior Court. The laws of the state of Washington shall govern any dispute and the interpretation of this Agreement.

6.10 Notices and Submittals. All notices, demands, and requests required under this Agreement shall be in writing sent by United States registered or certified mail, postage prepaid, and shall be addressed as follows:

If to State:
Washington State Parks and Recreation Commission
Lands Program
P.O. Box 42650
Olympia, WA 98504-2650
Ph: (360) 902-8500
Fax: (360) 902-8840

If to Grantee:
City of Ilwaco
120 First Avenue North
PO Box 548
Ilwaco, WA 98624
Ph: (360) 642-3145
Fax: (360) 642-3155

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Or at such other place as either party may from time to time designate by written notice to the other.

Notices, demands, and requests served upon State or Grantee as provided in this Section in the manner aforesaid shall be deemed sufficiently served or given for all purposes hereunder three (3) days after such notice, demand, or request shall be so mailed in any post office in the state of Washington.

6.11 Material Breach or Default. If Grantee breaches or defaults on any undertaking, promise or performance called for herein, State may terminate this Agreement after Grantee has been given thirty (30) days' written notice of the breach or default and (1) such breach or default has not been corrected within such time; or (2) if such breach or default cannot be reasonably corrected within such thirty (30) day period, Grantee has not commenced such correction and thereafter continued same with reasonable diligence. Upon such termination, all Facilities on the Easement Area shall be forfeited and become the property of State subject only to any previously approved waiver of interest or security interest. In addition to the right of termination, State shall have any other remedy available in law or equity. Any Grantee obligations not fully performed upon termination will continue until fully performed. The failure of State to exercise any right at any time will not waive State's right to terminate for any future breach or default. The failure by State to provide notice to Grantee shall not relieve Grantee of its obligations under this Agreement.

6.12 Force Majeure. Grantee's failure to comply with any of the obligations under this Agreement shall be excused only if due to causes beyond Grantee's control and without the fault or negligence of Grantee, including acts of God, acts of the public enemy, acts of any government, fires, floods, epidemics and strikes.

6.13 Amendments. Any amendments, revisions, supplements, or additions to this Agreement or the attached exhibits shall be made in writing, executed by the parties hereto, and neither State nor Grantee shall be bound by verbal or implied agreements.

6.14 Discrimination. Grantee shall not conduct or suffer any business upon the Easement Area which unlawfully discriminates against any person on the basis of race, color, creed, religion, sex, age, or physical or mental handicap.

6.15 Emergency Action. State may take such emergency action as is necessary to protect the public health, safety and welfare, including, but not limited to, temporary closing or otherwise restricting Grantee's use of the Easement Area. Grantee understands that it shall have no recourse against State for any losses incurred as a result of State's taking such action.



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6.16 Interpretation. This Agreement has been submitted to the scrutiny of all parties hereto and their counsel if desired, and shall be given a fair and reasonable interpretation in accordance with the words hereof, without consideration or weight being given to its having drafted by any party hereto or its counsel.

6.17 Non-Waiver. No failure of State to insist upon the strict performance of any provision of this Agreement shall be construed as depriving State of the right to insist on strict performance of such provision or any other provision in the future. No waiver by State of any provision of this Agreement shall be deemed to have been made unless expressed in writing and signed by State.

6.18 Remedies Cumulative. The specified remedies to which State may resort under this Agreement are cumulative and are not intended to be exclusive of any other remedies or means of redress to which State may lawfully be entitled in case of any breach or threatened breach by Grantee.. In addition to the remedies provided in this Agreement, State shall be entitled to the restraint by injunction of the violation, or attempted or threatened violation, of any of the terms and conditions of this Agreement.

6.19 Severability. If any term of this Agreement or the application thereof to any person or circumstance is found to be to any extent invalid or unenforceable, the remainder of this Agreement, or the application of such term or provision to persons or circumstances other than those as to which it is invalid or unenforceable, shall not be affected thereby, and each term of this Agreement shall be valid and be enforced as written to the fullest extent permitted by law.

6.20 State's Consent. Except in the case of assignment and purpose of the easement, State shall not unreasonably withhold its consent where such consent is expressly provided for in this Agreement.

6.21 Temporary Closure for Cause. If Grantee damages the Easement Area such that it interferes with the normal operation of the park (determined at State's discretion), State may close the park and/or restrict Grantee's access to the Easement Area until Grantee remedies the situation to State's satisfaction. Grantee understands it shall have no recourse against State for any losses incurred during such the shutdown or restriction.

6.22 Recording. Upon full execution, Grantee shall promptly record this Agreement in Pacific County and provide a copy of the recorded Agreement to State.

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IN WITNESS WHEREOF, the parties hereto have executed this instrument as of this 11th day of March, 2005,

GRANTEE: CITY OF ILWACO

By _____

Name EDWARD W. LEONARD

Title MAYOR, CITY OF ILWACO

STATE OF WASHINGTON STATE PARKS AND RECREATION COMMISSION

By _____

Larry Fairleigh, Assistant Director
Parks Development Service Center
By Delegation 2004-43, Section 7 (10-11-04)

Approved as to form only:

CHRISTINE GREGOIRE
Attorney General

By _____
MARK SCHUMOCK
Assistant Attorney General
Dated 2/7/05 MFS.

3-11-05 AL

This transaction is not Taxable under Chapter 11 of the Extraordinary Session Laws of 1951.
See Affidavit No. Exempt
PACIFIC COUNTY TREASURER

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GRANTEE'S ACKNOWLEDGMENT

STATE OF WASHINGTON)
) ss.
County of)

THIS IS TO CERTIFY that on this day, before me the undersigned Notary Public in and for the State of Washington, duly commissioned and sworn, personally appeared Edward W. Leonard to me known to be the Mayor of **the City of Ilwaco** that executed the foregoing instrument and acknowledged the said instrument to be the free and voluntary act and deed of said City, for the uses and purposes therein mentioned, and on oath stated that he was authorized to execute the said instrument.

WITNESS my hand and official seal this 22 day of February, 2005

DEBRA E. GORE
NOTARY PUBLIC
STATE OF WASHINGTON
COMMISSION EXPIRES
JUNE

Debra E Gore
Notary Public in and for the State of Washington
residing at Ocean Park, WA
My commission expires 6-01-2007

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WASHINGTON STATE PARKS & RECREATION COMMISSION
ACKNOWLEDGMENT

STATE OF WASHINGTON)
) ss.
County of THURSTON)

THIS IS TO CERTIFY that on this day, before me the undersigned Notary Public in and for the State of Washington, duly commissioned and sworn, personally appeared Larry Fairleigh to me known to be the Asst. Director of the **Washington State Parks and Recreation Commission** that executed the foregoing instrument and acknowledged the said instrument to be the free and voluntary act and deed of said Commission, for the uses and purposes therein mentioned, and on oath stated that he was authorized to execute the said instrument.

WITNESS my hand and official seal this 10th day of March, 2005.

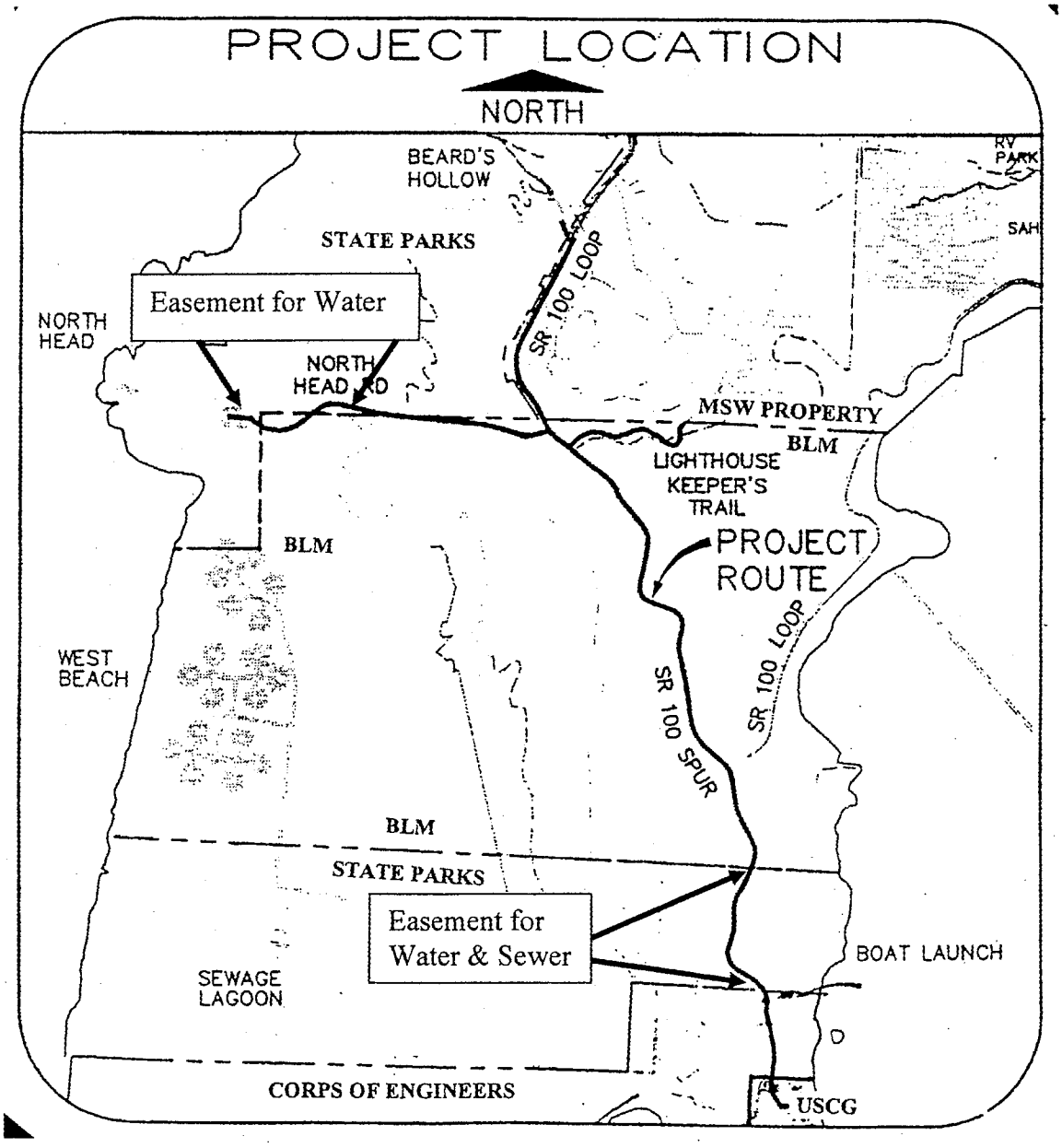
SREYTOUCH RYSER
COMMISSION EXPIRES
NOTARY
PUBLIC
6-4-07
STATE OF WASHINGTON

Sreytouch Ryser
Notary Public in and for the State of Washington
residing at Tumwater, WA
My commission expires 6-4-07

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EXHIBIT A
LEGAL DESCRIPTION OF EASEMENT AREA

A right-of-way that is ten (10) feet in width, being five (5) feet on either side of the water and sewer lines as constructed, located entirely within Cape Disappointment State Park, in Sections 5 and 9, Township 9 North, Range 11 West, W.M., Pacific County, WA, as shown below:



M:\Projects\Cape Disappointment\RPA\Easements\2004-04-693 City of Ilwaco-Water&Sewer\EASEMENT to City of Ilwaco-water&sewer.doc

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THREE-PARTY AGREEMENT
BETWEEN
UNITED STATES COAST GUARD,
WASHINGTON STATE PARKS AND RECREATION COMMISSION
AND
CITY OF ILWACO, WASHINGTON

THIS AGREEMENT is made and entered into by and between the United States Coast Guard, hereinafter referred to as "CG," the Washington State Parks and Recreation Commission, hereinafter referred to as "Parks", and the City of Ilwaco, hereinafter referred to as the "City" (collectively referred to as the "Parties").

IT IS THE PURPOSE OF THIS AGREEMENT to set forth the roles and responsibilities of the parties regarding the Fort Canby State Park Sewer and Water System Improvement Project (the "Project"), the long-term operation and maintenance of these improvements, and the provision of water and sewer services by the City to Parks and CG.

RECITALS

WHEREAS there is a recognized need for enhanced water and sewer utility services at Fort Canby State Park and CG Station Cape Disappointment, and both Parks and CG now desire increased pressure and adequate fire flow as required by Washington State regulatory standards.

WHEREAS, The Southwest Washington Coastal Erosion Project, conducted jointly by the Coast Guard and the Department of Ecology, in its February 16, 1999, report to Parks entitled "*Shoreline Change at Fort Canby State Park*" concluded that the ongoing progression of coastal erosion in the area of Fort Canby State Park will result in bridging of the primary dune by the year 2009, which in turn will likely result in the flooding of lowland areas, including the existing wastewater treatment plant of Fort Canby State Park. Accordingly, the city of Ilwaco has determined that an emergency exists under RCW 36.70A.110(4) in Resolution No. 2002-07.

WHEREAS Parks received funding from the State legislature, subject to the conditions of Section 324, Washington State Substitute Senate Bill 6155 (June 26, 2001), to complete the Project; and thereafter Parks and City entered into an Interlocal Agreement on March 7, 2002 setting forth the terms and conditions by which Parks will build new water and sewer lines, Parks will transfer ownership of these new lines to City, and City will be responsible for ongoing operations and maintenance of these lines and provision of utility services to Parks and CG (the "Interlocal Agreement," attached hereto as [redacted] by reference);

WHEREAS, MSW Ventures LLC, a private developer ("MSW"), and the City entered into a Sewer and Water Reimbursement Agreement (the "Reimbursement Agreement") setting forth the terms and conditions by which MSW shall build approximately one mile of water and sewer lines, from City's municipal utility plant

L-10 Back-up

across property that MSW owns and intends to develop, and up to a connection point at Park's property line. Pursuant to the Reimbursement Agreement, once constructed satisfactorily, MSW shall transfer ownership of these lines to City, and City shall be responsible for ongoing operation and maintenance of these lines. As set forth in the Interlocal Agreement, after the City obtains these lines, Parks shall pay a fixed fee of $923,000 to City in consideration of the future right to access and utilize these lines.

WHEREAS, in accordance with the Interlocal Agreement, Parks will contract to design and construct approximately 1.5 miles of water and sewer lines from the MSW property line, across Fort Canby State Park, and up to the connection point at or near CG's property line. CG's proportional usage of these lines is 30%, or approximately $1,068,222 of construction costs.

WHEREAS, in accordance with the utility contract between CG and City (the "Utility Contract," attached hereto as [redacted] and incorporated herein by reference), CG shall pay to City: (a) connection fees for 35 Equivalent Residential Units, or approximately $122,500, to reserve sewage treatment capacity in the City's plant; (b) a non-recurring, non-refundable service charge of approximately $1,068,222 as contribution in aid of construction for the new water and sewer lines to be constructed by Parks; (c) a latecomer's fee of $289,831 in consideration of the future right to access and utilize the lines owned by City and previously obtained from MSW; and (d) recurring monthly charges for water and sewer services in accordance with City's ordinance rates.

WHEREAS, the city has completed all facility and operational improvements to the city's existing wastewater treatment plant required by the Interlocal Agreement.

WHEREAS, the city has entered into a Water and Sewer Reimbursement Agreement with MSW and the required security and easements have been delivered into escrow for MSW constructed improvements.

WHEREAS the CG is entering this Agreement pursuant to the authority granted to it by 14 U.S.C. §93(b) authorizing the CG to maintain, operate and repair CG shore establishments, and 14 U.S.C. §93(b) authorizing the CG to enter into cooperative agreement with other Government agencies.

STATEMENT OF OBLIGATIONS

CG, Parks and the City agree as follows:

1. The CG shall pay the non-recurring, non-refundable service charge described above in four increments, as follows: (a) completion of design, (b) 50% completion of construction of Parks' portion of the lines, (c) 75% completion of construction of Parks' portion of the lines, and (d) 100% completion of construction of Parks' portion of the lines.

2. [redacted]

[redacted]

3. In accordance with the Utility Contract, CG shall pay a latecomer's fee of $289,831 in consideration of the future right to access and utilize the lines owned by City and previously obtained from MSW. The amount of $289,831 is a fixed fee and not subject to change. The City shall transfer the entire $289,831 CG latecomer's fee to Parks as CG's proportional contribution to the $923,000 fee paid by Parks to City in consideration of the future right to access and utilize these same lines.

4. When Parks determines that payment of (a) the latecomer's fee of $289,831; or (b) any incremental payment towards the non-recurring, non-refundable service charge of approximately $1,068,222 is due, Parks shall submit an invoice directly to CG at the address specified in Section G.3 of the Utility Contract. The invoice shall state that payment should be made to City. After CG review and concurrence, CG shall pay City the invoice amount.

5. The payments described in Paragraph 4 above shall be transferred in their entirety, plus all accrued interest, to Parks. City shall initiate and maintain a trust account with a federally insured financial institution. CG payments shall be deposited directly into this trust account and not co-mingled with other City funds. City shall take all necessary action to assist in the completion of this transfer of funds to Parks. The city will request the bank where the trust account is established to give both the city and Parks notice upon the deposit of any funds. In accordance with the Utility Contract, CG shall pay City an administrative processing fee of $200 for each transfer of funds as described above.

6. This Three-Party Agreement is limited to the definition of the roles and responsibilities of the respective parties in completing the Fort Canby State Park Sewer and Water System Improvement Project. There shall be no obligation of funds under this agreement. CG obligation of funds shall be accomplished in the Utility Contract.

EFFECTIVE DATE

This Agreement shall commence immediately upon execution by all three parties.

AGREEMENT ALTERATIONS AND AMENDMENTS

This Agreement may be amended by mutual agreement of the Parties. No amendment shall be binding unless it is in writing and signed by persons authorized to bind each of the Parties.

TERMINATION

This Agreement shall terminate upon the accomplishment of its purpose, the completion of the Fort Canby State Park Sewer and Water System Improvement Project, or otherwise upon the mutual written agreement of all three Parties. In addition, CG or Parks may give a Notice of Intent to terminate this Agreement or portions thereof by providing thirty (30) days written notification upon the occurrence of one or more of the following events:

1. Failure of MSW to complete construction and transfer to the City those water and sewer improvements which will affect service to Parks and CG or are necessary for Parks' and CG's water and sewer system by June 30, 2003.

2. Failure of MSW to submit all required plans, permit applications and other applicable documentation for the construction of sewer and water improvements from MSW's South property line to the City's connection to the City for approval within sixty (60) days of the Department of Ecology's revised compliance order releasing ERU capacity to serve Parks' and CG's requirements, and/or to the Department of Health and/or the Department of Ecology within thirty (30) days of approval by the City; or failure to begin off-site fabrication of the water reservoir by November 30, 2002; or failure to begin onsite construction of the water and sewer improvements by March 30, 2003;

3. Failure of the City Council to approve all comprehensive plan updates as required for extension and/or expansion of water and sewer services to Parks or failure of City Council to obtain acknowledgement or approval by October 31, 2002 from applicable governmental authorities that an emergency exists under RCW 36.70A.110(4) relating to the destruction of Parks' sewer ponds at Ft Canby State Park;

4. Any other failures, deficiencies or breaches of this Agreement, the Interlocal Agreement or the Utility Contract that materially affect the Parties' benefits as contained in each of these three documents.

The written notice shall state specifically the basis on which the party seeks termination. Upon receipt of written Notice of Termination, the recipient party shall have thirty (30) days to cure the reason for termination. The Notice of Termination shall be effective only if the occurrence giving rise to the Notice is not cured within thirty (30) days.

GOVERNING LAW

This agreement is entered into pursuant to laws of the State of Washington and any applicable Federal laws.

CONTRACT MANAGEMENT POINTS OF CONTACT

The program manager for each of the Parties shall be responsible for and shall be the contact person for all communications and billings regarding the performance of this Agreement.

The Program Manager for Parks is:

Andrew E. Gerst, Jr. P.E.
Facilities Engineering Manager
P.O. Box 42650
7150 Cleanwater Lane
Olympia, WA 98504-2650
(360) 902-8624

The Program Managers for City are:

Edward W. Leonard
Mayor, City of Ilwaco
120 First Avenue North
P.O. Box 548
Ilwaco, WA 98624
(360) 642-3145

and

Dave Nelson
City Attorney
1516 Hudson Street, Suite 204
Longview, WA 98632
(360) 425-9400

The Program Manager for CG is:

Robert Townsend
Contracting Officer
U.S. Coast Guard MLCPAC(fcp)
Coast Guard Island
Alameda, California 94501
(510) 437-3009

IN WITNESS WHEREOF, the Parties have executed this Agreement:

Washington Parks and Recreation Commission

By: _____

Print Name: LAWRENCE D FAIRLEIGH

Title: ASSISTANT DIRECTOR

Date: 9/5/02

City of Ilwaco

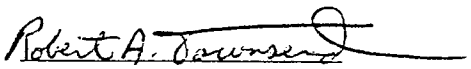
By: 

Print Name: Edward W. Leonard

Title: Mayor

Date: August 27, 2002

United States Coast Guard

By: 

Print Name: ROBERT A. TOWNSEND

Title: Contracting Officer

Date: SEP 17 2002

Exhibit A Interlocal Agreement between Parks and City, March 7, 2002
Exhibit B Utility Services Contract, No. DTCG89-02-C-64T001, between CG and City

REAL ESTATE CONTRACT

Between the Town of Ilwaco, a Washington muncipal corporation ("Ilwaco"), and Weyerhaeuser Company, a Washington corporation ("Weyerhaeuser"), dated March 20, 1987. jw

BACKGROUND:

Based on recommendations of its consultant, American Engineering Associates, and other information, Ilwaco has determined that it needs to acquire certain timberlands in the Indian Creek drainage for municipal watershed purposes. Ilwaco is authorized and prepared to acquire the needed property by condemnation if necessary. Weyerhaeuser owns portions of the property. Wishing to avoid the expense and delays of condemnation, Ilwaco and Weyerhaeuser agree to the following transaction.

AGREEMENTS:

1. Weyerhaeuser will convey to Ilwaco the following real property lying approximately as shown on the map attached as Exhibit A:

(a) "Parcel 1," containing approximately 133 acres, and consisting of the following portions of Section 28, Township 10 North, Range 10 West (W.M.), Pacific County, Washington:

(1) the North one half of the Southwest one quarter; and

(2) that portion of the Northwest one quarter lying South of the North boundary of a new county road right of way, to be sixty feet in width and located as close as practicable to the ridge line extending Northwesterly from the existing county road, and South of the South side of Weyerhaeuser logging road No. 1620 extending Southeasterly from the existing county road.

(b) "Parcel 2," containing approximately 327 acres, and consisting of the following portions of Township 10 North, Range 10 West (W.M.):

(1) In Section 28, that portion of the East one half lying South of the South side of Weyerhaeuser's existing logging road No. 1620;

(2) In Section 27, that portion of the Southeast one quarter lying South and West of the Southwest side of Weyerhaeuser's existing logging road No. 1620;

be based on the survey. The survey will be completed as soon as practicable after Ilwaco's review of the title report and Weyerhaeuser's approval of the staking of those boundaries requiring a survey.

6. In the deed Weyerhaeuser will quitclaim a non-exclusive easement to use any roads it may now or hereafter own or control that provide access from the nearest public road to the property conveyed, authorizing Ilwaco to use such roads to manage the lands for watershed and commercial timber management purposes. However, Weyerhaeuser does not guarantee that any such roads will remain usable, and Ilwaco will be responsible for any additional maintenance attributable to its use.

7. In the deed Ilwaco will covenant that the proposed replacement county road segment will be dedicated and open for public use before Ilwaco authorizes the existing segment within the subject property to be taken out of service.

8. Weyerhaeuser will pay any real estate excise tax under Ch. 82.45 RCW. Ilwaco will pay any "rollback taxes" attributable to the conveyances, and will reimburse Weyerhaeuser for property taxes pro rated as of the date of this agreement. If it elects to close through escrow, Ilwaco will pay all escrow fees. If it elects to purchase title insurance, Ilwaco pay any title insurance premiums and sales taxes on the title policy.

9. During the time this agreement is in effect, Weyerhaeuser may continue harvesting timber being reserved, and otherwise continue managing the property for commercial timber production.

10. This agreement may be terminated by Ilwaco if it decides not to proceed with its proposed watershed project, or by Weyerhaeuser if the transaction has not closed by _____, 1987.

* * * End of Agreement * * *

TOWN OF ILWACO

By _____
Mayor

WEYERHAEUSER COMPANY

By _____
Manager, Acquisition, Sale & Exchange

jw2/1124/a8
11/11/86

STATE OF WASHINGTON
) ss.
COUNTY OF KING)

* Manager, Acquisition, Sale & Exchange

On this 23rd day of March, 1987, before me personally appeared J. Whittig, to me known to be a ~~Vice President~~ * of WEYERHAEUSER COMPANY, the corporation that executed the within and foregoing instrument, and acknowledged said instrument to be the free and voluntary act and deed of said corporation, for the uses and purposes therein mentioned, and on oath stated that he was authorized to execute said instrument on behalf of said corporation.

IN WITNESS WHEREOF, I have hereunto set my hand and affixed my official seal the day and year first above written.

Notary Public in and for the State of Washington, residing at Seattle.

My appointment expires March 20, 1988

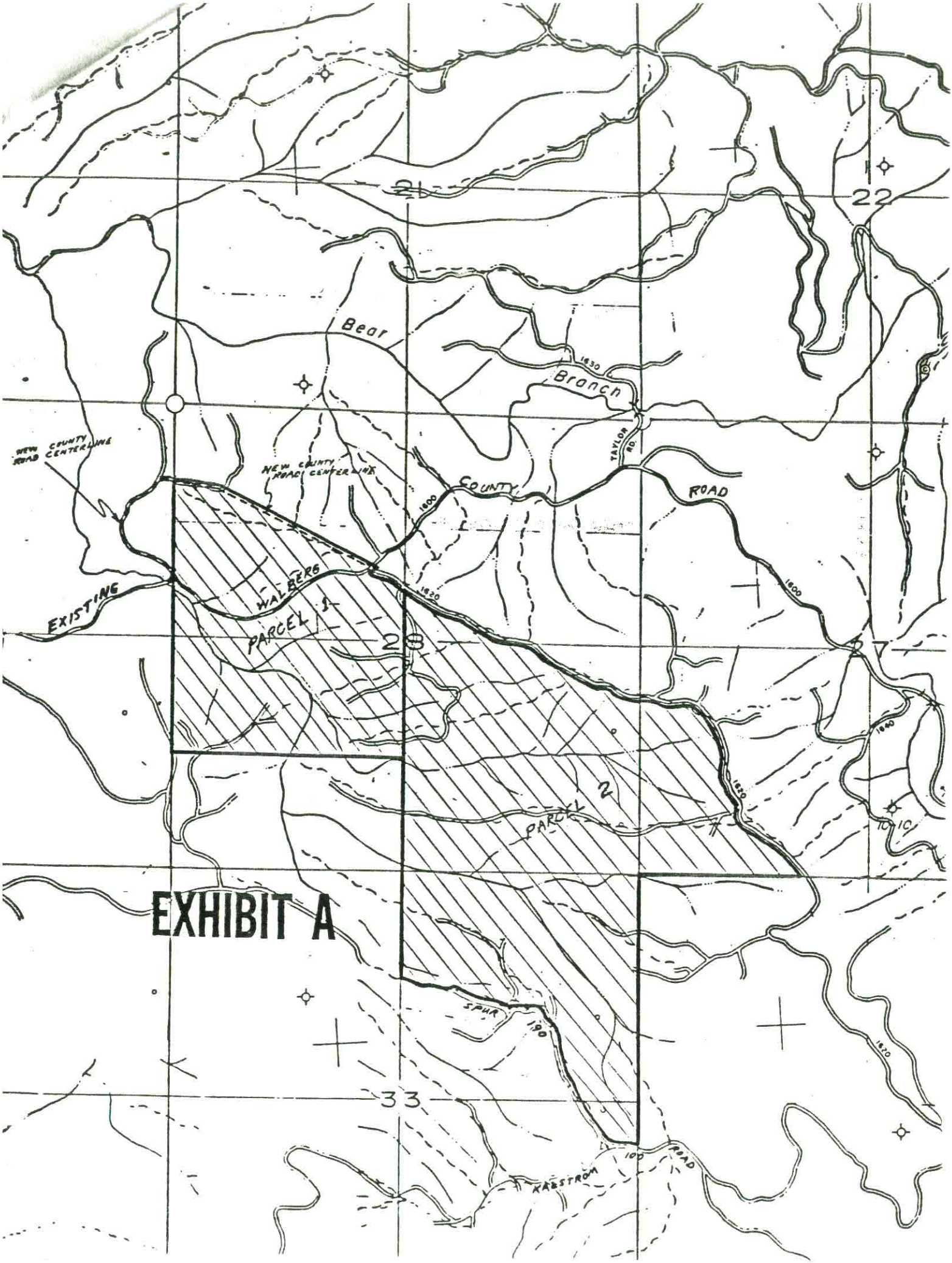

21
22
Bear
Branch
1830
NEW COUNTY ROAD CENTERLINE
NEW ROAD COUNTY CENTERLINE
TAYLOR RD.
COUNTY
ROAD
1800
EXISTING
WALBERG
PARCEL 1
1820
28
27
1840
PARCEL 2
1830
1810
EXHIBIT A
SPUR
180
33
1820
KARSTROM
100
ROAD

EXHIBIT B

Mineral Reservation

Grantor hereby expressly saves, excepts and reserves out of the grant hereby made, unto itself, its successors and assigns, forever, all geothermal steam and heat and all metals, ores and minerals of any nature whatsoever, not previously reserved, in or upon said land including but not limited to, coal, lignite, peat, oil and gas, including coal seam gas, together with the right to enter upon said lands for the purpose of exploring the same for such geothermal resources, metals, ores and minerals, and drilling, opening, developing and working mines and wells thereon and taking out and removing therefrom, including by surface mining methods, all such geothermal resources, metals, ores and minerals, and to occupy and make use of so much of the surface of said land as may be reasonably necessary for said purpose; provided, that Grantee and Grantee's heirs, representatives, successors and assigns, shall be paid just and reasonable compensation for any injury or damage to the surface of said land, to the crops or to the improvements thereon caused by the exercise of any rights herein reserved, provided, further, that the exercise of such rights by Grantor shall not be postponed or delayed pending reasonable efforts to agree upon or have determined such just and reasonable compensation.

EXHIBIT C

Reservation of Rights to Use Roads

The following reservation is to be included in the deed from Weyerhaeuser Company to the town of Ilwaco:

"The Grantor reserves, for itself and any successor owners of any tributary lands, the right to use and maintain all haul roads now existing on the lands hereby conveyed, and any replacement roads that may be constructed with consent of Grantee or its successors, for purposes of commercial timber management on lands now or hereafter owned or controlled by the Grantor or its successors that are tributary to such roads. For this purpose lands shall be considered "tributary" to a road segment if the road segment could be reasonably used in the ordinary course of business for access to the lands for commercial timber management purposes, and "commercial timber management" includes timber harvesting and hauling, site preparation for reforestation, protection of timber crops from fire, disease, pests and competing vegetation, and hauling of rock or other road building materials and equipment in preparation for or in connection with any such activities."

EXHIBIT D

Timber Reservations and Timber Management Covenants

The following reservations and covenants are to be included in the deed from Weyerhaeuser Company to the town of Ilwaco, with respect to "Parcel 2":

"1. Weyerhaeuser to itself, successors and assigns reserves the right to harvest the currently merchantable stand of timber designated on the attached map as Unit 644, containing approximately 120 acres, in the Northwest quarter of Section 28, until five years from recording of this conveyance. A portion of this timber is covered by the Indian Creek No. 1 timber cutting contract between Weyerhaeuser and M. Nygaard Logging Company, currently scheduled to expire March 31, 1987. Weyerhaeuser agrees to release the portion of Unit 644 covered by that contract promptly on its completion, if the timber has then been removed.

"2. Weyerhaeuser for itself, successors and assigns reserves the right to harvest the existing stands of timber designated on the attached map as Unit 626, containing approximately 59 acres, in the Southwest quarter of Section 27, and Units 579 and 761, containing approximately 102 acres and 14 acres respectively, in the East one half of Section 33, until 40 years from recording of this conveyance.

"3. Weyerhaeuser will give Ilwaco three years notice before exercising any of the rights hereby reserved, except Unit 644 currently scheduled for harvest in 1986 and 1987. If Weyerhaeuser gives notice of intent to harvest but is unable to obtain necessary regulatory permits to do so, it may elect either to extend the timber reservation until it is able to remove the reserved timber or to sell such timber to Ilwaco at its then current market value, disregarding any adverse effects on market value attributable to its location within a municipal watershed or unavailability of harvest permits.

"4. Weyerhaeuser will release its rights under these timber reservations and timber management covenants as to each unit or portion of a unit on completion of harvest.

"5. Weyerhaeuser will be responsible for any post-harvest slash disposal and reforestation to the extent necessary to meet normal regulatory requirements for comparable timberlands outside municipal watersheds. Weyerhaeuser will indemnify Ilwaco against any penalties and other costs imposed by regulatory

agencies for failure to meet normal regulatory requirements relating to slash disposal and reforestation, but Ilwaco will reimburse Weyerhaeuser for any additional slash disposal or reforestation costs attributable to the fact that the lands are used for domestic water supply purposes.

"6. Weyerhaeuser reserves the right to manage and protect the reserved timber by thinning, fire control, pest control, fertilization, and other generally accepted silvicultural practices, provided that Weyerhaeuser:

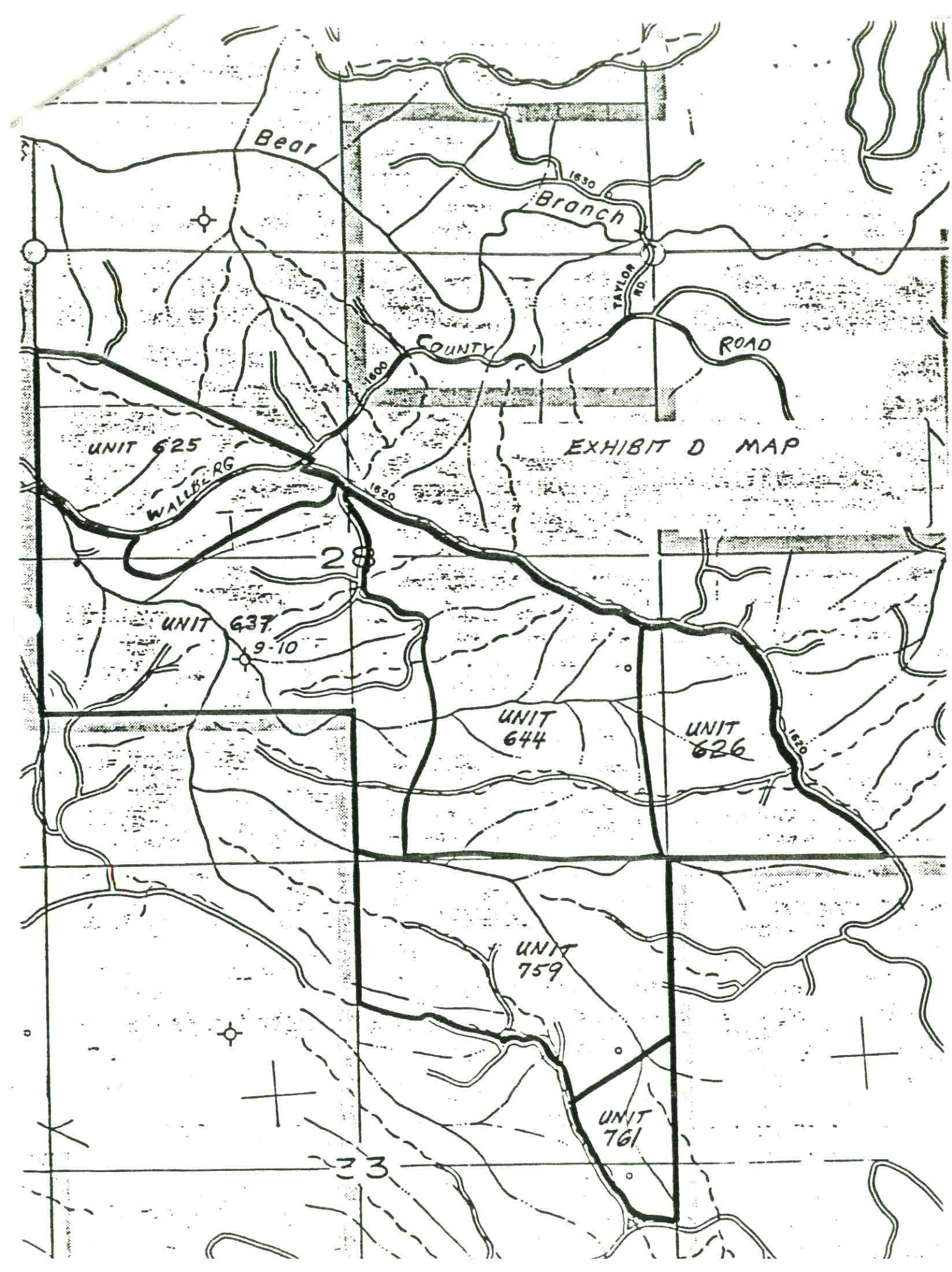
(a) will comply with all applicable state laws and regulations generally applicable to similar operations in municipal watersheds;

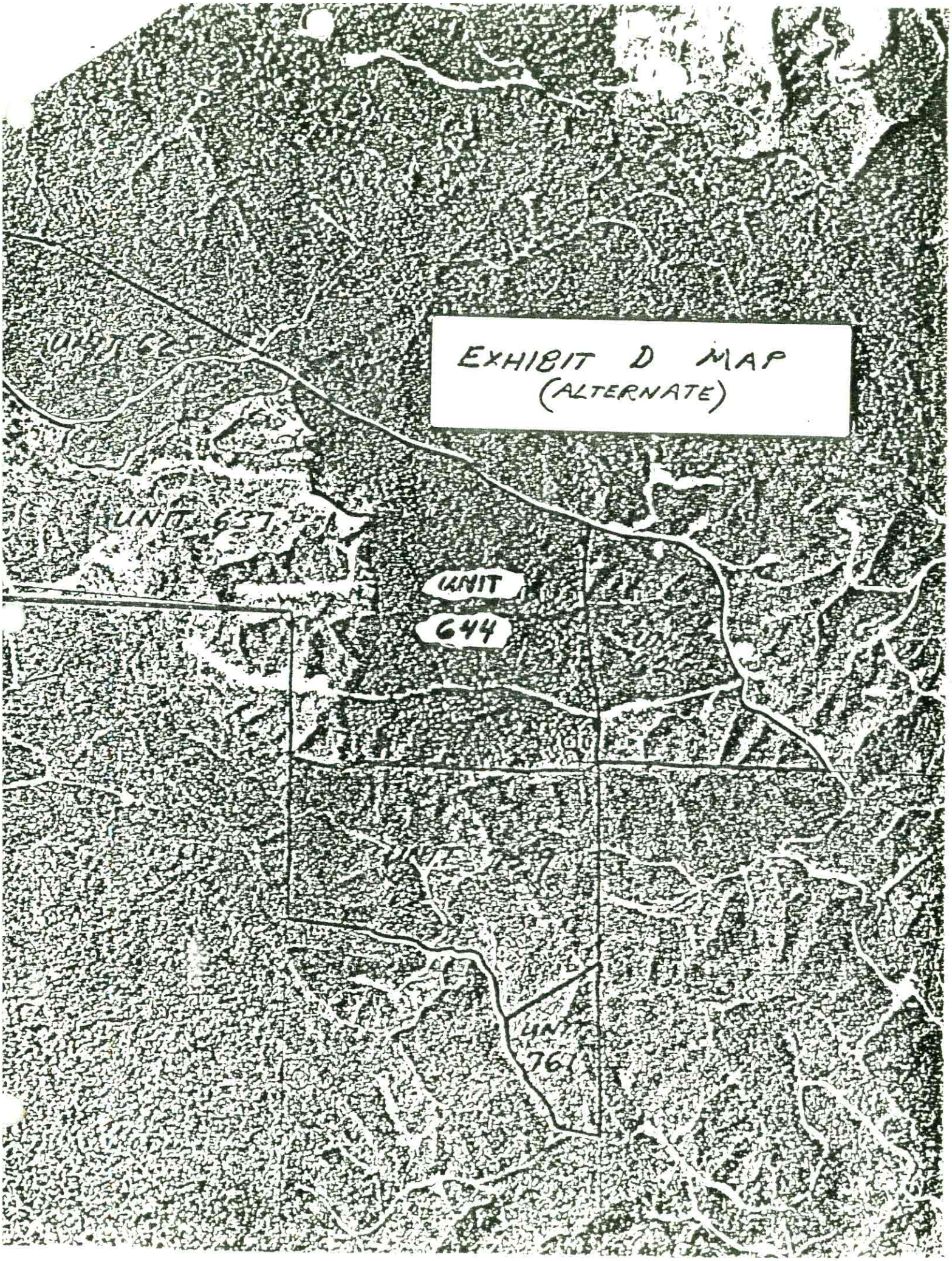
(b) will not apply pesticides within the watershed without approval of Ilwaco, which approval will not be unreasonably withheld;

(c) will give Ilwaco 90 days notice before commencing any forest practice, except in emergencies where Weyerhaeuser will give notice as soon as practicable;

(d) does not guarantee that the area will be adequately protected from fire, pests or other damage, and will have no responsibility to Ilwaco for any damage occurring to the timber from natural or other causes.

"7. The town of Ilwaco agrees not to unreasonably interfere with Weyerhaeuser's harvest of the reserved timber or with Weyerhaeuser's management of the reserved timber stands. Ilwaco will cooperate with Weyerhaeuser to manage the water supply system in a manner which minimizes the possibility of adverse effects being caused by Weyerhaeuser's timber harvest and silvicultural operations."


Bear
Branch
1630
TAYLOR RD.
COUNTY
ROAD
1600
EXHIBIT D MAP
UNIT 625
WALLBERG
1620
28
UNIT 637
9-10
UNIT 644
UNIT 626
1620
UNIT 759
UNIT 761
33


EXHIBIT D MAP
(ALTERNATE)
UNIT 637
UNIT
644
UNIT
761

APPENDIX C

WATER RIGHTS

STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY

PERMIT

TO APPROPRIATE PUBLIC WATERS OF THE STATE OF WASHINGTON

[X] Surface Water (issued in accordance with the provisions of Chapter 117, Laws of Washington for 1917, and amendments thereto, and the rules and regulations of the Department of Ecology.)

[ ] Ground Water (issued in accordance with the provisions of Chapter 263, Laws of Washington for 1945, and amendments thereto, and the rules and regulations of the Department of Ecology.)

PRIORITY DATE	APPLICATION NUMBER	PERMIT NUMBER	CERTIFICATE NUMBER
April 24, 1995	S2-29218	S2-29218	

NAME
City of Ilwaco

ADDRESS (STREET)	(CITY)	(STATE)	(ZIP CODE)
PO Box 548	Ilwaco	Washington	98624-0548

The applicant is, pursuant to the Report of Examination which has been accepted by the applicant, hereby granted a permit to appropriate the following described public waters of the State of Washington, subject to existing rights and to the limitations and provisions set out herein.

PUBLIC WATERS TO BE APPROPRIATED

SOURCE
Indian Creek - Reservoir

TRIBUTARY OF (IF SURFACE WATERS)
Bear River

MAXIMUM CUBIC FEET PER SECOND	MAXIMUM GALLONS PER MINUTE	MAXIMUM ACRE-FEET PER YEAR
.77		22

QUANTITY, TYPE OF USE, PERIOD OF USE		
22 Acre-feet per year	Municipal Supply	Year-round as needed

LOCATION OF DIVERSION/WITHDRAWAL

APPROXIMATE LOCATION OF DIVERSION/WITHDRAWAL
500 feet North and 350 feet East of the East quarter corner of Section 29.

LOCATED WITHIN (SMALLEST LEGAL SUBDIVISION)	SECTION	TOWNSHIP N.	RANGE E. OR W. W.M.	W.R.I.A.	COUNTY
SW¼ NW¼	28	10	10W	24	Pacific

RECORDED PLATTED PROPERTY

LOT	BLOCK	OF (GIVE NAME OF PLAT OR ADDITION)

LEGAL DESCRIPTION OF PROPERTY ON WHICH WATER IS TO BE USED

Area served by City of Ilwaco

DESCRIPTION OF PROPOSED WORKS

City of Ilwaco treatment plant.

DEVELOPMENT SCHEDULE

BEGIN PROJECT BY THIS DATE:	COMPLETE PROJECT BY THIS DATE:	WATER PUT TO FULL USE BY THIS DATE
January 1, 1996	January 1, 1997	January 1, 2015

PROVISIONS

The permittee is advised that notice of Proof of Appropriation of water (under which the final certificate of water right is issued) should not be filed until the permanent distribution system has been constructed and tha quantity of water allocated by the permit has been put to full beneficial use."

An approved metering device shall be installed and maintained in accordance with RCW 90.03.360, WAC 508-64-020 through -040 (installation, operation, and maintenance requirements are attached). Meter readings shal be recorded at least monthly.

Issuance of this water right is subject to the implementation of the minimum requirements established in the Conservation Planning Requirements, Guideline and Requirements for Public Water Systems Regarding Wate Use Reporting, Demand Forecasting Methodology, and Conservation Programs, July 1994, and as revised.

Under RCW 90.03.005 and 90.54.020(6), conservation and improved water use efficiency must be emphasized in the management of the states water resources, and must be considered as a potential new source of water. Accordingly, as part of the terms of this water right, the applicant shall prepare and implement a wate conservation plan approved by Department of Health. The standards for such a plan may be obtained from either the Department of Health or the Department of Ecology.

This permit shall be subject to cancellation should the permittee fail to comply with the above development schedule and/or fail to give notice to the Department of Ecology on forms provided by that Department documenting such compliance.

Given under my hand and the seal of this office at Olympia, Washington,

this 11th *day of* September, *19* 95.

Mary Riveland, Director

Department of Ecology

ENGINEERING DATA
OK JOH

by Gale Bloomstrom

STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY

CERTIFICATE OF WATER RIGHT

APPLICATION NO.	PERMIT NO.	CERTIFICATE NO.
April 21, 1961	S2-25880	S2-25880 P

NAME
Town of Ilwaco

MAILING ADDRESS
Post Office Box 548 | CITY: Ilwaco | STATE: Washington | ZIP CODE: 98624

This is to certify that the herein named applicant has made proof to the satisfaction of the Department of Ecology of a right to the use of the public waters of the State of Washington as herein defined, and under and specifically subject to the provisions contained in the Permit issued by the Department of Ecology, and that said right to the use of said waters has been perfected in accordance with the laws of the State of Washington, and is hereby confirmed by the Department of Ecology and entered of record as shown, but is limited to an amount actually beneficially used.

PUBLIC WATERS TO BE APPROPRIATED

SOURCE
Indian Creek

TRIBUTARY OF (IF SURFACE WATERS)
Bear River

MAXIMUM CUBIC FEET PER SECOND	MAXIMUM GALLONS PER MINUTE	MAXIMUM ACRE-FEET PER YEAR
1.56		710

QUANTITY, TYPE OF USE	PERIOD OF USE	
710 acre-feet per year	Municipal supply	Continuously

LOCATION OF DIVERSION/WITHDRAWAL

APPROXIMATE LOCATION OF DIVERSION/WITHDRAWAL
500 feet North and 350 feet East of the East Quarter Corner of Section 29.

LOCATED WITHIN SMALLEST LEGAL SUBDIVISION	SECTION	TOWNSHIP N.	RANGE, E. OR W.W.M.	W.R.I.A.	COUNTY
SW¼NW¼	28	10	10 W	24	Pacific

RECORDED PLATTED PROPERTY

LOT	BLOCK	OF (GIVE NAME OF PLAT OR ADDITION)

LEGAL DESCRIPTION OF PROPERTY ON WHICH WATER IS TO BE USED

Area served by the Town of Ilwaco.

PROVISIONS

The Town of Ilwaco will be required to apply for additional flow rights from Indian Creek at such time as the treatment plant capacity is increased above 1 million gallons per day.

The Town of Ilwaco's Certificate of Adjudicated Water Right, as recorded in Volume IX-C of Adjudicated Water Right Certificates, at page 7, for diversion of water from Black Lake will be maintained as an Emergency Backup Source Only, as requested by the Town of Ilwaco and the Department of Health. This mitigation measure has been approved by the Department of Wildlife.

The Water Resources Act of 1971 specifies certain criteria regarding utilization and management of the waters of the state in the best public interest. Use of water may be subject to regulation at certain times, based on the necessity to maintain water quantities sufficient for preservation of the natural environment.

The intake shall be screened at all times in accordance with the Department of Fisheries and the Department of Wildlife screening criteria.

An approved measuring device shall be installed and maintained in accordance with RCW 90.03.360, WAC 508.64.020 through 508-64-040.

On-going studies may reflect needed modifications to these provisions. Any modifications will be in written agreement between The City of Ilwaco, Department of Fisheries Department of Wildlife, and the Department of Ecology.

The right to the use of the water aforesaid hereby confirmed is restricted to the lands or place of use herein described, except as provided in RCW 90.03.380, 90.03.390, and 90.44.020.

This certificate of water right is specifically subject to relinquishment for nonuse of water as provided in RCW 90.14.180.

Given under my hand and the seal of this office at Olympia, Washington,

this 4th *day of* March, 1991.

Christine O. Gregoire, Director
Department of Ecology

ENGINEERING DATA
OK BB

by Julie Bowerman

FOR COUNTY USE ONLY

☒ SURFACE WATER ☐ GROUND WATER

$10.00 MINIMUM STATUTORY EXAMINATION FEE REQUIRED WITH APPLICATION

(GRAY BOXES FOR OFFICE USE ONLY)

APPLICATION NO. S 227606 | W.R.I.A. 24 | COUNTY Pacific | PRIORITY DATE 8/18/89 | TIME 1:14

APPLICANT'S NAME – PLEASE PRINT

Town of Ilwaco

Bus. Tel. 642 – 3
Home Tel.
Other Tel.

ADDRESS (STREET) P.O. Box 548 (CITY) Ilwaco (STATE) WA (ZIP) 98624

DATE & PLACE OF INCORPORATION IF APPLICANT IS A CORPORATION

1. SOURCE OF SUPPLY

IF SURFACE WATER

SOURCE (NAME OF STREAM, LAKE, SPRING, ETC.) (IF UNNAMED, SO STATE)
Bear River

TRIBUTARY
Bear ~~Branch~~ River per letter dated 10/6-89 SF

IF GROUND WATER

SOURCE (WELL, TUNNEL, INFILTRATION TRENCH, ETC.)

SIZE AND DEPTH

I have examined this application as required by SEPA and find that it is: ☐ not an "action". ☐ categorically exempt.

USE DATE SIGNATURE

2. USE TO WHICH WATER IS TO BE APPLIED (DOMESTIC SUPPLY, IRRIGATION, MINING, MANUFACTURING, ETC.)
Community municipal
Multi-family, commercial, and industrial

ENTER QUANTITY OF WATER REQUESTED USING UNITS OF: CUBIC FEET PER SECOND (CFS) 3 OR GALLONS PER MINUTE (GPM) ACRE FEET PER YEAR 2172

TIMES DURING YEAR WATER WILL BE REQUIRED
All year as needed

IF IRRIGATION, NUMBER OF ACRES

IF DOMESTIC USE, NUMBER OF UNITS BY TYPE, E.G. 1-HOME, 1-MOBILE HOME, 2-CAMPSITES, ETC.

IF MUNICIPAL USE, ESTIMATED POPULATION 20 YEARS FROM TODAY 108

DATE PROJECT WAS OR WILL BE STARTED
unknown at present stage

DATE PROJECT WAS OR WILL BE COMPLETED
unknown at present stage

3. LOCATION OF POINT OF DIVERSION/WITHDRAWAL

3A. IF IN PLATTED PROPERTY

LOT	BLOCK	OF (GIVE NAME OF PLAT OR ADDITION)	SECTION	TOWN	RANGE

ALSO, PLEASE ENCLOSE A COPY OF THE PL MARK THE POINT(S) OF WITHDRAWAL OR E

3B. IF NOT IN PLATTED PROPERTY

ON ACCOMPANYING SECTION MAPS, ACCURATELY MARK AND IDENTIFY EACH POINT OF DIVERSION. SHOW NORTH-SOUTH AND EAST-WEST DISTANCES FROM NEAREST SECTION CORNER OR PROPERTY CORNER.

ALSO, ENTER BELOW THE DISTANCES FROM THE NEAREST SECTION OR PROPERTY CORNER TO THE DIVERSION OR WITHDRAWAL

1000 feet SW of NE corner of section 28

LOCATED WITHIN (SMALLEST LEGAL SUBDIVISION) N 1/2 NE 1/4 ~~NE 1/4 of the NE 1/4~~

SECTION	TOWNSHIP N.	RANGE (E OR W)	W.M.	COUNTY
28	10	10W		Pacific

Approx 2000 feet SOUTH and 2000 feet WEST of the NORTHEAST section COR of Section

4. DO YOU OWN THE LAND ON WHICH THIS SOURCE IS LOCATED. IF NOT, INSERT NAME & ADDRESS OF OWNER
Crown Zellerbach Corp./Cavenham Forest Industries (503) 795-3221

5. LEGAL DESCRIPTION OF PROPERTY ON WHICH WATER IS TO BE USED

ATTACH A COPY OF THE LEGAL DESCRIPTION OF THE PROPERTY (ON WHICH THE WATER WILL BE USED) TAKEN FROM A REAL ESTATE CONTRACT, PROPERTY DEED OR TITLE INSURANCE POLICY. OR, COPY CAREFULLY IN THE SPACE BELOW

~~See attached map W.C.S. 84~~

Area Served by Town of Ilwaco.

SEPA - TOWN OF ILWACO
FOW, HQ Field. DSt

APPLIC.

of Ecology

■ SURFACE WATER ☐ GROUND WATER

$10.00 MINIMUM STATUTORY EXAMINATION FEE REQUIRED WITH APPLICATION

(GRAY BOXES FOR OFFICE USE ONLY)

APPLICATION NO.	W.R.I.A.	COUNTY	PRIORITY DATE	TIME
S227232	24	Pacific	2-1-88	11:06

APPLICANT'S NAME — PLEASE PRINT

City of Ilwaco

Paulene → Bus. Tel. 206-642-31

Home Tel.

Other Tel.

ADDRESS (STREET)	(CITY)	(STATE)	(ZIP CO
P.O. Box 548	Ilwaco	Washington	9862

DATE & PLACE OF INCORPORATION IF APPLICANT IS A CORPORATION

1. SOURCE OF SUPPLY

IF SURFACE WATER	IF GROUND WATER
SOURCE (NAME OF STREAM, LAKE, SPRING, ETC.) (IF UNNAMED, SO STATE)	SOURCE (WELL, TUNNEL, INFILTRATION TRENCH, ETC.)
Kallstrom Creek	
TRIBUTARY	SIZE AND DEPTH
Chinook River	

2. USE

USE TO WHICH WATER IS TO BE APPLIED (DOMESTIC SUPPLY, IRRIGATION, MINING, MANUFACTURING, ETC.)

Domestic Supply - Municipal

ENTER QUANTITY OF WATER REQUESTED USING UNITS OF:	CUBIC FEET PER SECOND (CFS)	OR	GALLONS PER MINUTE (GPM)	ACRE FEET PER YEAR
	4.0		1800	

Year Round As needed

TIMES DURING YEAR WATER WILL BE REQUIRED

All seasons

IF IRRIGATION, NUMBER OF ACRES	IF DOMESTIC USE, NUMBER OF UNITS BY TYPE, E.G. 1-HOME, 1-MOBILE HOME, 2-CAMPSITES, ETC.	IF MUNICIPAL USE, ESTIMATED POPULATION 20 YEARS FROM TODAY
		1,0

DATE PROJECT WAS OR WILL BE STARTED	DATE PROJECT WAS OR WILL BE COMPLETED
1990	2000

3. LOCATION OF POINT OF DIVERSION/WITHDRAWAL

3A. IF IN PLATTED PROPERTY

LOT	BLOCK	OF (GIVE NAME OF PLAT OR ADDITION)	SECTION	TOWN	RANGE

ALSO, PLEASE ENCLOSE A COPY OF THE PLA
MARK THE POINT(S) OF WITHDRAWAL OR DI

3B. IF NOT IN PLATTED PROPERTY

ON ACCOMPANYING SECTION MAPS, ACCURATELY MARK AND IDENTIFY EACH POINT OF DIVERSION. SHOW NORTH-SOUTH AND EAST-WEST DISTANCES FROM NEAREST SECTION CORNER OR PROPERTY CORNER.

ALSO, ENTER BELOW THE DISTANCES FROM THE NEAREST SECTION OR PROPERTY CORNER TO THE DIVERSION OR WITHDRAWAL.

1000 Ft. East of Center of Section 32 T 10N. R.10 W.W.M.

LOCATED WITHIN (SMALLEST LEGAL SUBDIVISION)	SECTION	TOWNSHIP N.	RANGE (E OR W.) W.M.	COUNTY
N ½ of SE ¼	32	10 N	10 W	Pacific

4. DO YOU OWN THE LAND ON WHICH THIS SOURCE IS LOCATED. IF NOT, INSERT NAME & ADDRESS OF OWNER

Weyerhaeuser Corporation

5. LEGAL DESCRIPTION OF PROPERTY ON WHICH WATER IS TO BE USED

ATTACH A COPY OF THE LEGAL DESCRIPTION OF THE PROPERTY (ON WHICH THE WATER WILL BE USED) TAKEN FROM A REAL ESTATE CONTRACT, PROPERTY DEED OR TITLE INSURANCE POLICY, OR COPY CAREFULLY IN THE SPACE BELOW

City of Ilwaco - Municipal water system - all within T 10 N; R. 11 W.W.M.

and T 9 N.; R 11 W.W.M.

HQ

F&W

DOHS

RECEIVED

88 FEB -1 AM 9:06

APPLIC

ECY 040-1-14
Rev. 1/85

SEPA: City of Ilwaco

Water Right Self-Assessment Form for Water System Plans

331-372 • 1/13/2017

All water right permits, claims, and certificates must be evaluated in a water right self-assessment for all sources used to supply the water system. The self-assessment compares the parameters and other limitations of existing water rights against current and forecasted water production, as described in your water system plan, to determine whether the rights are adequate to serve your system's current and future water needs.

You must account for all sources of supply and total quantities of water withdrawn from the source. If you purchase water from another purveyor through a non-emergency intertie, you must complete the INTERTIES section of the self-assessment.

A Note on Exempt Wells

If you're seeking DOH approval of a new Group A or Group B water system using an exempt well, you must complete the self-assessment, although certain fields will not apply. Talk to your DOH regional planner about using the Water Right Self-Assessment form for a Small Water System Management Program instead of this version.

Local governments must ensure that an adequate potable water supply is available from the exempt well before issuing a building permit. Before developing a permit exempt well, check with your local authorities on their criteria for establishing an adequate potable water supply for your planned public water system.

Water Right Parameters

Below is a brief description of the parameters associated with a typical water right. For the self-assessment, you only need to describe the last two bulleted items if they apply to your water rights.

Source Type – this refers to whether the source is surface water, groundwater or a spring.

Source Location – this refers to the location of points of groundwater withdrawal or surface water diversion for each right.

Purpose of Use – this refers to the type of use, such as municipal water supply, community domestic, industrial or agricultural purposes.

Place of Use – this describes where water can be put to beneficial use under the right. Under the 2003 Municipal Water Law, RCW 90.03.386, the place of use for a water right held for municipal water supply purposes may be the system's service area as identified in an approved water system plan or small water system management program. See Ecology Policy 2030 for information on how Ecology administers the Municipal Water Law.

Washington State Department of Health

If you need this publication in an alternative format, call 800.525.0127 (TDD/TTY call 711). This and other publications are available at www.doh.wa.gov/drinkingwater.

Period of Use – this refers to time-of-year limitations in which the water right may be put to use. If any water right has a time-of-year limitation, please include this information in the INTERRUPTIBLE WATER RIGHTS section.

Provisions or Limiting Conditions – this refers to any provisions or conditions placed on the water right. If a water right has a limiting condition or other provision, such as a collection and reporting requirement, other than a time-of year limitation, include this information in the ADDITIONAL COMMENTS section at the bottom of the self-assessment and in the water system plan narrative.

See Ecology Policy 1040 for more information on water right terminology. If you have questions about your water rights, please contact the Ecology regional office in your area.

Completing the Water Right Self-Assessment Form

The self-assessment is a Word document to allow users to make changes or to expand the document. You may use another format, if preferred, as long as all required information is included. Below is a description of all fields and how to complete them. This form is divided into four different sections. Each section is described in the headings below.

See the column identifiers (A, B, C, etc) at the bottom of each column for guidance in completing the necessary calculations.

Water Right Permit, Certificate, or Claim Number: This number is assigned by Ecology when a permit application is filed. It's listed at the top of the permit or certificate. For water right claims, this is the registration number stamped in the lower left hand corner of the claim form.

WFI Source #: Identify the individual sources (e.g. well #1, well #2) as defined on the DOH Water Facilities Inventory form. If a water right is associated with multiple sources, list all sources in the same row in this column. If a source is associated with multiple water rights, identify each water right on a separate row.

If you have any source(s) that is not currently being used (categorized as standby, back-up, or emergency), and the source has an associated water right that is not listed in column #1, please include the source and water right information in the ADDITIONAL COMMENTS section. This will identify that the source is still intended for a beneficial use under RCW 90.03.015(4). See Ecology Policy 1040.

EXISTING WATER RIGHTS SECTION *(olive green color, top section)*

This section refers to existing water rights. It does not include any water right applications that have been submitted to Ecology.

Primary Qi (Instantaneous Quantity): This is also known as instantaneous flow rate. It's the amount of water allowed to be taken under the right from the source during a period of peak operation. For surface water, this is generally expressed in terms of cubic feet per

second (cfs). For groundwater, this is generally expressed in terms of gallons per minute (gpm). One cfs equals 448.8 gpm. Please indicate the units of measurement you are using for each source. If there are situations where the flow rate will be limited (e.g. limitations established on the source when other sources are utilized), please note them in the ADDITIONAL COMMENTS section in the form and in the WSP narrative.

Non-Additive Qi: This term was formally known as "supplemental." Your water rights may use the old terminology. See Ecology Policy 1040 for more information. Not all water rights have non-additive quantities. If a water right has non-additive Qi quantities, include the non-additive quantity in this field. This is generally listed in the "quantity, type of use, period of use" section on both permits and certificates. *Non-additive quantities should not be included in the primary Qi totals.*

Primary Qa (Annual Quantity): This is the amount of water that can be taken from the source under the right on an annual basis. It's usually expressed in terms of acre-feet. An acre-foot is the amount of water necessary to submerge an acre of land to a depth of one foot. One acre-foot equals 43,560 cubic feet or 325,851 gallons of water.

Non-Additive Qa: This term was formerly known as "supplemental." Your water rights may use the old terminology. See Ecology Policy 1040 for more information. Not all water rights have non-additive quantities. If a water right has non-additive Qa quantities, include the non-additive quantity in this field. This is generally listed in the "quantity, type of use, period of use" section on both permits and certificates. *Non-additive quantities should not be included in the primary Qa totals.*

CURRENT SOURCE PRODUCTION SECTION *(light green color, top section)*

This section refers to how much water is withdrawn from the source under each water right for the most recent full calendar year. You will need to determine any excess or deficiency for each water right after calculating how much water was withdrawn compared to how much water is allowed under each water right. If demand has decreased over past years, you may wish to include historic maximum production information in the ADDITIONAL COMMENTS section. This will provide a more complete picture of the use of your water rights.

Use the water use data and demand projections from your water system plan to define current and projected water needs. You can determine if you'll need additional water rights based on the comparison of existing water rights, current water production, and projected 10- and 20-year needs.

Total Qi (Instantaneous Quantity): This refers to the total maximum instantaneous flow rate withdrawn from the source under each water right during the most recent calendar year. For surface water, this is expressed in terms of cubic feet per second (cfs). For groundwater, this is expressed in terms of gallons per minute (gpm). One cfs equals 448.8 gpm.

Current Excess or Deficiency (Qi): Please calculate the excess or deficiency for each water right after comparing the total amount withdrawn against each water right. Please use parentheses for deficient amounts.

Total Qa (Annual Quantity): This refers to the total volume of water withdrawn from each source under each water right during the most recent calendar year. It's usually expressed in acre-feet.

Current Excess or Deficiency (Qa): Please calculate the excess or deficiency for each water right after comparing the total amount withdrawn against each water right. Please use parentheses for deficient amounts.

10-YEAR FORECASTED SOURCE PRODUCTION SECTION *(light blue color, top section)*

This section refers to how much water you project to withdraw from each source in ten years as determined in your water system plan. Please complete this section in the same manner (using the same units of measurement) as the current source production section using your 10-year forecasted amounts.

20-YEAR FORECASTED SOURCE PRODUCTION SECTION *(darker blue color, top section)*

This section refers to how much water you project to withdraw from each source in twenty years as determined in your water system plan. Please complete this section in the same manner (using the same units of measurement) as the current source production section using your 20-year forecasted amounts. If you are unable to provide 20-year forecasts for each source, you may choose to include the combined 20-year total at the bottom.

PENDING WATER RIGHTS SECTION *(second section of form)*

Please complete this section for any water right applications that have been submitted to Ecology. Please include the application number, whether it's a new or a change application, the date submitted, and the total quantities requested.

INTERTIES SECTION *(third section of form)*

This section must be completed by purveyors who purchase any amount of wholesale water. If your system sells water to another public water system, include the quantity sold in the CURRENT SOURCE PRODUCTION section.

Purchasers of wholesale water must account for all water obtained through the intertie for non-emergency supply purposes. This is to ensure that all sources of supply are considered when evaluating whether new water rights are needed within 20 years.

Please identify the maximum quantity of water, expressed in the same manner as the above sections, allowed under each intertie contract. If there are limiting conditions or temporary

agreements that effect the long-term use of the intertie, you must account for such limiting conditions when evaluating the current and forecasted water supply needs in your water system plan.

Finally, purchasers of wholesale water are responsible for ensuring that the underlying water right (held by the purveyor selling water) are adequate for such use. You should confirm that the selling system has accounted for the wholesale area in their water system plan to ensure that the water right authorizes the distribution of water through the intertie.

INTERRUPTIBLE WATER RIGHTS SECTION *(bottom section of form)*

This section refers to water rights that have an annual time-of-year interruption. Please complete this section for any water right listed in the above fields that has a time-of-year interruption. Please include the water right number, describe the limitation, and the time period of interruption. Purveyors with interruptible rights should develop a water shortage response plan as part of their water system plan to describe how demand will be met during periods of interruption through aggressive demand-side conservation, fixing leaks or other means.

ADDITIONAL COMMENTS SECTION *(bottom section of form)*

If the system has any source that is not currently being used on a regular basis (such a source may be categorized as stand-by, back-up, emergency), you should identify the source in this section if the source has an associated water right that is not listed in the above sections. The purpose is to identify that such water rights are still intended for a future beneficial use as required under RCW 90.03.015(4). See Page 2, Item 9 (b) in ECY Policy 2030. For these water rights, please briefly describe the future intended use of the source and when you expect to utilize the water right. This does not refer to sources categorized as seasonal sources.

You should also include any other comments in this section that will explain aspects of your water right portfolio that are not identified above.

Water Right Self-Assessment Form for Water System Plan

Mouse-over any link for more information. Click on any link for more detailed instructions.

Water Right Permit, Certificate, or Claim # *If water right is interruptible, identify limitation in yellow section below	WFI Source # If a source has multiple water rights, list each water right on separate line	Existing Water Rights Qi= Instantaneous Flow Rate Allowed (GPM or CFS) Qa= Annual Volume Allowed (Acre-Feet/Year) This includes wholesale water sold				Current Source Production – Most Recent Calendar Year Qi = Max Instantaneous Flow Rate Withdrawn (GPM or CFS) Qa = Annual Volume Withdrawn (Acre-Feet/Year) This includes wholesale water sold				10-Year Forecasted Source Production (determined from WSP) This includes wholesale water sold				20-Year Forecasted Source Production (determined from WSP) This includes wholesale water sold			
		Primary Qi Maximum Rate Allowed	Non-Additive Qi Maximum Rate Allowed	Primary Qa Maximum Volume Allowed	Non-Additive Qa Maximum Volume Allowed	Total Qi Maximum Instantaneous Flow Rate Withdrawn	Current Excess or (Deficiency) Qi	Total Qa Maximum Annual Volume Withdrawn	Current Excess or (Deficiency) Qa	Total Qi Maximum Instantaneous Flow Rate in 10 Years	10-Year Forecasted Excess or (Deficiency) Qi	Total Qa Maximum Annual Volume in 10 Years	10-Year Forecasted Excess or (Deficiency) Qa	Total Qi Maximum Instantaneous Flow Rate in 20 Years	20-Year Forecasted Excess or (Deficiency) Qi	Total Qa Maximum Annual Volume in 20 Years	20-Year Forecasted Excess or (Deficiency) Qa
S2-29218	Indian Creek	0.77		22		0	0.77	0	22	0	0.77	0	22	0	0.77	0	22
S2-25880	Indian Creek	1.56		710		0.89	0.67	270	440	0.96	0.60	291	419	1.04	0.52	314	396
3																	
4																	
5																	
6																	
	TOTALS =	2.33		732		0.89	1.44	270	462	0.96	1.37	291	441	1.04	1.29	314	418
Column Identifiers for Calculations:		A		B		C	=A-C	D	=B-D	E	= A-E	F	=B-F	G	=A-G	H	=B-H

PENDING WATER RIGHT APPLICATIONS: Identify any water right applications that have been submitted to Ecology.

Application Number	New or Change Application?	Date Submitted	Quantities Requested			
			Primary Qi	Non-Additive Qi	Primary Qa	Non-Additive Qa
				-	-	-

INTERTIES: Systems receiving wholesale water complete this section. Wholesaling systems must include water sold through intertie in the current and forecasted source production columns above.

Name of Wholesaling System Providing Water	Quantities Allowed In Contract		Expiration Date of Contract	Currently Purchased Current quantity purchased through intertie				10-Year Forecasted Purchase Forecasted quantity purchased through intertie				20-Year Forecasted Purchase Forecasted quantity purchased through intertie			
	Maximum Qi Instantaneous Flow Rate	Maximum Qa Annual Volume		Maximum Qi Instantaneous Flow Rate	Current Excess or (Deficiency) Qi	Maximum Qa Annual Volume	Current Excess or (Deficiency) Qa	Maximum Qi 10-Year Forecast	Future Excess or (Deficiency) Qi	Maximum Qa 10-Year Forecast	Future Excess or (Deficiency) Qa	Maximum Qi 20-Year Forecast	Future Excess or (Deficiency) Qi	Maximum Qa 20-Year Forecast	Future Excess or (Deficiency) Qa
1 N/A															
2															
3															
TOTALS =															
Column Identifiers for Calculations:	A	B		C	=A-C	D	=B-D	E	=A-E	F	=B-F	G	=A-G	H	=B-H

INTERRUPTIBLE WATER RIGHTS: Identify limitations on any water rights listed above that are interruptible.

Water Right #	Conditions of Interruption	Time Period of Interruption
1 N/A		
2		
3		

ADDITIONAL COMMENTS:

APPENDIX D

DESIGN STANDARDS

CITY OF ILWACO
WATER SYSTEM STANDARDS

GENERAL

A. The standards established by this chapter are intended to represent the minimum standards for the design and construction of water system facilities. Greater or lesser requirements may be mandated by the City due to localized conditions. Extensions, connections or modifications to the existing system shall be in compliance with the requirements of the State Department of Health and the Department of Ecology as applicable.

B. Off-site improvements to the existing system may be warranted based on (1) the condition and capacity of the existing water system and (2) impacts caused by the proposed development. These off-site improvements (in addition to "on-site improvements) shall be completed as determined by the Public Works Superintendent to mitigate impacts caused by the development.

C. All water mains shall have a capacity at least 150% of the expected maximum size required for the development.

D. All water systems shall have telemetry satisfactory to the Public Works Superintendent on all associated lines, tanks, reservoirs, pumps, valves, and associated vaults and buildings for sampling and monitoring those items such as chlorination, turbidity, pressure, levels, flow, and status, which may be required by the Public Works Superintendent.

E. All water booster pump stations shall be equipped with on-site auxiliary power capability sufficient to ensure the station is operable during a power outage.

DESIGN STANDARDS

A. The design of water system improvements shall depend on their type and local site conditions. The design elements of water system improvements shall conform to the standards as set forth in this Chapter.

B. Detailed plans which provide the locations, size, and type of the proposed water system and points of connection shall be submitted for the City's review. These plans shall be separate from sewer plans.

C. Project plans shall have a horizontal scale of not more than 50 feet to the inch. Plans shall show:

1. Locations of streets, right-of-ways, existing utilities, and water system facilities;

2. Ground surface, pipe type and size, water valves, and hydrants stationing;

3. All known existing structures, both above and below ground, which might interfere with the proposed construction, particularly sewer lines, gas mains, storm drains, telephone lines, television cables, and overhead and underground power lines; and

4. All utility easements, and applicable County recording number(s).

5. Computations and other data used for design of the water system shall be submitted to the City for approval.

D. The water system facilities shall be constructed in conformance with the current version of the Standard Specifications for Road, Bridge, & Municipal Construction and current amendments thereto, State of Washington, revised as to form to make reference to Local Governments and as modified by the City's requirements and standards.

E. Material and installation specifications shall contain appropriate requirements that have been established by the industry in its technical publications, such as ASTM, AWWA, WPCF, and APWA standards. Requirements shall be set forth in the specifications for the pipe and methods of bedding and backfilling so as not to damage the pipe or its joints.

F. Except as otherwise noted herein, all work shall be accomplished as recommended in applicable American Water Works Association (AWWA) Standards, and according to the recommendations of the manufacturer of the material or equipment concerned.

G. The location of the water mains, valves, hydrants, and principal fittings including modifications shall be staked by the Developer. No deviation shall be made from the required line or grade. The Contractor shall verify and protect all underground and surface utilities encountered during the progress of this work.

H. Prior to final inspection, all pipelines shall be tested and disinfected.

I. Before acceptance of the water system by the City, all pipes, assemblies, and other appurtenances shall be cleaned of all debris and foreign material. After all other work is completed and before final acceptance, the entire roadway, including the roadbed, planting, sidewalk areas, shoulders, driveways, alley and side street approaches, slopes, ditches, utility trenches, and construction areas shall be neatly finished to the lines, grades and cross sections for a new roadway consistent with the original section.

J. The Developer shall be required, upon completion of the work and prior to acceptance by the City, to furnish the City with a written guarantee covering all material and workmanship for a period of three years after the date of final acceptance and he shall make all necessary repairs during that period at his own expense, if such repairs are necessitated as the result of furnishing poor materials and/or workmanship. The Developer shall obtain warranties from the contractors, subcontractors and suppliers of material or equipment where such warranties are required and shall deliver copies to the City upon completion of the work.

GENERAL REQUIREMENTS

A. Prior to construction, the Contractor shall schedule a pre-construction meeting with the Public Works Superintendent, stakeholders, and all other interested parties.

B. Work shall be performed only by contractors experienced in laying public water mains.

C. Prior to any work being performed, the Contractor shall contact the Public Works Superintendent to set forth his proposed work schedule.

D. D. Contractor shall obtain approval of materials to be used from the Public Works Superintendent prior to ordering of materials.

E. Water mains shall be laid only in dedicated street, rights-of-ways or easements shown on preliminary plats or which have been granted to the City. A street is normally not considered dedicated until the plat which created it has been officially filed with the County Auditor.

F. All water main distribution pipeline construction shall have a minimum 36" cover from finished grade and 42-inch cover over transmission mains (Standard Detail W-D1). Mains shall generally be located parallel to and 10 feet northerly or easterly of street centerline. Water mains shall be extended to the far property line(s) of the property being served. Off-site extensions may be required to hydraulically loop existing and new

systems. Oversizing of water mains may be required to be installed per City's current Water System Plan.

G. Minimum distance between sewer and water lines shall be 10 feet horizontally and 1 foot vertically. Refer to Standard Detail W-D17 for requirements regarding utility separation and crossing.

H. Water main pie and service connections shall be a minimum of 10 feet away from building foundations and/or roof lines.

I. Air relief valves are required at high points in water lines. Air relief valves shall be installed in accordance with Standard Detail W-D4 or Standard Detail W-D5.

J. Fire hydrants are generally required approximately every 600 feet in residential areas, and every 300 feet in commercial areas. However, fire hydrants shall be furnished and installed at all locations as specifically mandated by the local fire marshall and/or per City Building Code. Refer to Standard Detail W-D2 and Standard Detail W-D3 for information regarding fire hydrant installation.

K. Fire hydrants on dead end streets and roads shall be located within approximately 300 feet from the frontage center of the farthest lot. Distances required herein shall be measured linearly along street or road.

L. Pipes connecting hydrants to mains shall be at least 6 inch in diameter and be less then 17 feet in length.

M. Dead end lines are not permitted except where the Developer can demonstrate to the City's satisfaction that it would be impractical to extend the line at a future date. Water mains on platted cul-de-sacs shall extend to the plat line beyond the cul-de-sac to neighboring property for a convenient future connection, and extended off-site to create a hydraulic loop, or, as minimum, have a four (4") inch blow off assembly installed at the termination point (Standard Detail W-D7).

N. All materials shall be new and undamaged.

O. Unless otherwise approved or required by the Public Works Superintendent, the water main shall be HDPE or C-900 PVC. Ductile iron pipe may be appropriate in special circumstances and must receive specific approval from the Public Works Superintendent. The minimum nominal size for water mains shall be 8 inches, unless otherwise approved/required by City.

EXCEPTION: 6-inch hydrant spools and pipelines located beneath rock or retaining walls shall be Class 53 ductile iron.

P. Fittings shall be compatible with HDPE, C-900 PVC, and ductile iron as appropriate. Ductile iron fittings shall be cement-lined.

Q. Provide bends in field to suit construction and in accordance with pipe manufacturer's recommendations so as not to exceed allowable deflection at pipe joints.

R. Provide thrust blocking and/or restrained joints at all fittings and bends in accordance with the City standards and conditions (Standard Detail W-D10 and Standard Detail W-D12). Blocking is to be designed by Developer's Engineer.

S. Provide anchor blocking at all up-thrust vertical bends in accordance with City standards (Standard Detail W-D11). Blocking is to be designed by Developer's Engineer.

T. Water valves shall be located in clusters when possible and shall be located so that each leg of the main line system can be isolated separately.

U. All water valve marker posts shall be painted yellow and marked with the distance to valve being referenced (Standard Detail W-D4, Standard Detail W-D5).

V. Residential water service pipe shall be one-inch diameter copper or PE pipe (no joints beneath pavement areas), meeting or exceed ASTM D2239, SDR-7 as manufactured by Driscopipe (CL 200), or City approved equal (Standard Detail W-D8).

W. Minimum size service lines between the water main and the water meter shall be 1 inch unless otherwise specified (W-D8). All service lines shall be the minimum size otherwise specified by the Uniform Plumbing Code in accordance with fixture units, unless otherwise specified.

X. Meter services and meter boxes shall be set to final grade and all adjustments shall be made prior to final pressure testing of the system, centerline of service inlets shall be located to match bottom elevation of meter box in such a manner that meter inlet and outlet will be the same elevation as bottom of meter box. Refer to Standard Detail W-D8 for required materials and installation information for water services 2” and smaller. Refer to Standard Detail W-D9 for required materials and installation information for water services 3” and larger.

Y. All water services shall end within road right-of-way or easements.

Z. All meters shall be installed by the City, and the Developer shall pay the current meter installation charge.

AA. All meters shall be compatible with the radio-read meter system used by the City.

BB. Contractor shall install water sampling stations per Figure W-D21. Contractor shall furnish the location of water sample stations to City Utilities Department. One station is required for development in size of 1 to 10 lots. One additional station is required for each additional 50 lots or portions thereof.

CC. All new buildings and residences shall include in their water service a suitable pressure reducing valve to protect the plumbing from excessive pressures, unless waived on the application form of the City. Refer to Standard Detail W-D24 for installation requirements for pressure reducing stations.

DD. All new construction shall comply with the "Accepted Procedure and Practice in Cross Connection Control Manual" as published by the Pacific Northwest Section of the American Water Works Committee", November 1995, Sixth Edition, and current amendments thereto. A copy of such is available for review at the City office. Where required, backflow and cross-control devises will be installed.

EE. Cut in connections shall <u>not</u> be made on Fridays, holidays or weekends. All tapping sleeves and tapping valves shall be pressure tested prior to making connection to existing mains.

FF. Contractor shall notify the Public Works Superintendent and obtain approval from him prior to any water shut-off or turn-on, affecting the water system, a minimum of 48 hours in advance.

GG. Biological test samples will be taken by the City and paid for by the contractor.

HH. All water mains and appurtenances shall be hydrostatically tested at 200 psi in accordance with City Standards.

II. Resilient seated wedge gate valves shall be used for 10-inch mains and smaller. Butterfly valves shall be used for mains greater than 10 inches.

JJ. Road restoration shall be in accordance with City, County and State design and construction standards, as may be applicable. Developer and Contractor shall become familiar with all City, County and State conditions of required permits, and shall adhere to all conditions and requirements.

MATERIALS

A. Water Mains & Fittings

1. Water mains to be installed shall be HDPE or if approved by the Public Works Superintendent, C-900 PVC. Under special circumstances the Public Works Superintendent may approve the limited use of ductile iron of an appropriate class.

B. HDPE Pipe and Fittings

1. HDPE pipe for water mains shall be manufactured from PE 3408.3608 resin conforming to ASTM D3350. 4" and greater pipe shall be IPS/DIPS, DR9 conforming to ASTM F714, AWWA C906, NSF. ½" through 3" pipe shall be IPS, DR9, conforming to D3035, AWWA C901, NFS.

2. All HDPE molded fittings and fabricated fittings shall be fully pressure rated to match the pipe DR pressure rating to which they are made. All fittings shall be molded or fabricated by the manufacturer. No Contractor fabricated fittings shall be used unless approved by the City.

3. The manufacture of the HDPE pipe shall supply all HDPE fittings and accessories as well as any adapters and/or specials required to perform the work.

4. All fittings shall be installed using butt-fused fittings, thermo-fused fittings/couplings, or flanged adapters and must be approved by the City.

5. All transition from HDPE pipe to ductile iron or PVC shall be made per the approval of the City and per the HDPE pipe manufacturer's recommendations and specifications. A molded flange connector adapter within a carbon steel back-up ring assembly shall be used for pie type transitions. Ductile iron back-up rings shall mate with cast iron flanges per ANSI B16.1. A 316

stainless steel back-up ring shall mate with a 316 stainless steel flange per ANSI B16.1.

C. PVC Pipe and Fittings

1. PVC pipe for water mains shall C-900 be made from material conforming to ASTM C1784. The pipe shall be DR 18 and conform to ANSI/AWWA C900 specification, with gaskets meeting ASTM F477 and joints in compliance with ASTM D3139. Pipe joints shall be gasketed. Solvent-cement joints are not acceptable.

2. PVC Schedule 80 fittings shall conform to ASTM D 2467. PVC Schedule 80 threaded fittings shall conform to ASTM D 2464.Pipe and fittings shall be manufactured as a system and be the product of one manufacturer. Pipe and fittings shall conform to National Sanitation Foundation (NSF) Standard 61 or the health effects portion of NSF Standard 14.

D. Ductile Iron Pipe and Fittings:

1. If approved, ductile iron pipe shall conform to ANSI/AWWA C151/A21.51-91 Standards, and current amendments thereto, except the ductile iron pipe shall be thickness Class 52 for 4" through 14" diameter pipe (except for 6-inch hydrant spools which shall be Cl. 53) and Class 50 for 16" and larger. Grade of iron shall be a minimum of 60-42-10. The pipe shall be cement lined to a minimum thickness of 1/16", and the exterior shall be coated with an asphaltic coating. Each length shall be plainly marked with the manufacturer's identification, year case, thickness, class of pipe and weight.

2. If approved, ductile iron joints shall be mechanical joint or push-on type, employing a single gasket, such as "Tyton", except where otherwise calling for flanged ends. Bolts furnished for mechanical joint pipe and fittings shall be high strength ductile iron, with a minimum tensile strength of 50,000 psi.

3. If approved, restrained ductile iron joint pipe, where shown on the plans shall be push-on joint pipe with "Fast Tight" gaskets as furnished by U.S. Pipe or equal for 12" diameter and smaller pipe and "TR FLEX" as furnished by U.S. Pipe or equal for 16" and 24" diameter pipes. The restrained joint pipe shall meet all other requirements of the non-restrained pipe.

4. All ductile iron fittings shall be short-bodied and comply with applicable ANSI/AWWA C110 or C153 Standards for 350 psi pressure rating for mechanical joint fittings and 250 psi pressure rating for flanged fittings. All fittings shall be lined and either mechanical joint or flanged, as indicated on the plans.

E. All pipe shall be jointed by the manufacturer's standard coupling, be all of one manufacturer, and be carefully installed in complete compliance with the manufacturer's recommendations.

F. Joints shall be "made up" in accordance with the manufacturer's recommendations. Standard joint materials, including rubber ring gaskets, shall be furnished with the pipe. Material shall be suitable for the specified pipe size and pressures.

G. Fittings in areas shown on the plans for restrained joints shall be mechanical joint fittings with a mechanical joint restraint device. The mechanical joint restraint device shall have a working pressure of at least 250 psi with a minimum safety factor of 2:1 and shall be City approved.

H. The pipe and fittings shall be inspected for defects and prepped prior to installation. HDPE and PVC piping shall be wiped clean. If ductile iron has been approved, all lumps, blisters and excess coal tar coating shall be removed from the bell and spigot end of each pipe, and the outside of the spigot and the inside of the bell shall be wire-brushed and wiped clean and dry, and free from oil and grease before the pipe is laid.

I. Every precaution shall be taken to prevent foreign material from entering the pipe while it is being placed in the line. After placing a length of pipe in the trench, the spigot end shall be centered in the bell and pipe forced home and brought to correct line and grade. The pipe shall be secured in place with select backfill tamped under it. Precaution shall be taken to prevent dirt from entering the joint space. At times when pipe laying is not in progress, the open ends of pipe shall be closed by a water-tight plug. If water is in the trench when work resumes, the seal shall remain in place until the trench is pumped completely dry. No pipe shall be laid in water or when trench conditions are unsuitable.

J. The cutting of pipe for inserting fittings or closure pieces shall be done in a neat and workmanlike manner, without damage to the pipe or lining, and so as to leave a smooth end at right angles to the axis of the pipe. Pipe shall be laid with bell ends facing in the direction of the laying, unless directed otherwise by the City. Wherever it is necessary to deflect pipe from a straight line, the amount of deflection allowed shall not exceed pipe manufacturer's recommendations.

K. For connection of mechanical joints, the socket, plain end of each pipe and gasket shall be cleaned of dirt before jointing, and shall be jointed according to manufacturer's directions. Bolts shall be tightened alternately at top, bottom and sides, so pressure on gasket is even.

L. For connection of "Tyton" joints, the jointing shall be done according to manufacturer's recommendations, with special care used in cleaning gasket seat to prevent any dirt or sand from getting between the gasket and pipe. Lubricant to be used on the gasket shall be non-toxic and free from contamination. When a pipe length is cut, the outer edge of the cut shall be beveled with a file to prevent injury to the gasket during jointing.

M. Valves, fittings, plugs and caps shall be set and jointed to pipe in the manner as required. All dead ends on new mains shall be closed with dead end M.J. caps and thrust blocks.

N. Fittings shall be "blocked" with poured-in-place concrete, with a firm minimum bearing against an undisturbed earth wall per Standard Detail W-D10 or Standard Detail W-D12. Thrust blocks shall be poured as soon as possible after setting the fittings in place to allow the concrete to "set" before applying the pressure test. The concrete thrust blocks shall be in place before beginning the pressure test. Anchor blocks shall be allowed to set sufficiently to develop the necessary bond strength between the reinforcing rods and the concrete anchor before beginning the pressure test.

O. All of the new piping, valves and blocking shall have been installed, disinfected and tested up to the point of cutting into existing lines before the crossover is made. The crossover to the existing system shall be in full readiness, including the cut and sized specials. Forty-eight (48) hour notice shall be given the City in advance of the planned "cut-ins".

P. Valves

1. All valves larger than 10” shall generally be furnished and installed as butterfly valves. All valves 10" and smaller shall generally be furnished and installed as resilient seat gate valves.

Q. Resilient-Seated Gate Valves.

1. All gate valves shall conform to ANSI/AWWA C509-87 Standards for resilient-seated, high strength, bronze stemmed gate valves. The valves shall be iron-bodied, iron disk completely encapsulated with polyurethane rubber and bronze, non-rising stem with "O" ring seals. The polyurethane sealing rubber shall be fusion bonded to the wedge to meet ASTM tests for rubber to metal bond ASTM D429. The valves shall open counter-clockwise and be furnished with 2-inch square operating nuts except valves in vaults shall be furnished with handwheels. All surfaces, interior and exterior shall be fusion bonded epoxy coated, acceptable for potable water.

2. For applications with working pressure above 175 psi, a ductile iron valve rated as 250 psi or higher shall be used.

3. The valves shall be set with stems vertical. The axis of the valve box shall be common with the axis projected off the valve stem. The tops of the adjustable valve boxes shall be set to the existing or established grade, whichever is applicable.

4. Valves shall be Dresser, M&H, Waterous, or Mueller.

R. Butterfly Valves.

1. Butterfly valves shall be ductile iron body of the tight closing rubber seat type with rubber seat either bonded to the body or mechanically retained in the body with no fasteners or retaining hardware in the flowstream. The valves shall meet the full requirements of AWWA C504, Class 150B except the valves shall be able to withstand 200 psi differential pressure without leakage. The valves may have rubber seats mechanically affixed to the valve vane. Where threaded fasteners are used, the fasteners shall be retained with a locking wire or equivalent provision to prevent loosening. Rubber seats attached to the valve vane shall be equipped with stainless steel seat ring integral with the body, and the body internal surfaces shall be epoxy coated to prevent tuberculations buildup, which might damage the disc-mounted rubber seat.

2. No metal-to-metal sealing surfaces shall be permitted. The valves shall be bubble-tight at rated pressures with flow in either direction, and shall be satisfactory for applications involving valve operations after long periods of inactivity. Valve discs shall rotate ninety (90) degrees from the full open position to the tight shut position. The valve shall be Henry Pratt Company *"Groundhog",* or owner approved equal.

S. Tapping Sleeves & Tapping Valves

1. Connections to existing water mains typically shall be wet taps through a tapping tee and tapping valve and shall be made by a city approved contractor. The tapping sleeves shall be rated for a working pressure of 250 psi minimum and furnished complete with joint accessories. Refer to Standard Detail W-D6 for detailed information regarding tapping sleeves.

2. Size-on-size tapping sleeves shall be stainless steel. Stainless steel sleeves only shall be used on AC pipe. Ductile iron tapping tees shall be allowed if tap is at least 2" smaller in diameter than the existing water main.

3. Cut in connections shall not be made on Fridays, holidays or weekends.

4. All tapping sleeves and tapping valves shall be pressure tested to a minimum of 200 psi prior to making connection to existing mains.

T. Pressure Reducing and Relief Valves.

1. Pressure reducing valves in the water service pipe are required when street main pressure exceeds 80 psi, as follows:

2. When street main pressure exceeds 80 psi, an approved pressure reducing valve with an approved pressure relief device shall be installed in the water service pipe near its entrance to the building to reduce the pressure to 80 psi or lower, except where the water service pipe supplies water directly to a water-pressure boost system, an elevated water gravity tank, or to pumps provided in connection with a hydro pneumatic or elevated gravity water-supply tank system. Pressure at any fixture shall be limited to no more than 80 psi under no-flow conditions. Refer to Standard Detail WD-24 – Pressure Reducing Stations.

U. All Valves

1. All valves with operating nuts located more than 42" below finished grade shall be equipped with extension stems to bring the operating nut to within 18" of the finished grade. Cast iron or PVC adjustable valve boxes shall be provided for all valves.

2. At the top of the extension stem, there shall be a two-inch (2") standard operating nut, complete with a centering flange that closely fits the five-inch (5") pipe encasement of the extension stem. The valve box shall be set in a telescoping fashion around the five-inch (5") pipe cut to the correct length to allow future adjustment up or down.

V. Fire Hydrants

1. All fire hydrants shall be Mueller Super Centurion – 250, Model A-421 in conformance with AWWA Standard Specification C-502. Each hydrant shall be equipped with one (1) 4-1/2” and two (2) 2-1/2" hose ports with permanent Storz hydrant adaptor and Storz blind cap. Refer to Standard Detail W-D2 for fire hydrant details.

2. The hydrant shall be prime coated with Steelcote SR53 Heavy Duty brush type enamel. Top coat shall be two coats of

Sherwin/Williams blue industrial enamel (#B54W101) or Krylon Industrial Rust Tough blue enamel.

3. A blue reflective pavement marker shall be furnished and installed 6 to 12 inches off center on the hydrant side of the road adjacent to the hydrant.

4. The holding spools between the gate valve and fire hydrant shall be made from six-inch (6") Class 52 ductile iron pipe, 3 foot minimum length and 17 foot maximum length without restrained joints.

W. Blow-offs & Air Relief Assemblies

1. Two (2") or Four (4") inch blowoff assemblies shall be installed at the terminus of all dead end water mains (Standard Detail W-D7). Blowoffs utilized by the Contractor for flushing the water main shall be sufficient size to obtain 2.5 feet per second velocity in the main. Temporary blow-offs shall be removed and replaced with a suitably sized watertight brass plug.

2. Two (2") inch air and vacuum release valves shall be installed at principal high points in the system (Standard Detail W-D4 and Standard Detail W-D5).

3. The installation of these items shall include connection piping, gate valve, valve box, and all accessories. Valve markers shall be installed.

X. Water Sampling Station

1. One water sampling station shall be provided to the City for each development in size of 1 to 10 lots. One additional sampling station shall be provided for each additional 50 lots or portion thereof. The water sampling station shall be furnished and installed at a location as determined by the Public Works Superintendent and as further shown in Standard Detail W-D21.

WATER PIPE TESTING & DISINFECTING

A. A water hydrant meter shall be required and procured from the City for all water utilized for flushing pipelines. All pumps, gauges, plugs, saddles, corporation stops, miscellaneous hose and piping, and measuring

equipment necessary for performing the test shall be furnished, installed and operated by the Contractor.

B. Feed for the pump shall be from a barrel or other container within the actual amount of "makeup" water, so that it can be measured periodically during the test period.

C. The pipeline shall be backfilled sufficiently to prevent movement of the pipe under pressure. All thrust blocks shall be in place and time allowed for the concrete to cure before testing. Where permanent blocking is not required, the Contractor shall furnish and install temporary blocking.

D. As soon as pipe is secured against movement under pressure, it may be filled with water. Satisfactory performance of all valves shall be checked while the line is filling.

E. Contractor shall preflush all water mains after water has remained in the main for 24 hours and before pressure testing the main.

F. After the pipe is filled and all air expelled, it shall be pumped to a test pressure of 250 psi, and this pressure shall be maintained for a period of not less than thirty (30) minutes to insure the integrity of the thrust and anchor blocks. **The contractor/developer is cautioned regarding pressure limitations on butterfly valves.** All tests shall be made with the hydrant auxiliary gate valves open and pressure against the hydrant valve. Hydrostatic tests shall be performed on every complete section of water main between two valves, and each valve shall withstand the same test pressure as the pipe with no pressure active in the section of pipe beyond the closed valve.

G. In addition to the hydrostatic pressure test, a leakage test shall be conducted on the pipeline. The leakage test shall be conducted at 150 psi for a period of not less than one (1) hour. The quantity of water lost from the main shall not exceed the number of gallons per hour determined by the formula:

$$L = \frac{ND(P)}{7{,}400}^{0.5}$$

in which

L = Allowable leakage, gallons/hour
N = Number of joints in the length of pipeline tested

D = Nominal diameter of the pipe in inches
P = Average test pressure during the leakage test, psi

H. Defective materials or workmanship, discovered as a result of the tests, shall be replaced by the Contractor at the Contractor's expense. Whenever it is necessary to replace defective material or correct the workmanship, the tests shall be re-run at the Contractor's expense until a satisfactory test is obtained.

I. As sections of pipe are constructed and before pipelines are placed in service, they shall be sterilized in conformance with the requirements of the State of Washington Department of Health Services.

J. The Contractor shall be responsible for flushing all water mains prior to water samples being acquired. The water mains shall be flushed at a rate to provide a minimum 2.5 feet per second velocity in the main.

K. In all disinfection processes, the Contractor shall take particular care in flushing and wasting the chlorinated water from the mains to assure that the flushed and chlorinated water does no physical or environmental damage to property, streams, storm sewers or any waterways. The Contractor shall chemically or otherwise treat the chlorinated water to prevent damage to the affected environment, particularly aquatic and fish life of receiving streams.

L. Chlorine shall be applied in one of the following manners, listed in order of preference, to secure a concentration in the pipe of at least 50 ppm.

1. Injection of chlorine-water mixture from chlorinating apparatus through corporation cock at beginning of section after pipe has been filled, and with water exhausting at end of section at a rate controlled to produce the desired chlorine concentration;

2. Injection similarly of a hypochlorite solution;

3. Other City pre-approved method(s) selected by the Developer and/or Contractor.

4. After the desired chlorine concentration has been obtained throughout the section of line, the water in the line shall be left standing for a period of twenty-four (24) hours. Following this, the line shall be thoroughly flushed and a water sample collected. The line shall not be placed in service until a satisfactory bacteriological report has been received.

M. Only City employees only will be allowed to operate existing and new tie-in valves. The Contractor, his subcontractors, and their respective employees are expressly forbidden to operate any valve on any section of line which has been accepted by the City.

BACKFLOW PREVENTION AND SPRINKLER SYSTEMS

A. All water systems connected to the public water system shall have backflow prevention as required by WAC 248-54-285. Refer to Standard Detail W—D22 regarding Reduced Pressure Backflow Assembly ¾" to 2" and Standard Detail W-D23 regarding Reduced Pressure Backflow Assembly 3" and Larger.

B. Fire sprinkler systems as mandated, proposed, or required by the local Fire Marshal and/or City Ordinance that have a fire department connection shall have backflow prevention as required by WAC 248-54-285. Refer to Standard Detail W-D15 regarding Fire Line Connection and Standard Detail W-D16 regarding Fire Line Riser Details.

C. Building sprinkler systems may be required based on Building Codes and Fire Marshall requirements.

STAKING

A. All surveying and staking shall be performed by an engineering or surveying firm employed by the Developer and capable of performing such work. The engineer or surveyor directing and/or performing such work shall be currently licensed by the State of Washington to perform said tasks.

B. A preconstruction meeting shall be held with the Public Works Superintendent prior to commencing staking. All construction staking shall be inspected by the City prior to construction.

C. The minimum staking of water systems shall be as follows:

1. Provide staking sufficient to satisfy Public Works Superintendent. In new plat development roadway centerline staking must be readily identifiable; and

2. Stake locations of all proposed fire hydrant, blow-off, air-vac,valves, meters, etc.

TRENCH EXCAVATION

A. Clearing and grubbing where required shall be performed within the easement or public right-of-way as permitted by the City and/or governing agencies. Debris resulting from the clearing and grubbing shall be disposed of by the owner or contractor in accordance with the terms of all applicable permits.

B. Trenches shall be excavated to the line and depth designated by the City to provide a minimum of 36 inches of cover over the pipe. Except for unusual circumstances where approved by the City, the trench sides shall be excavated vertically and the trench width shall be excavated only to such widths as are necessary for adequate working space as allowed by the governing agency and in compliance with all safety requirements of the prevailing agencies. See Standard Detail W-D1. The trench shall be kept free from water until joining is complete. Surface water shall be diverted so as not to enter the trench. The owner shall maintain sufficient pumping equipment on the job to insure that these provisions are carried out.

C. The contractor shall perform all excavation of every description and whatever substance encountered and boulders, rocks, roots and other obstructions shall be entirely removed or cut out to the width of the trench and to a depth 6 inches below the pipeline grade. Where materials are removed from below the pipeline grade, the trench shall be backfilled to grade with material satisfactory to the City and thoroughly compacted.

D. Trenching and shoring operations shall not proceed more than 100 feet in advance of pipe laying without approval of the City, and shall be in conformance with Washington Industrial Safety and Health Administration (WISHA) and Office of Safety and Health Administration (OSHA) Safety Standard.

E. The bedding course shall be finished to grade with hand tools in such a manner that the pipe will have bearing along the entire length of the barrel. The bell holes shall be excavated with hand tools to sufficient size to make up the joint.

BACKFILLING

a. Backfilling and surface restoration shall closely follow installation of pipe. The City, based on the location of construction, shall designate the amount of trenching which may be left exposed. In no case shall more than 100 feet be left exposed during construction hours without approval of the Public Works Superintendent.

b. Selected material shall be placed and compacted around and under the storm drain by hand tools. Special precautions should be provided to

protect the pipe to a point 12 inches above the crown of the pipe. The remaining backfill shall be compacted to 95 percent of the maximum density in traveled areas and road prisms, 90 percent outside driveway, roadways, road prism, shoulders, parking or other traveled areas. Where governmental agencies other than the City have jurisdiction over roadways, the backfill and compaction shall be done to the satisfaction of the agency having jurisdiction. Typically, all trenches located in roadway sections, roadway "prisms", and in traffic bearing areas shall be required to be backfilled and compacted with 5/8-inch minus crushed rock.

c. Due to local conditions, as may be specifically approved by the Public Works Superintendent, suitable excavated backfill material or sand, as determined by the Public Works Superintendent, may be utilized as backfill, or if such material is not available from trenching operations, the Public Works Superintendent may order the placing of CDF or gravel base conforming with Section 9-03.10 of the Standard Specifications (WSDOT) as appropriate for backfilling the trench. All excess material shall be promptly loaded and hauled to waste.

STREET PATCHING AND RESTORATION

A. See Chapter 4 and Standard Details for requirements regarding street patching and trench restoration.

EROSION CONTROL

A. The detrimental effects of erosion and sedimentation shall be minimized by conforming to the following general principles:

1. Soil shall be exposed for the shortest possible time;

2. Reducing the velocity and controlling the flow of runoff;

3. Detaining runoff on the site to trap sediment; and

4. Releasing runoff safely to downstream areas.

B. In applying these principles, the Developer and/or Contractor shall provide for erosion control by conducting work in workable units; minimizing the disturbance to cover crop materials; providing mulch and/or temporary cover crops, sedimentation basins, and/or diversions in critical areas during construction; controlling and conveying runoff; and establishing permanent vegetation and installing erosion control structures as soon as possible.

C. Trench mulching will be required where there is danger of backfill material being washed away due to steepness of the slope along the direction of the trench, backfill material shall be compacted and held in place by covering the disturbed area with straw and held with a covering of jute matting or wire mesh anchored in place.

D. Cover Crop Seeding.

1. A cover crop shall be sown in all areas excavated or disturbed during construction that were not paved, landscaped and/or seeded prior to construction. Areas landscaped and/or seeded prior to construction shall be restored to their original or superior condition.

2. Contact the City Clerk for water charges if use of City water is contemplated and the Public Works Superintendent for use of a hydrant for water in furtherance of seeding.

3. Hydrants shall only be opened and closed by members of the City crew.

4. Cover-crop seeding shall follow backfilling operations. The Developer and/or Contractor shall be responsible for protecting all areas from erosion until the cover crop affords such protection.

5. The cover crop shall be re-seeded if required and additional measures taken to provide protection from erosion until the cover crop is capable of providing protection.

6. During winter months, the Contractor may postpone seeding, if conditions are such that the seed will not germinate and grow. The Developer and/or Contractor will not, however, be relieved of the responsibility of protecting all areas until the cover crop has been sown and affords protection from erosion.

7. The cover crop shall be sown at a rate of 10 to 15 pounds of seed per acre using a hand or power operated mechanical seeder capable of providing a uniform distribution of seed.

FINISHING AND CLEANUP

A. After all other work on this project is completed and before final acceptance, the entire roadway, including the roadbed, planting, sidewalk areas, shoulders, driveways, alley and side street approaches, slopes, ditches, utility trenches, and construction areas shall be neatly finished to

the lines, grades and cross sections of a new roadway consistent with the original section, and as hereinafter specified.

B. On water system construction where all or portions of the construction is in undeveloped areas, the entire area which has been disturbed by the construction shall be shaped so that upon completion the area will present a uniform appearance, blending into the contour of the adjacent properties. All other requirements outlined previously shall be met. All pipes, valves, tanks, reservoirs, boost pumps, boost pump stations and building associated therewith shall be cleaned of all debris and foreign material.

C. Slopes, sidewalk areas, planting areas and roadway shall be smoothed and finished to the required cross section and grade by means of a grading machine insofar as it is possible to do so without damaging existing improvements, trees and shrubs. Machine dressing shall be supplemented by hand work to meet requirements outlined herein, to the satisfaction of the City Inspector and/or the Public Works Superintendent.

D. Upon completion of the cleaning and dressing, the project shall appear uniform in all respects. All graded areas shall be true to line and grade. Where the existing surface is below sidewalk and curb, the area shall be filled and dressed out to the walk. Wherever fill material is required in the planting area, the finished grade shall be elevated to allow for final settlement, but nevertheless, the raised surface shall present a uniform appearance.

E. All rocks in excess of one (1) inch diameter shall be removed from the entire construction area and shall be disposed of the same as required for other waste material. In no instance shall the rock be thrown onto private property. Overhang on slopes shall be removed and slopes dressed neatly so as to present a uniform, natural, well-sloped surface.

F. All excavated material at the outer lateral limits of the project shall be removed entirely. Trash of all kinds resulting from clearing and grubbing or grading operations shall be removed and not placed in areas adjacent to the project. Where machine operations have broken down brush and trees beyond the lateral limits of the project, the Developer and/or Contractor shall remove and dispose of same and restore said disturbed areas at his own expense.

G. Drainage facilities such as inlets, catch basins, culverts, and open ditches shall be cleaned of all debris, which is the result of the Developer and/or Contractor's operations.

H. All pavements and oil mat surfaces, whether new or old, shall be thoroughly cleaned. Existing improvements such as Portland cement concrete curbs, curb and gutters, walls, sidewalks, and other facilities, which have been sprayed by the asphalt cement, shall be cleaned and re-painted where needed, all to the satisfaction of the Public Works Superintendent.

I. Castings for monuments, water valves, vaults and other similar installations which have been covered with the asphalt material shall be cleaned to the satisfaction of the Public Works Superintendent.

GENERAL GUARANTEE AND WARRANTY

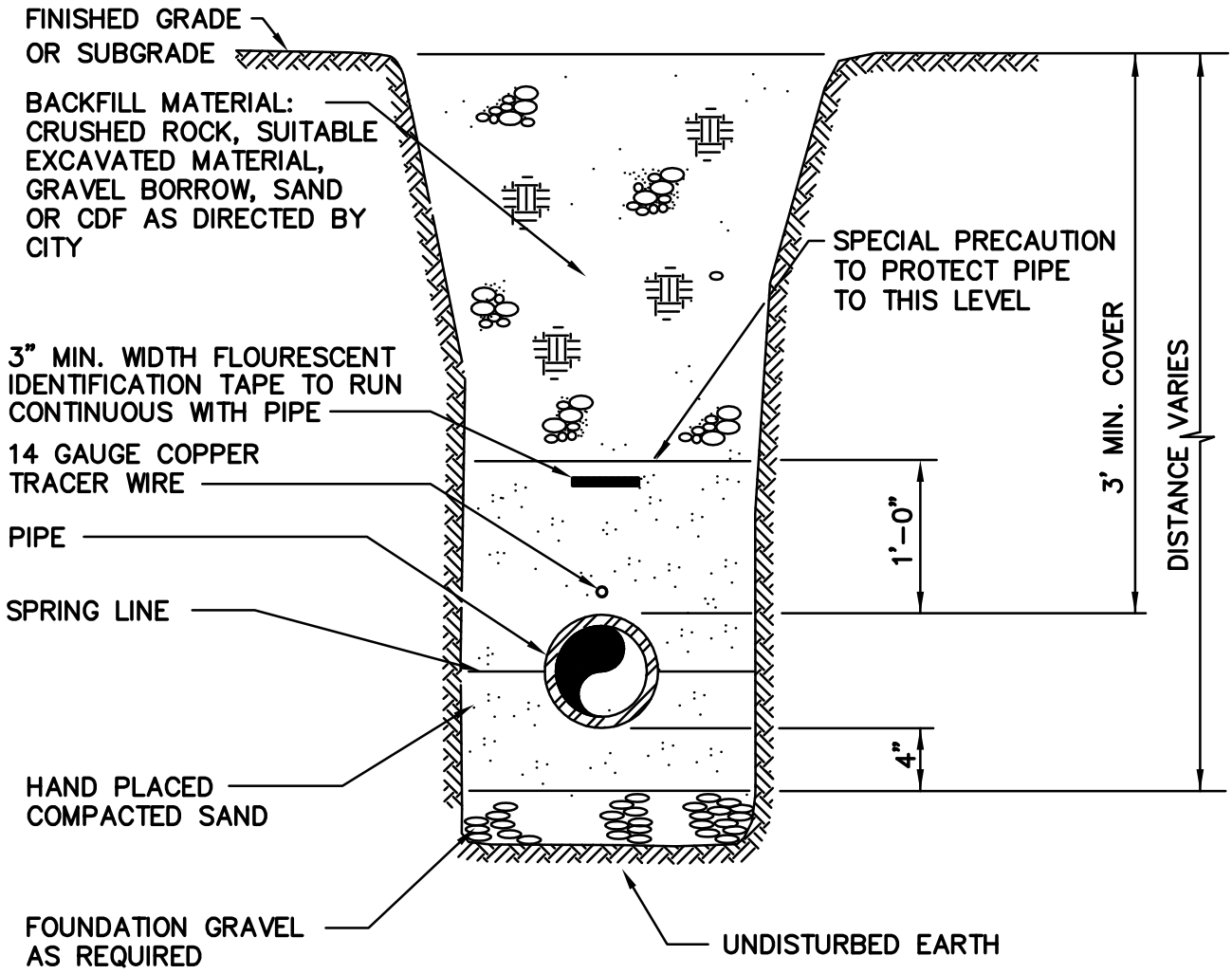
A. The Developer shall be required, upon completion of the work and prior to acceptance by the City, to furnish the City a written guarantee covering all material and workmanship for a period of two years after the date of final acceptance and he shall make all necessary repairs during that period at his own expense, if such repairs are necessitated as the result of furnishing poor materials and/or workmanship.

B. The Developer shall obtain warranties from the contractors, subcontractors and suppliers of material or equipment where such warranties are required, and shall deliver copies to the City upon completion of the work. Delivery of such warranties to the City shall not relieve the Developer of liability under his guarantee.

C. Easement documents, if applicable, shall be filed and recorded with the County Auditor's office and the documents reviewed by the City prior to project acceptance.

CITY OF ILWACO
WATER SYSTEM STANDARDS
STANDARD DETAILS

Detail Number	Title
W-D1	Trench Section for Water Pipe
W-D2	Fire Hydrant Assembly
W-D3	Fire Hydrant Use
W-D4	1" Air Release Assembly
W-D5	2" Air Release Assembly
W-D6	Wet Tap Connection
W-D7	In-Line Blow Off Assembly
W-D8	Water Service Installation (2" and Smaller)
W-D9	3" and Larger Water Service and Installation
W-D10	Thrust Blocking
W-D11	Vertical Anchor Block
W-D12	Thrust Restraint for Ductile Iron Pipe
W-D13	"Individual" Double Check Detector Assembly
W-D14	Double Check Detector Backflow Prevention Assembly
W-D15	Fire Line Connection
W-D16	Fire Line Riser Detail
W-D17	Typical Utility Crossing
W-D18	Asphalt Pavement Repair
W-D19	Concrete Pipe Encasement
W-D20	Water Valve Stem Extension
W-D21	Water Sampling Station
W-D22	Reduced Pressure Backflow Assembly 3/4" to 2"
W-D23	Reduced Pressure Backflow Assembly 3" and Larger
W-D24	Pressure Reducing Station



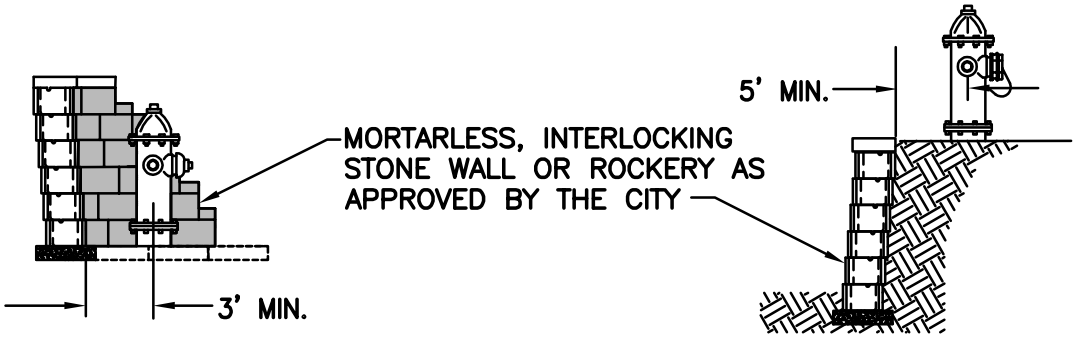
NOTE:

BACKFILL MATERIAL AND COMPACTION SHALL BE IN CONFORMANCE WITH CITY STANDARDS AND/OR THE STATE OR COUNTY PERMIT REQUIREMENTS (AS MAY BE APPLICABLE);

MINIMUM REQUIREMENTS:
ALL GRANULAR BACKFILL SHALL BE COMPACTED TO 95% MODIFIED PROCTOR, ASTM D1557

TRENCH SECTION FOR WATER PIPE

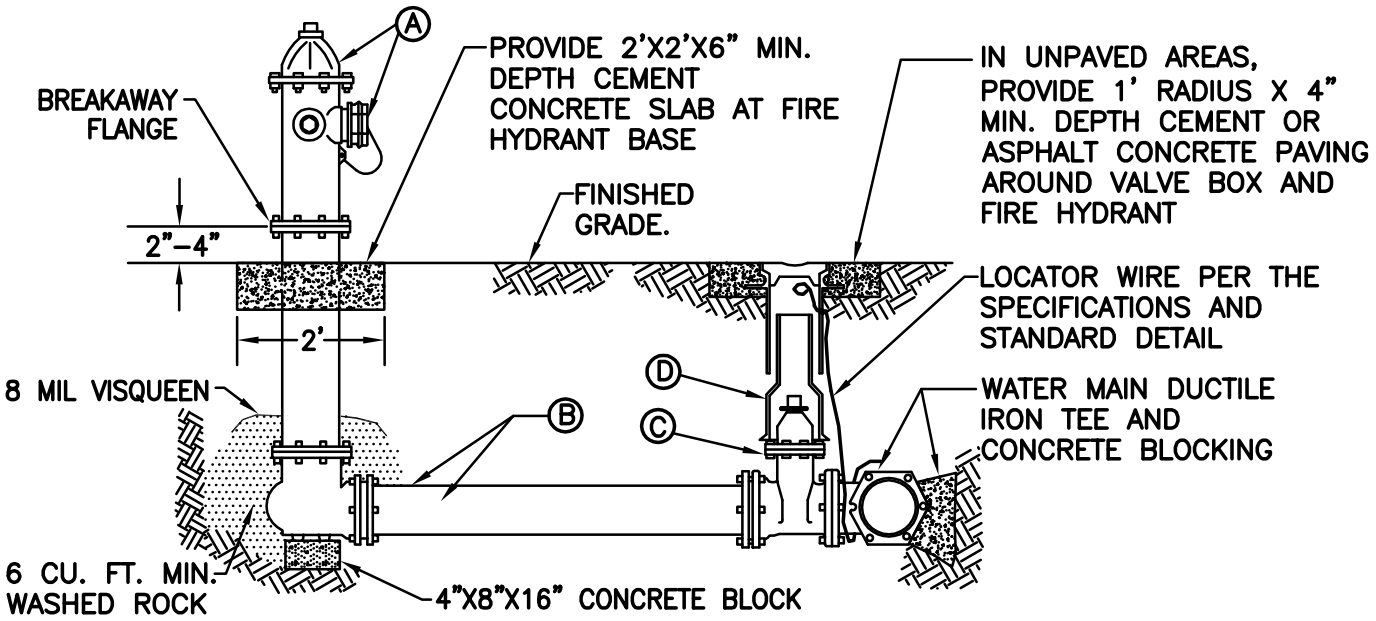
Detail Approval Engineer: N.E.L.	CITY OF ILWACO STANDARD WATER DETAILS February 2011	W-D1



FIRE HYDRANT IN CUT

FIRE HYDRANT IN FILL

FIRE HYDRANT LOCATION IN CUT OR FILL



MATERIALS LIST

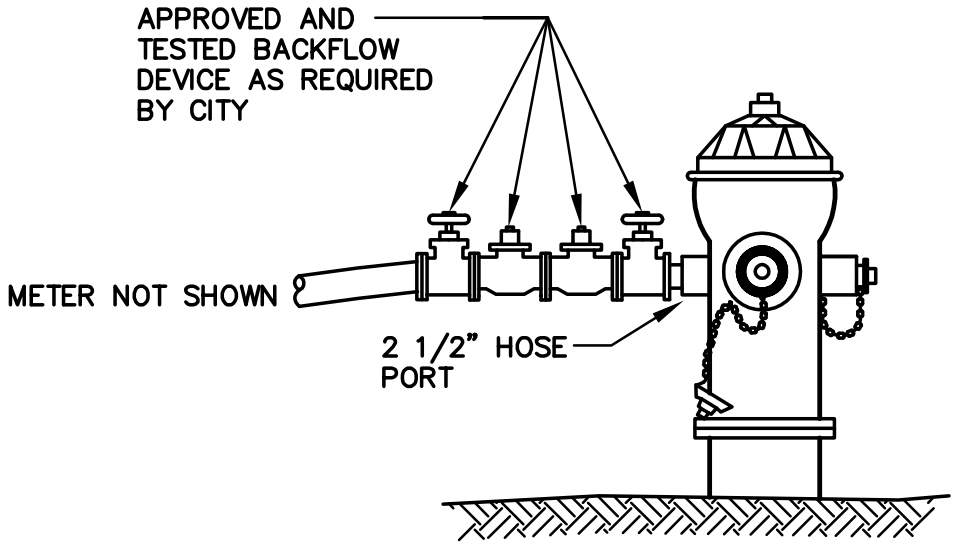
ITEM	DESCRIPTION
Ⓐ	HYDRANT: SHALL BE MUELLER SUPER CENTURION-250, MODEL A-421 IN CONFORMANCE WITH AWWA STANDARD SPECIFICATION C-502. PROVIDE STORZ ADAPTERS AS FOLLOWS: 4-1/2" (ONE EACH) AND 2-1/2" (TWO EACH). HYDRANT SHALL BE PRIME COATED WITH STEELCOTE SR53 HEAVY DUTY BRUSH TYPE ENAMEL. TOP COAT SHALL BE TWO COATS OF SHERWIN/WILLIAMS BLUE INDUSTRIAL ENAMEL #B54W101 OR KRYLON INDUSTRIAL RUST TOUGH BLUE ENAMEL.
Ⓑ	6" CL. 52 D.I. PIPE, 3' MIN. AND 50' MAX. WITH RESTRAINED JOINTS.
Ⓒ	6" R.W. GATE VALVE, FL. X M.J.: SHALL BE AMERICAN FLOW CONTROL SERIES 2500, CLOW 2638, MUELLER 2361, KENNEDY 7000 OR M&H 7000 IN CONFORMANCE WITH AWWA C515.
Ⓓ	TWO-PIECE VALVE BOX PER THE SPECIFICATIONS AND STANDARD DETAIL.

NOTES:

1. HYDRANT SHALL BE ORIENTED PER FIRE MARSHALL AND HAVE 3' MIN. CLEARANCE AROUND CENTERLINE.
2. GATE VALVE OPERATING NUT SHALL BE 2' MINIMUM AND 4'-6" MAXIMUM FROM FINISHED GRADE.

FIRE HYDRANT ASSEMBLY

Detail Approval Engineer: N.E.L.	CITY OF ILWACO STANDARD WATER DETAILS February 2011	W-D2

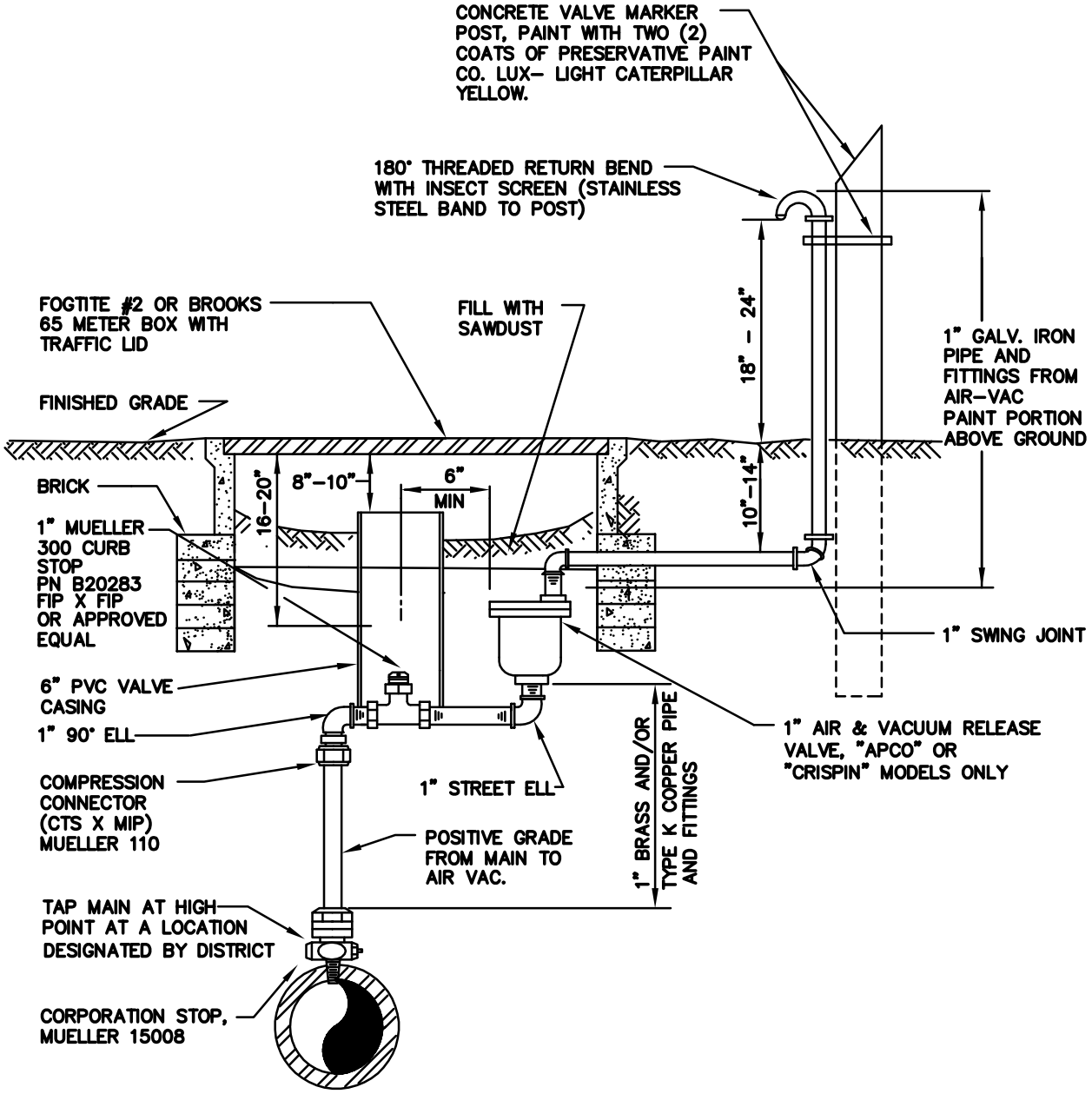


HYDRANT USE PROCEDURES

1. THERE SHALL BE AN ACCEPTABLE WASHINGTON STATE APPROVED BACKFLOW DEVICE. A HYDRANT METER SHALL BE OBTAINED FROM CITY. (NOT SHOWN ABOVE).
2. OPENING & CLOSING OF HYDRANT VALVE SHALL BE WITH AN ACCEPTABLE WRENCH TO RECEIVE THE 5–SIDED NUT.
3. THERE SHALL BE AN AUXILIARY VALVE ATTACHED TO THE 2 1/2" HOSE PORT OF THE HYDRANT.
4. THE HYDRANT VALVE SHALL BE FULLY OPENED AND THE WATER USE CONTROLLED EXCLUSIVELY BY THE AUXILIARY VALVE.
5. THE AUXILIARY VALVE SHALL BE OPERATED IN A SLOW MANNER TO PREVENT UNDUE SHOCK PRESSURE ON THE WATER SYSTEM.

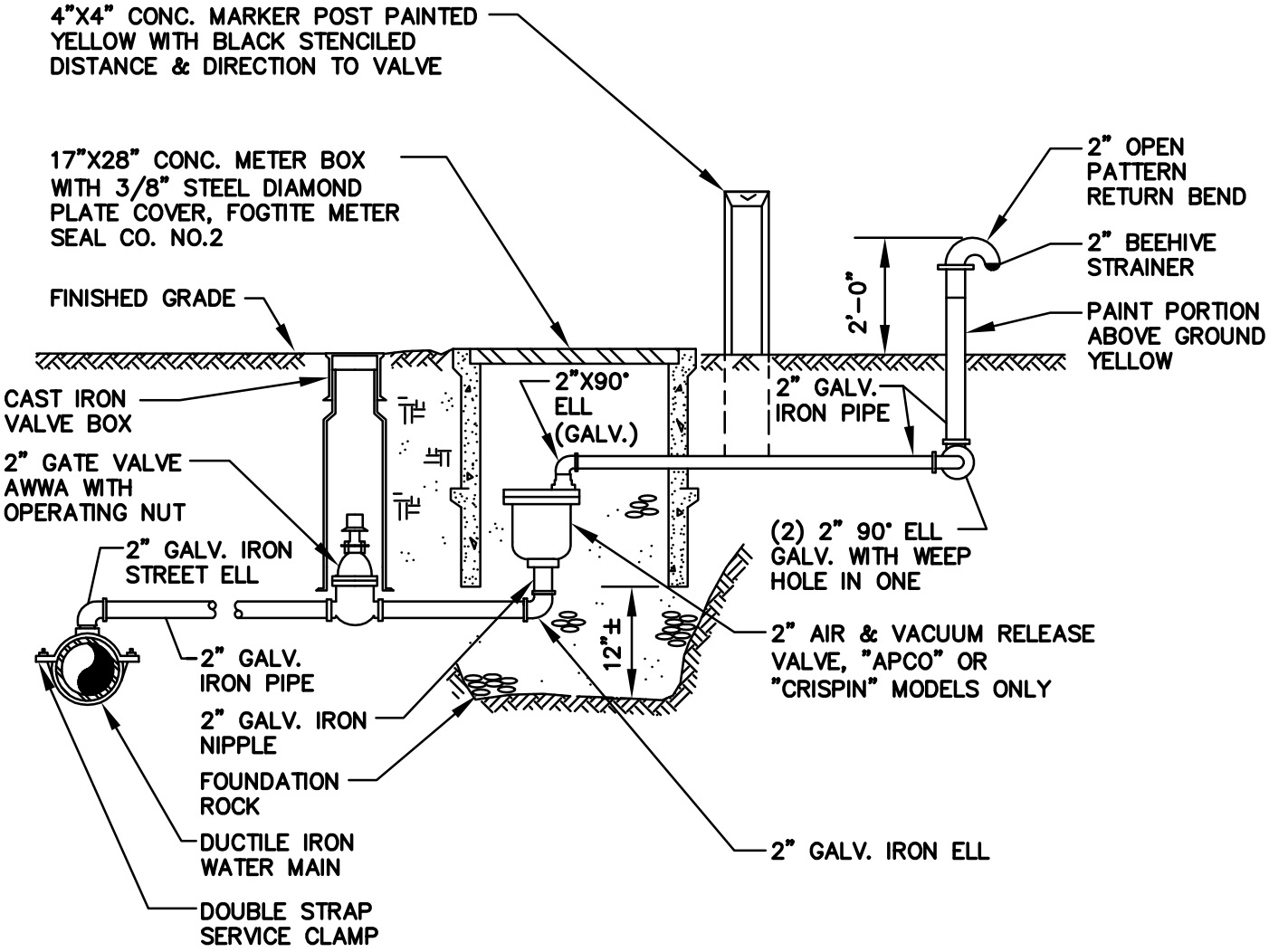
FIRE HYDRANT USE

Detail Approval Engineer: N.E.L.	CITY OF ILWACO STANDARD WATER DETAILS February 2011	W–D3



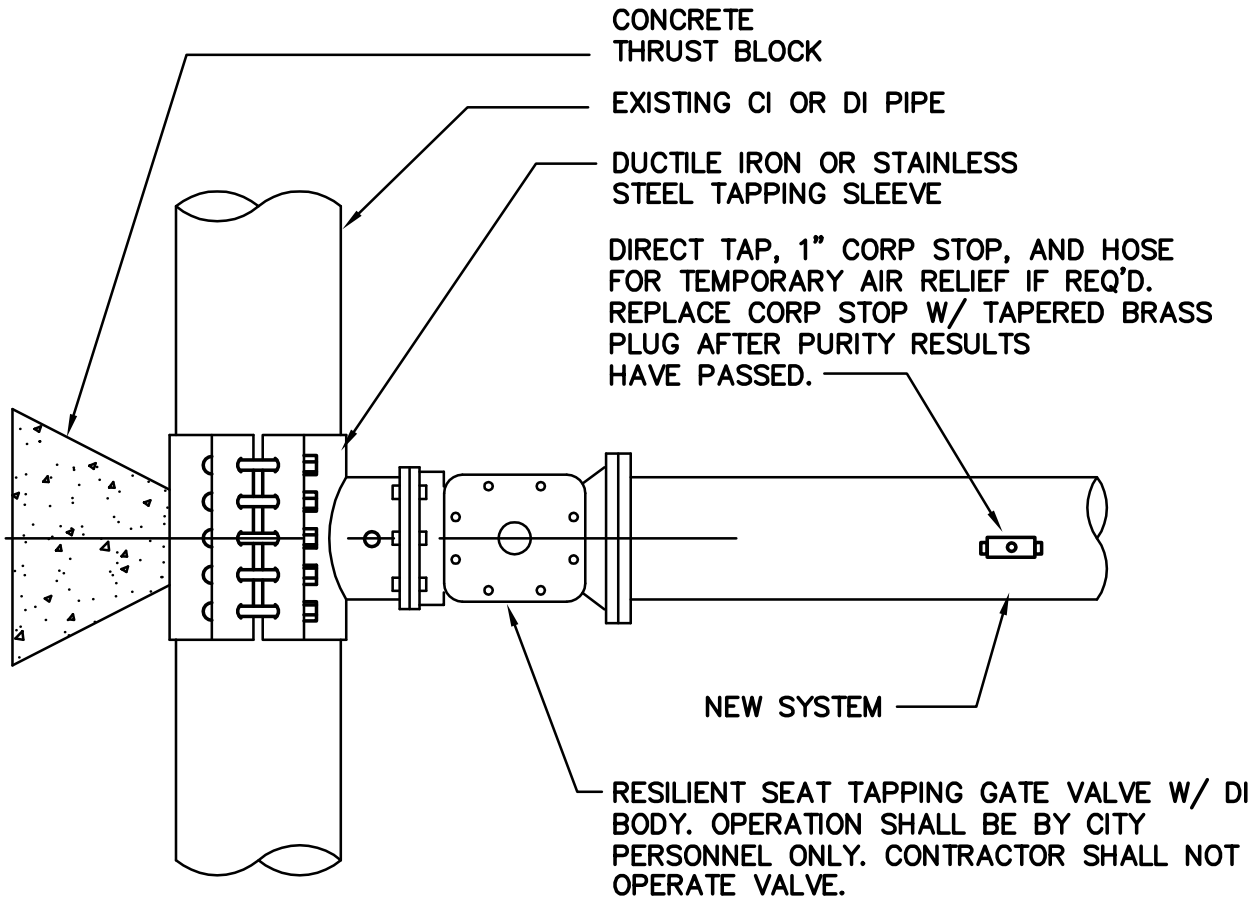
1" AIR RELEASE ASSEMBLY

Detail Approval Engineer: N.E.L.	CITY OF ILWACO STANDARD WATER DETAILS February 2011	W–D4



2" AIR RELEASE ASSEMBLY

Detail Approval Engineer: N.E.L.	CITY OF ILWACO STANDARD WATER DETAILS February 2011	W–D5

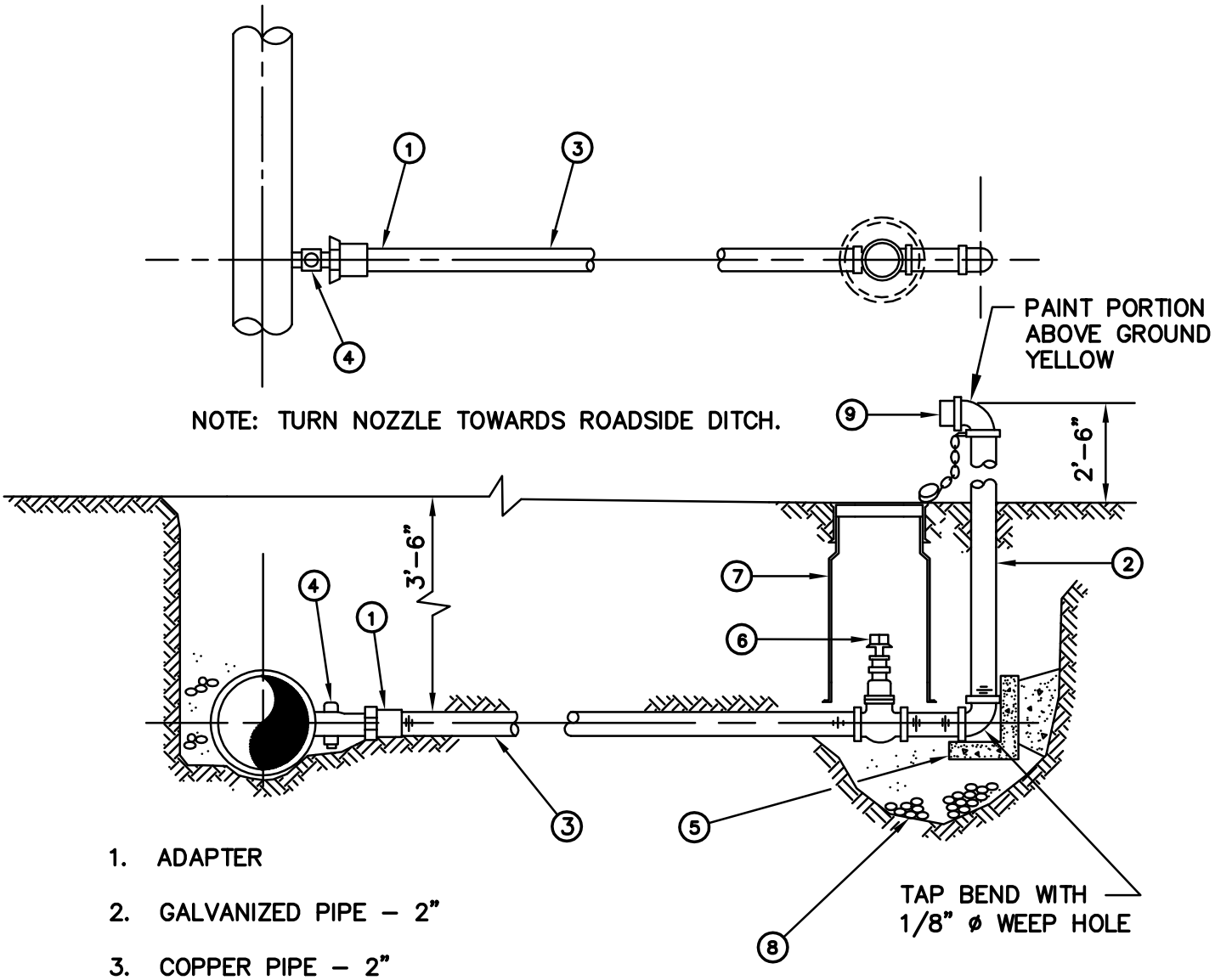


NOTES:

1. SIZE-ON-SIZE TAPPING TEES SHALL BE STAINLESS STEEL FULL CIRCLE MECHANICAL SLEEVE.
2. DUCTILE IRON TAPPING TEES SHALL BE ALLOWED IF TAP IS AT LEAST 2" SMALLER IN DIAMETER THAN THE EXISTING WATER MAIN.
3. TAPPING TEES SHALL BE PRESSURE TESTED TO 200 PSI
4. CONNECTIONS NOT ALLOWED ON FRIDAYS, HOLIDAYS, OR WEEKENDS

WET TAP CONNECTION

Detail Approval Engineer: N.E.L.	CITY OF ILWACO STANDARD WATER DETAILS February 2011	W-D6

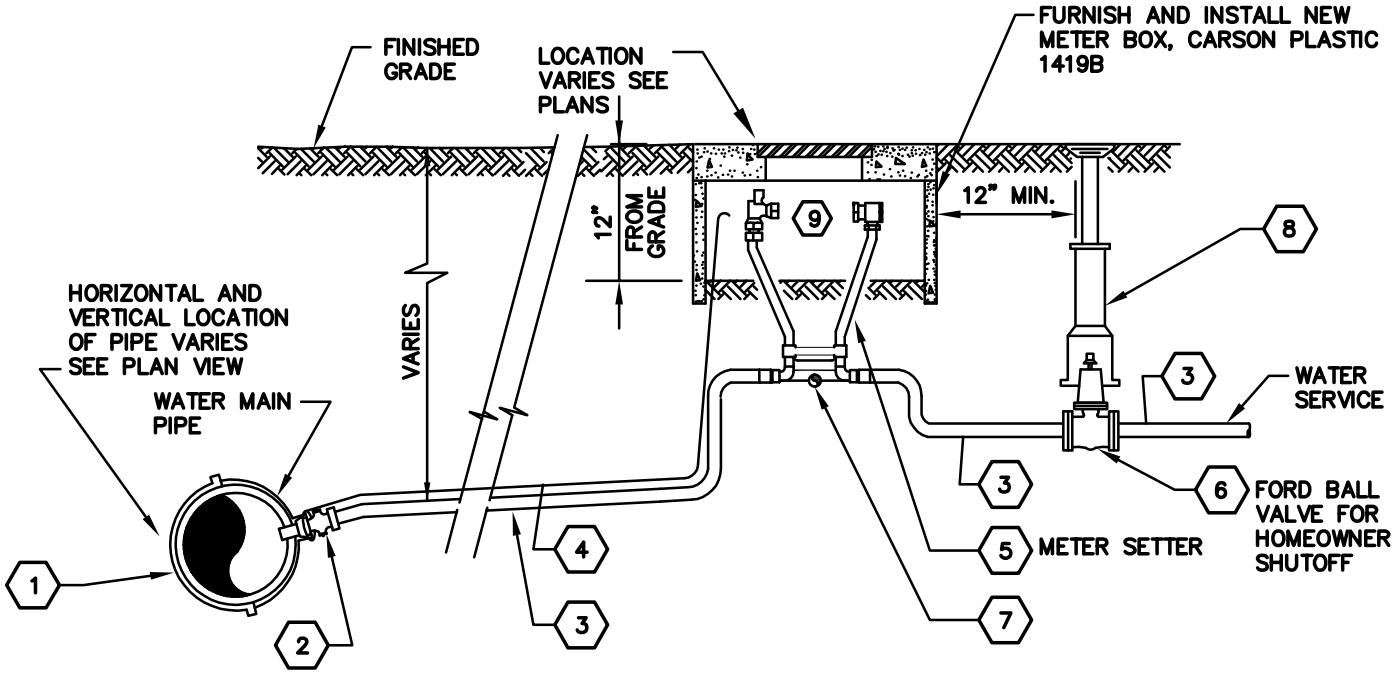


1. ADAPTER
2. GALVANIZED PIPE – 2"
3. COPPER PIPE – 2"
4. 1–1/2" CORP STOP.
5. 2 – 2"X8"X16" CONC. BLOCKS.
6. 2" GATE VALVE WITH HEX NUT.
7. CAST IRON VALVE BOX
8. 1/4 CUBIC YARD WASHED GRAVEL POCKET.
9. 2"X2–1/2" HOSE THREADS BRASS INSERT WITH CUP AND CHAIN (ELIMINATE HOSE THREADS ON TEMPORARY ASSEMBLY).

IN–LINE BLOW OFF ASSEMBLY

Detail Approval Engineer: N.E.L.	CITY OF ILWACO STANDARD WATER DETAILS February 2011	W–D7

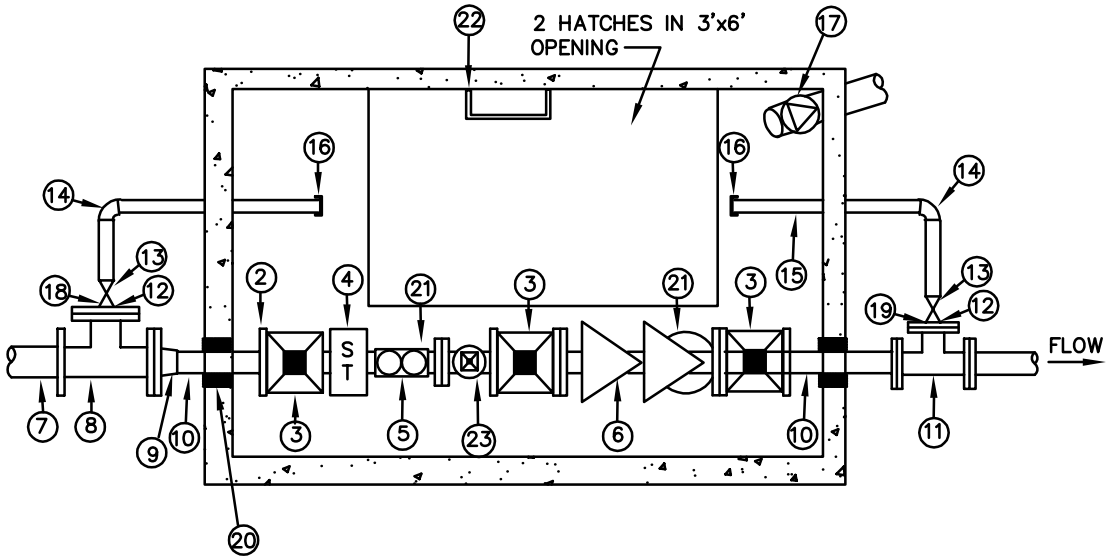
ITEM NUMBER	ITEM DESCRIPTION	**FORD** = FORD METER BOX CO. CATALOG NUMBER **ALASKAN** = ALASKAN COPPER AND BRASS COMPANY **APCO** = APCO WILLAMETTE VALVE & PRIMER CORPORATION **FOG TITE** = FOG TITE INC., SEATTLE, WA.		
		FOR 2" SERVICE W/ COPPER OR CTS PE	FOR 1" SERVICE W/ COPPER OR CTS PE	FOR 1" SERVICE W/ PEP
			COMMON TO BOTH TYPES	
1	TAPPING SADDLE			
	FOR DI PIPE	FORD – 202B–XXX–CC7	FORD – 202B–XXX–CC4	
	FOR AC & PVC PIPE	FORD – FC202–XXX–CC7	FORD – FC202–XXX–CC4	
2	CORPORATION STOP – 2"	FORD – FB1000–7	FORD FB1000–4	FORD FB1001–4
3	TUBING / PIPE	2" COPPER OR PE TUBING	1" COPPER OR PE TUBING	1" PE PIPE
4	TRACER WIRE	14 GAUGE COPPER	14 GAUGE COPPER	14 GAUGE COPPER
5	METER SETTER	FORD VHH77–12B–44–77	FORD VBHC74–12W–44–44	FORD VBHC74–12W–66–44
6	CURB STOP VALVE	FORD – B44–777	FORD – B44–444	FORD B66–444
7	BRACE PIPE	G.I. PIPE – 18" LENGTH	G.I. PIPE – 12" LENGTH	
8	CURB BOX	FORD – EA1–30–40–18R	FORD – EA1–30–40–18R	FORD – EA1–30–40–18R
NOTE – XXX=PIPE SIZE CODE FOR LINE BEING TAPPED				



NOTE: (9) NEW METER (SUPPLIED BY THE CITY)

WATER SERVICE INSTALLATION (2" AND SMALLER)

Detail Approval Engineer: N.E.L.	CITY OF ILWACO STANDARD WATER DETAILS February 2011	W–D8



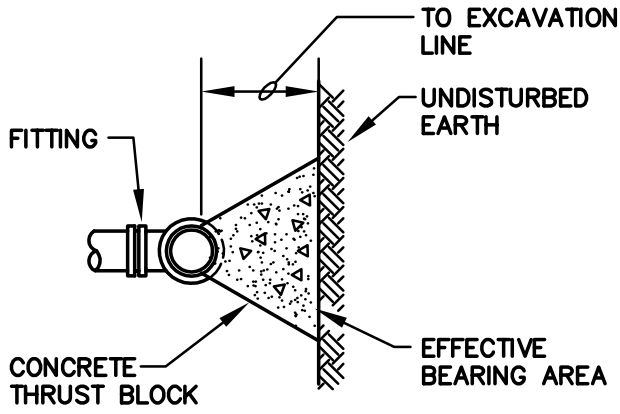
NO.	DESCRIPTION
1	UTILITY VAULT 4484–LA OR APPROVED EQUAL
2	UNIFLANGE ADAPTER
3	3" RWGV
4	3" STRAINER
5	NEW METER (SUPPLIED BY THE CITY)
6	STATE HEALTH DEPT. APPROVED 3" DOUBLE CHECK VALVE ASSEMBLY
7	4" DIP
8	4" TEE (MF X FL) W/ MEGA LUGS
9	4" X 3" REDUCER (4" PE X 3" MJ) W/MEGA LUG
10	3" DIP
11	3" TEE (MJ X FL) W/ MEGA LUGS
12	2" BRASS CLOSE NIPPLE
13	2" RWGV W/ STANDARD C.. VALVE BOX AND COVER
14	2" BRASS ELBOW
15	2" THREADED BRASS PIPE
16	2" BRASS CAP
17	6" PVC DRAIN TO DAYLIGHT OR CB. MINIMUM SLOPE 1%, SCREENS AT BOTH ENDS W/ BACKWATER VALVE IN VAULT
18	4" BLIND FLANGE TAPPED 2"
19	3" BLIND FLANGE TAPPED 2"
20	NON SHRINK WATER TIGHT GROUT, INLETS AND OUTLETS
21	PLACE PIPE SUPPORTS STANDON S–92 OR EQUAL UNDER ASSEMBLY IN TWO PLACES
22	GALV. STEEL LADDER, LOCATE AS DIRECTED BY DISTRICT, SECURE TO VAULT
23	3" TEE (FL), 3" BLIND FLANGE TAPPED 2" (FIP), 2" CLOSE NIPPLE BRASS, 2" BALL VALVE, 2" MIP X 2 1/2" NST HOSE NOZZLE

* LARGER SERVICES REQUIRE 3" FITTINGS AND PIPE BE REPLACED WITH LARGER/LIKE SIZE.

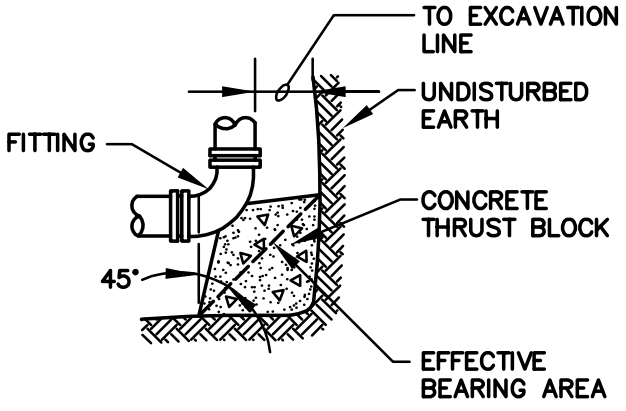
** 4" DIAMETER AND SMALLER DIP SHALL BE CLASS 53 IF USED IN A THREADED APPLICATION.

3" AND LARGER WATER SERVICE AND INSTALLATION

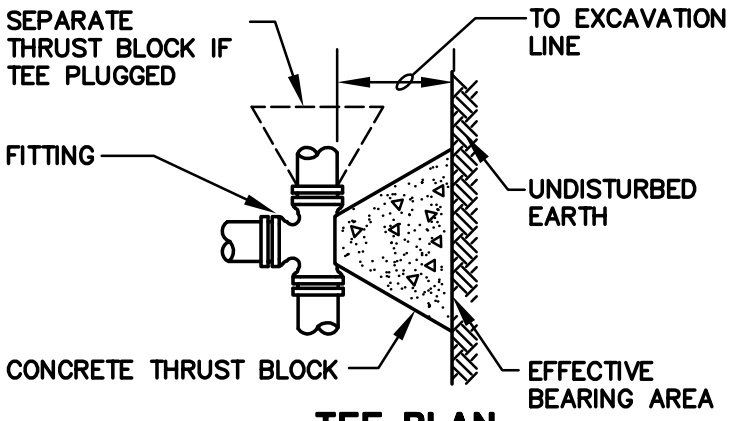
Detail Approval Engineer: N.E.L.	CITY OF ILWACO STANDARD WATER DETAILS February 2011	W–D9



TYPICAL SECTION



90° EL PLAN



TEE PLAN

EFFECTIVE BEARING AREA REQUIRED

FITTING D	TEE	90°	45°	22 1/2°	11 1/4°
6"	4 SQ. FT.	6 SQ. FT.	3 SQ. FT.	2 SQ. FT.	2 SQ. FT.
8"	7 SQ. FT.	10 SQ. FT.	6 SQ. FT.	3 SQ. FT.	2 SQ. FT.
10"	10 SQ. FT.	15 SQ. FT.	9 SQ. FT.	5 SQ. FT.	3 SQ. FT.
12"	14 SQ. FT.	22 SQ. FT.	12 SQ. FT.	6 SQ. FT.	4 SQ. FT.
16"	25 SQ. FT.	38 SQ. FT.	21 SQ. FT.	11 SQ. FT.	7 SQ. FT.
18"	32 SQ. FT.	48 SQ. FT.	27 SQ. FT.	14 SQ. FT.	8 SQ. FT.

TYPICAL FOR SANDY SOIL WITH 2,000 P.S.F. BEARING STRENGTH & 100 P.S.I. WORKING PRESSURE. ADJUST BEARING AREA BY PRESSURE & SOIL BEARING CAPACITY. USE TEE FOR DEAD ENDS

NOTES:

1. BLOCKING SHALL BE TO SOLID BEARING SURFACE.
2. FITTING SHALL BE PROTECTED WITH VISQUEEN.
3. BEARING AREA SHALL BE PROPORTIONALLY INCREASED WITH PRESSURES IN EXCESS OF 100 P.S.I OR IN SOIL CONDITIONS WITH LESS THAN 2,000 P.S.F BEARING STRENGTH.
4. ALL BLOCKS ON TEES SHALL BE SEPARATED FOR DIRECTION OF THRUST.

THRUST BLOCKING

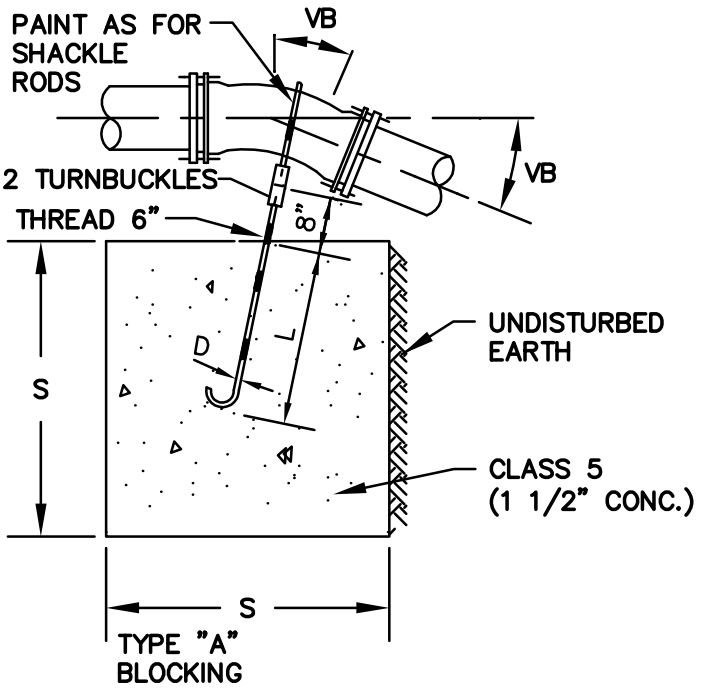
Detail Approval Engineer: N.E.L.	CITY OF ILWACO STANDARD WATER DETAILS February 2011	W–D10

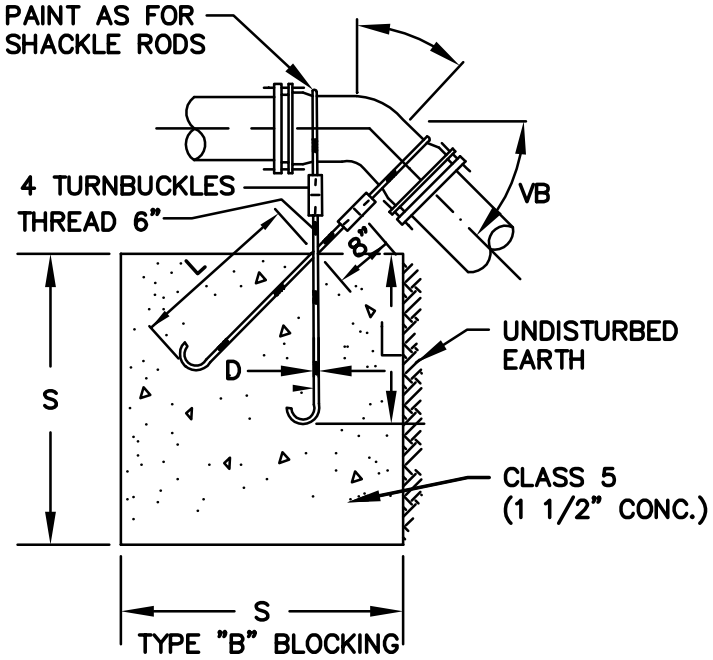
TYPE "A" BLOCKING
FOR 11 1/4°–22 1/2°–30° VERTICAL BENDS

PIPE SIZE NOMINAL DIAMETER– INCHES	TEST PRESSURE PSI	VB VERTICAL BEND DEGREES	No. OF CU. FT. OF CONC. BLOCKING	S SIDE OF CUBE LIN. FT.	D DIAM. OF SHACKLE RODS (2) INCHES	L DEPTH OF RODS IN CONCRETE LIN. FT.
4"	300	11 1/4	8	2	5/8"	1.5
		22 1/2	11	2.2		2.0
		30	17	2.6		
6"	300	11 1/4	11	2.2	5/8"	2.0
		22 1/2	25	2.9		
		30	41	3.5		
8"	300	11 1/4	16	2.5	5/8"	2.0
		22 1/2	47	3.6		
		30	70	4.1	3/4"	2.5
12"	250	11 1/4	32	3.2	5/8"	2.0
		22 1/2	88	4.5	7/8"	3.0
		30	132	5.1		
16"	225	11 1/4	70	4.1	7/8"	3.0
		22 1/2	184	5.7	1 1/8"	4.0
		30	275	6.5	1 1/4"	
20"	200	11 1/4	91	4.5	7/8"	3.0
		22 1/2	225	6.1	1 1/4"	4.0
		30	330	6.9	1 3/8"	4.5
24"	200	11 1/4	128	5.0	1"	3.5
		22 1/2	320	6.8	1 3/8"	4.5
		30	480	7.9	1 7/8"	5.5

TYPE "B" BLOCKING
FOR – 45° VERTICAL BENDS

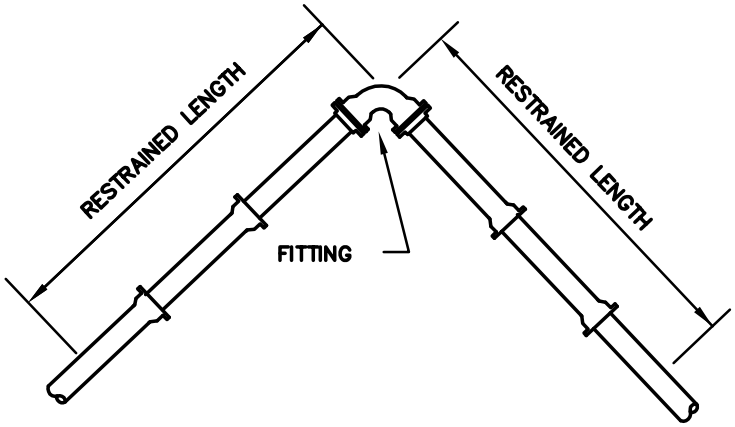
		VB		S	D	L
4"	300	45	30	3.1	5/8"	2.0
6"			68	4.1		
8"			123	5.0		
12"	250		232	6.1	3/4"	2.5
16"	225		478	7.8	1 1/8"	4.0
20"	200		560	8.2	1 1/4"	
24"			820	9.4	1 3/8"	4.5





VERTICAL ANCHOR BLOCK

Detail Approval	CITY OF ILWACO STANDARD WATER DETAILS	W–D11
Engineer: N.E.L.	February 2011	



PIPE SIZE	90° BEND	45° BEND	22 1/2° BEND	11 1/4° BEND	TEE OR DEAD END CAP
	RESTRAINED LENGTH IN FEET				
4"	32	14	7	3	26
6"	44	19	9	5	32
8"	58	24	12	6	43
10"	70	29	14	7	54
12"	82	34	16	8	66
16"	106	44	21	11	88
18"	116	48	23	12	100

NOTES:

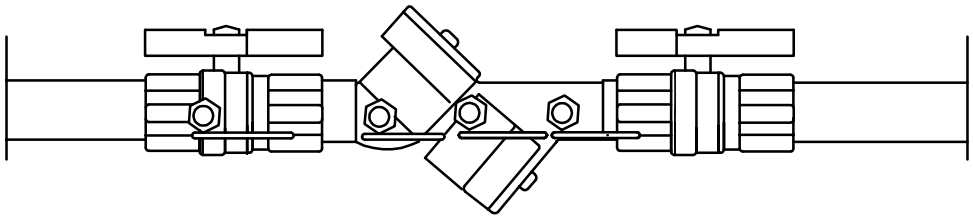
① RESTRAINED LENGTHS SHOWN ARE MINIMUM AND FOR LINEAL FEET REQUIRED ON EACH SIDE OF FITTING INDICATED.

② FOOTAGES ARE BASED ON 200 PSI PRESSURE AND 42 INCHES COVER. IF PRESSURE IS GREATER OR COVER IS LESS, THE RESTRAINED LENGTH SHALL BE INCREASED.

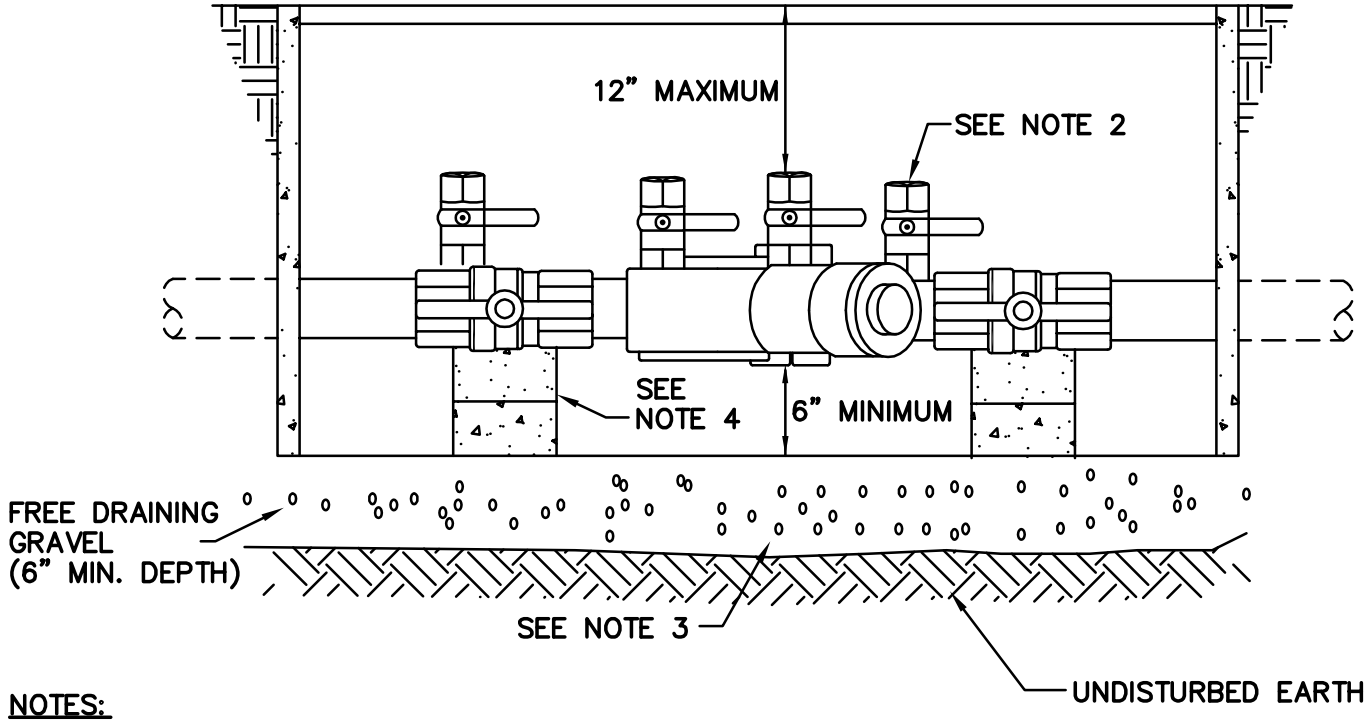
③ THIS TABLE REPRESENTS THE "MINIMUM" CONSTRUCTION STANDARDS. THE DEVELOPER'S ENGINEER SHALL BE RESPONSIBLE FOR DETERMINING THE APPROPRIATE LENGTH OF ALL RESTRAINED JOINT BASED ON EXISTING AND LOCAL CONDITIONS.

THRUST RESTRAINT FOR DUCTILE IRON PIPE

Detail Approval Engineer: N.E.L.	CITY OF ILWACO STANDARD WATER DETAILS February 2011	W–D12



PLAN VIEW

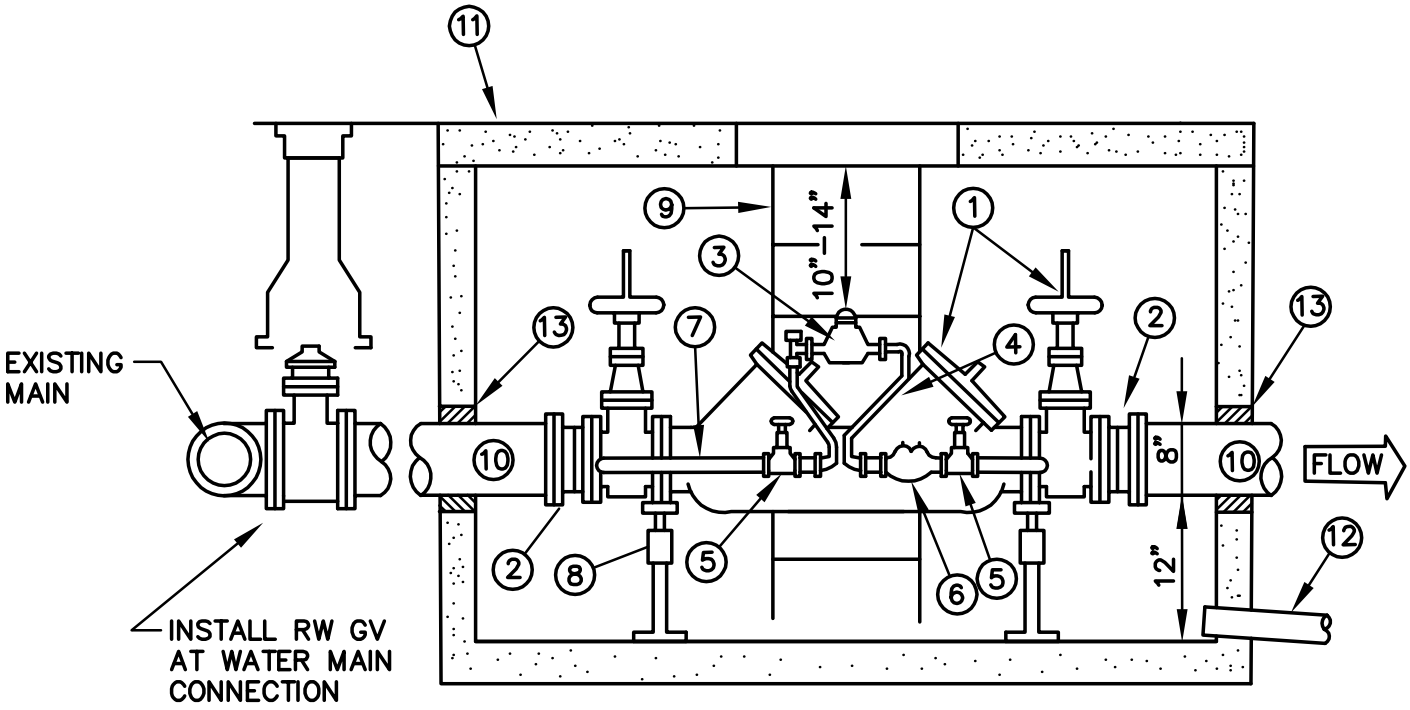


NOTES:

1. MINIMUM BOX SIZE 3/4"– 1" ASSEMBLIES, 10"X13"
   1 1/4"– 2" ASSEMBLIES, 14"X20"
2. ASSEMBLY MUST BE INSTALLED WITH TEST COCKS FACING UP OR TO ONE SIDE. INSTALL WATERTIGHT PLUGS IN ALL TEST COCKS.
3. SUFFICIENT DRAINAGE MUST BE PROVIDED TO PREVENT ASSEMBLY FROM BEING SUBMERGED.
4. PROVIDE SUPPPORT BLOCKS AS MAY BE REQUIRED.
5. PROVIDE A STRAINER WITH BLOW OUT TAPPING AHEAD OF DEVICE IF REQUIRED BY CITY.
6. THOROUGHLY FLUSH THE LINE, PRIOR TO THE INSTALLATION OF THE DCVA.
7. PROTECT DEVICE FROM FREEZING BY INSTALLING IN STRUCTURE OR PER "HOT BOX" SHOWN IN REDUCED PRESSURE BACKFLOW ASSEMBLY DETAIL.

"INDIVIDUAL" DOUBLE CHECK DETECTOR ASSEMBLY

Detail Approval Engineer: N.E.L.	CITY OF ILWACO STANDARD WATER DETAILS February 2011	W–D13



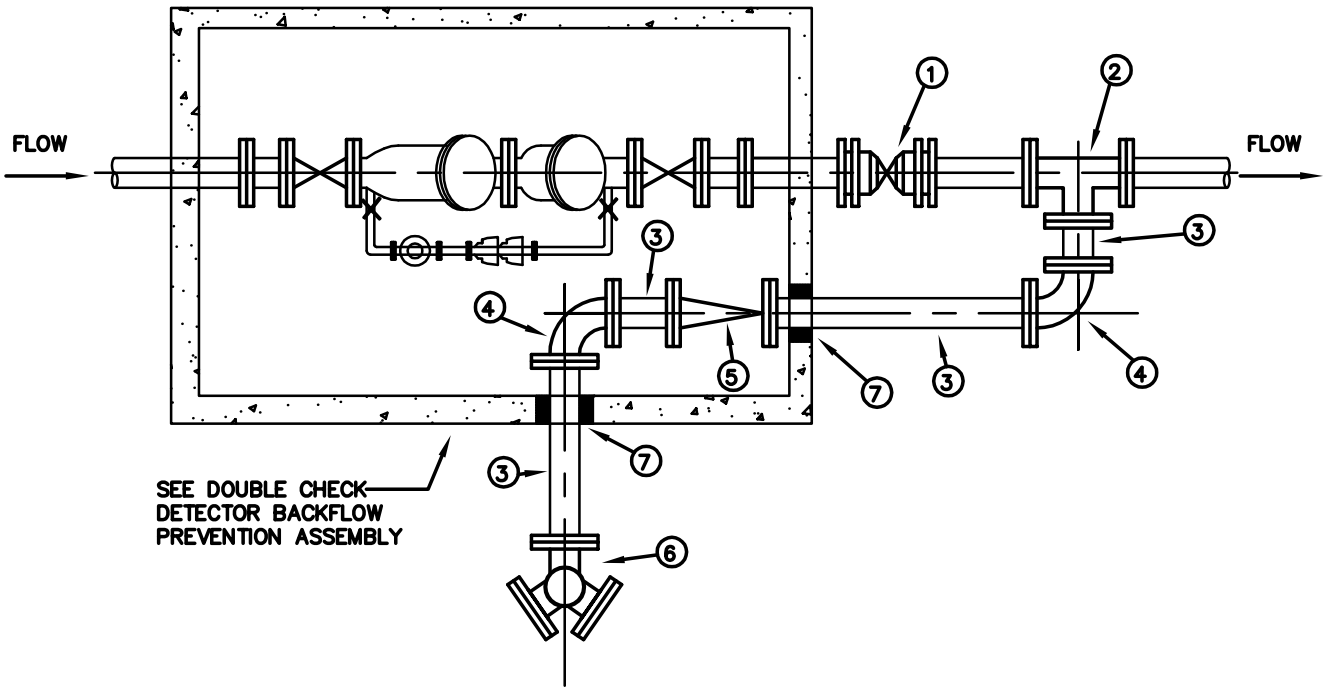
NO.	DESCRIPTION
1	STATE APPR'D DOUBLE CHECK DETECTOR BACKFLOW PREV. ASSY, (W/O.S.&Y. V.)
2	ROMAC STYLE 'FCA 501' FLANGED COUPLING ADAPTER
3	5/8" X 3/4" ROCKWELL OR NEPTUNE METER (GALLON READING)
4	FORD V42 RESETTER
5	SHUT–OFF VALVE
6	STATE APPROVED 3/4" DOUBLE CHECK VALVE ASSY.
7	BRASS OR TYPE K COPPER
8	2 EA. ADJUSTABLE STANCHIONS (LOCATE AT ENDS OF DOUBLE CHECK)
9	GALV. STEEL LADDER (LOCATE AS SHOWN ON PLAN)
10	PIPE SPOOL, CL. 52 D.I. PLAIN END
11	UTILITY VAULT. NO. 612–LA (6' X 12' X 6'–6" H, INSIDE DIM.), HINGED AND SPRING LOCKED STL. PL. COVER NO. 5106 TL–2–332 P (DOUBLE HATCH COVER) CHECK VAULT SIZE REQ'D. FOR ENCLOSING ASSY'S. SMALLER OR LARGER THAN 8" SIZE
12	6" PVC DRAIN LINE, DAYLIGHT WITH SCREEN OR CONNECT TO CATCH BASIN
13	WATER TIGHT GROUT, INLET AND OUTLET PIPE

NOTES:

AFTER PRESSURE TEST AND PURITY SAMPLES ARE RECEIVED A CERTIFIED BACKFLOW TECHNICIAN MUST SUPPLY CITY WITH A WRITTEN TEST REPORT ON EACH BACKFLOW ASSEMBLY.

DOUBLE CHECK DETECTOR BACKFLOW PREVENTION ASSEMBLY

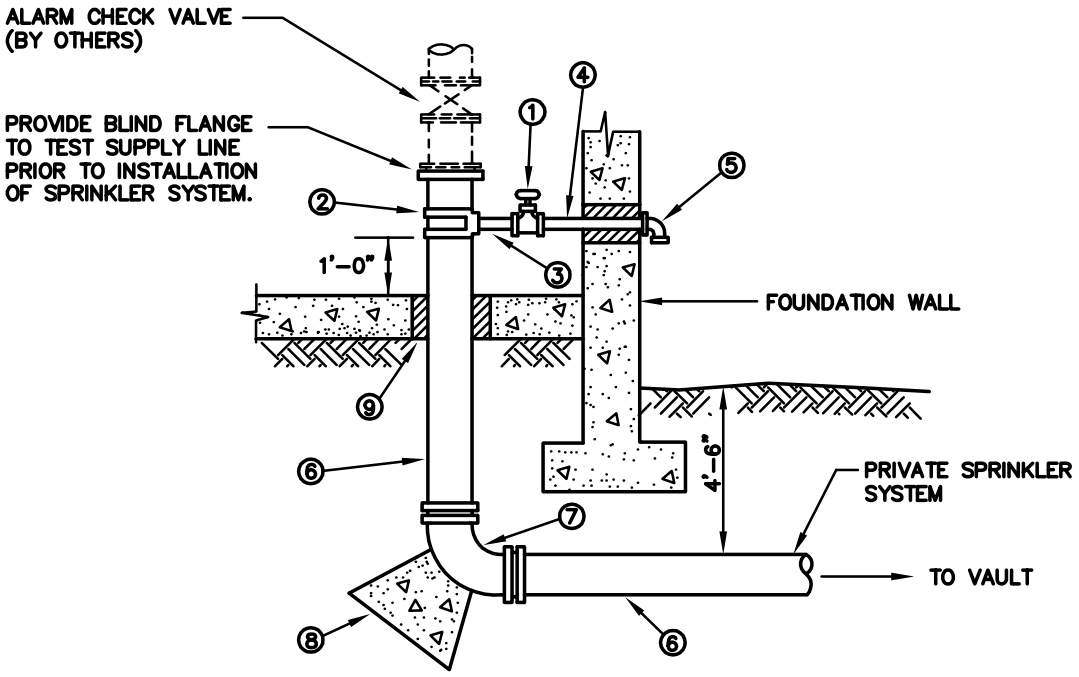
Detail Approval Engineer: N.E.L.	CITY OF ILWACO STANDARD WATER DETAILS February 2011	W–D14



NO.	DESCRIPTION
1	POST INDICATOR VALVE, MJ WITH MEGALUGS
2	4" TEE, MJ WITH MEGALUGS
3	4" DUCTILE IRON PIPE, CLASS 52
4	4" X 90° BENDS, MJ WITH MEGALUGS
5	4" FLAPPER CHECK VALVE, MJ WITH MEGALUGS
6	FIRE DEPARTMENT CONNECTION, MJ WITH MEGALUGS. CONNECTION TO COMPLY WITH FIRE DEPARTMENT REQUIREMNETS.
7	WATERTIGHT GROUT

FIRE LINE CONNECTION

Detail Approval Engineer: N.E.L.	CITY OF ILWACO STANDARD WATER DETAILS February 2011	W–D15



No.	DESCRIPTION
1	2" RWGV OR BRONZE BALL VALVE
2	ROMAC STYLE 202S STAINLESS STEEL DOUBLE STRAP SADDLE (OR APPROVED EQUAL)
3	2" BRASS NIPPLE
4	2" GALVANIZED NIPPLE
5	2" GALVANIZED 90° EL
6	D.I. CL. 52 SUPPLY MAIN (SIZE AS DETERMINED BY FIRE FLOW REQUIREMENTS).
7	90° BEND (MJ X MJ) WITH MEGALUG
8	CONCRETE THRUST BLOCK (SIZE TO BE APPROVED BY CITY)
9	1/2" EXPANSION JOINT

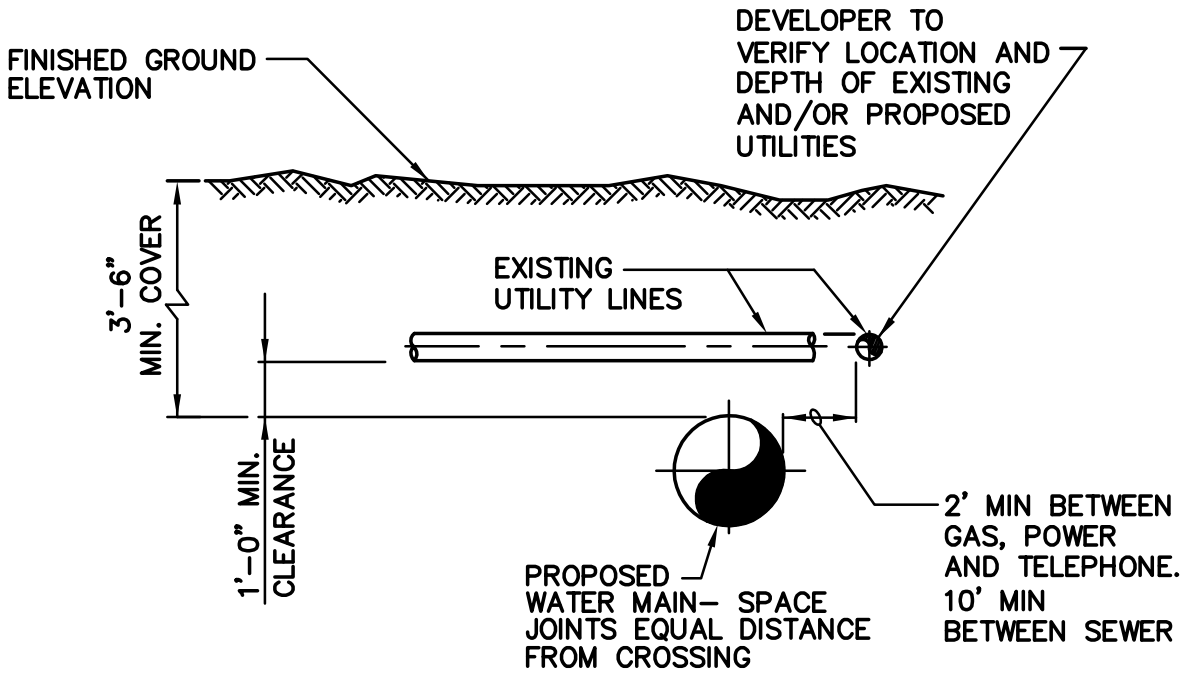
NOTE

AFTER SYSTEM IS PRESSURE TESTED, PURITY SAMPLES SHALL BE TAKEN AT ALL RISERS IN SYSTEM.

4" DIAMETER AND SMALLER DUCTILE IRON PIPE SHALL BE CLASS 53 IF USED IN A THREADED APPLICATION.

FIRE LINE RISER DETAIL

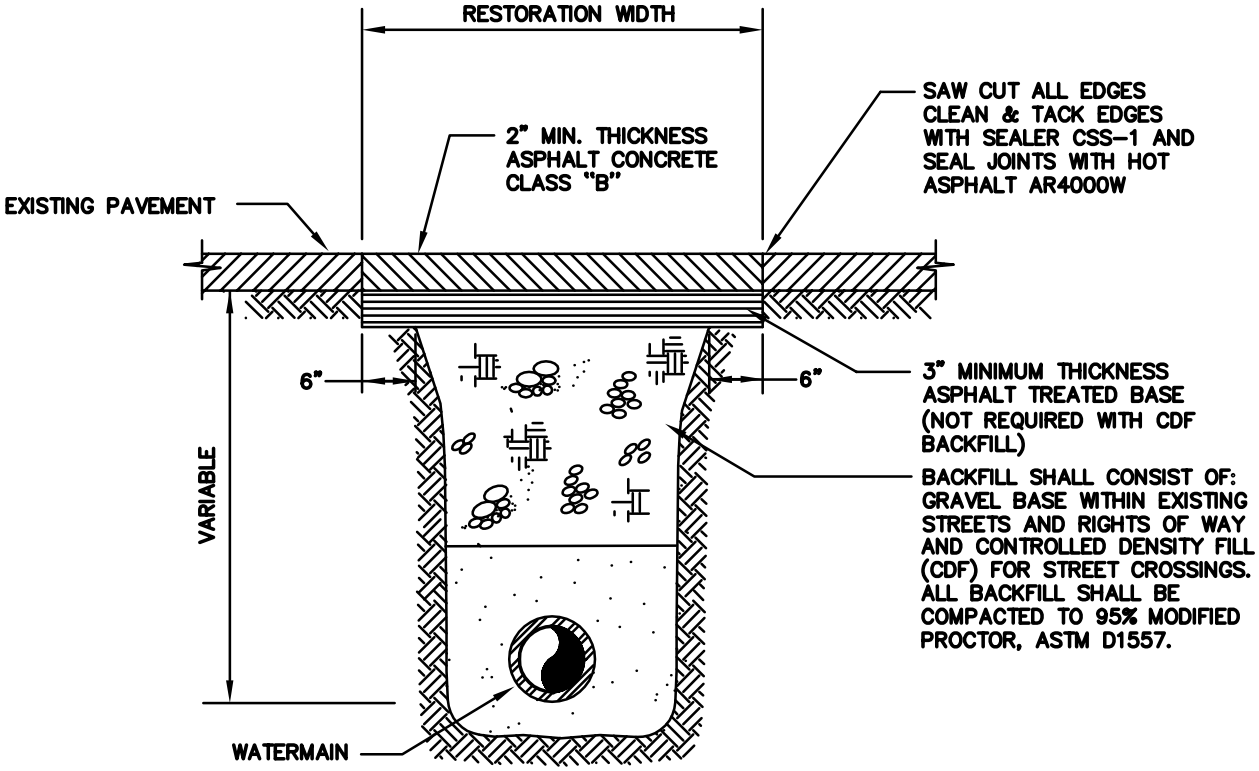
Detail Approval Engineer: N.E.L.	CITY OF ILWACO STANDARD WATER DETAILS February 2011	W-D16



NOTE: CONCRETE ENCASEMENT (BEDDING) SHALL BE UTILIZED, IF APPROVED BY THE CITY, AT LOCALIZED UTILITY CROSSING IF MINIMUM PIPE SEPARATION (ELEVATION) CANNOT BE MAINTAINED / ACHIEVED.

TYPICAL UTILITY CROSSING

Detail Approval Engineer: N.E.L.	CITY OF ILWACO STANDARD WATER DETAILS February 2011	W-D17

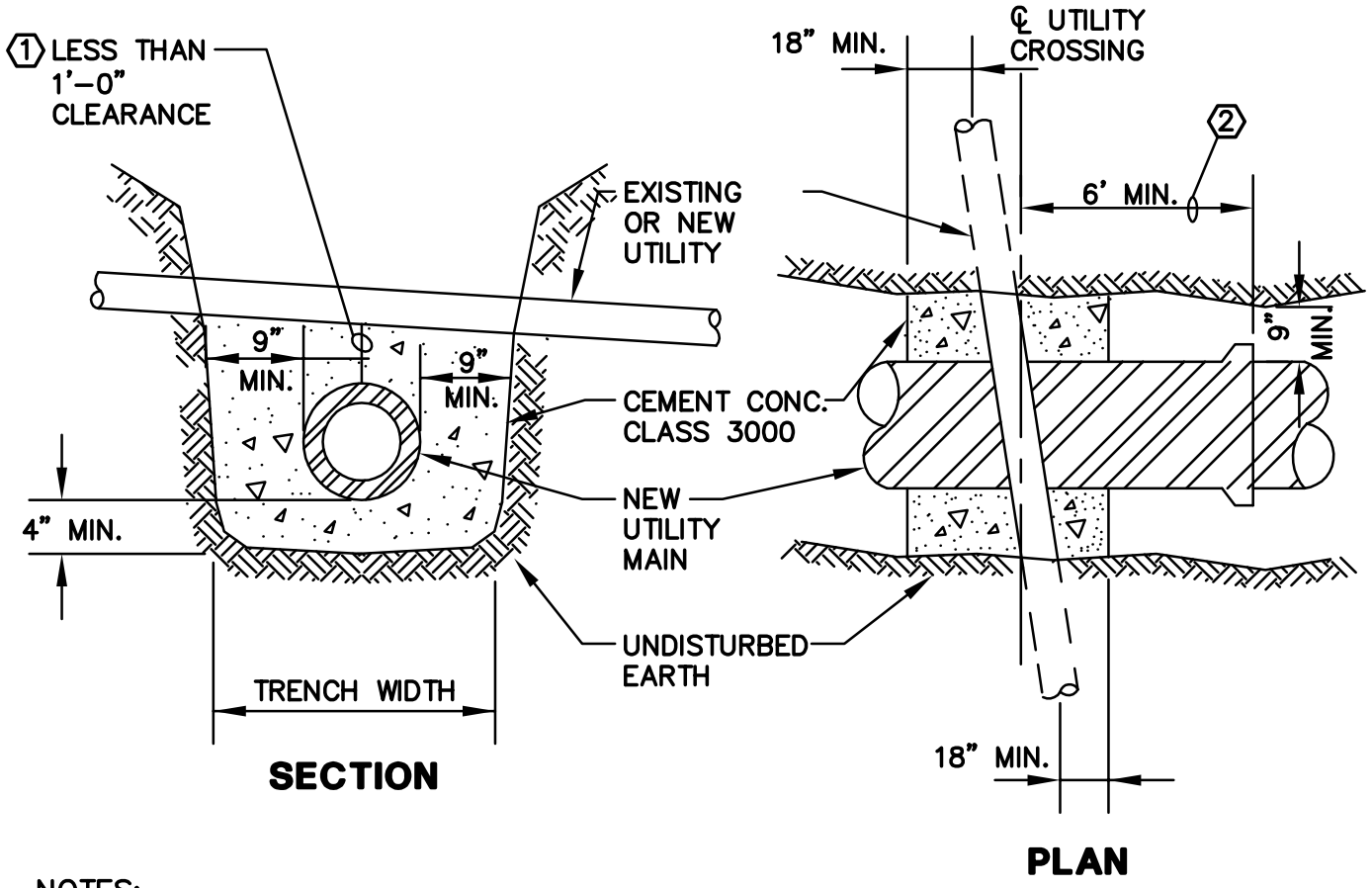


NOTES:

1. ALL ASPHALT STREETS AND DRIVEWAYS SHALL BE TEMPORARILY REPAIRED WITH COLD MIX, EXCEPT CROSSINGS WITH CDF SHALL BE COVERED WITH STEEL PLATES UNTIL THE CDF HAS CURRED TO ALLOW FOR PLACEMENT OF THE ASPHALT.
2. PATCH SHALL BE MACHINE ROLLED FLUSH WITH EXISTING PAVEMENT AND SHALL BE PLACED PER SEC. 5-04 OF THE WA. STATE D.O.T. SPECIFICATIONS.

ASPHALT PAVEMENT REPAIR

Detail Approval Engineer: N.E.L.	CITY OF ILWACO STANDARD WATER DETAILS February 2011	W-D18



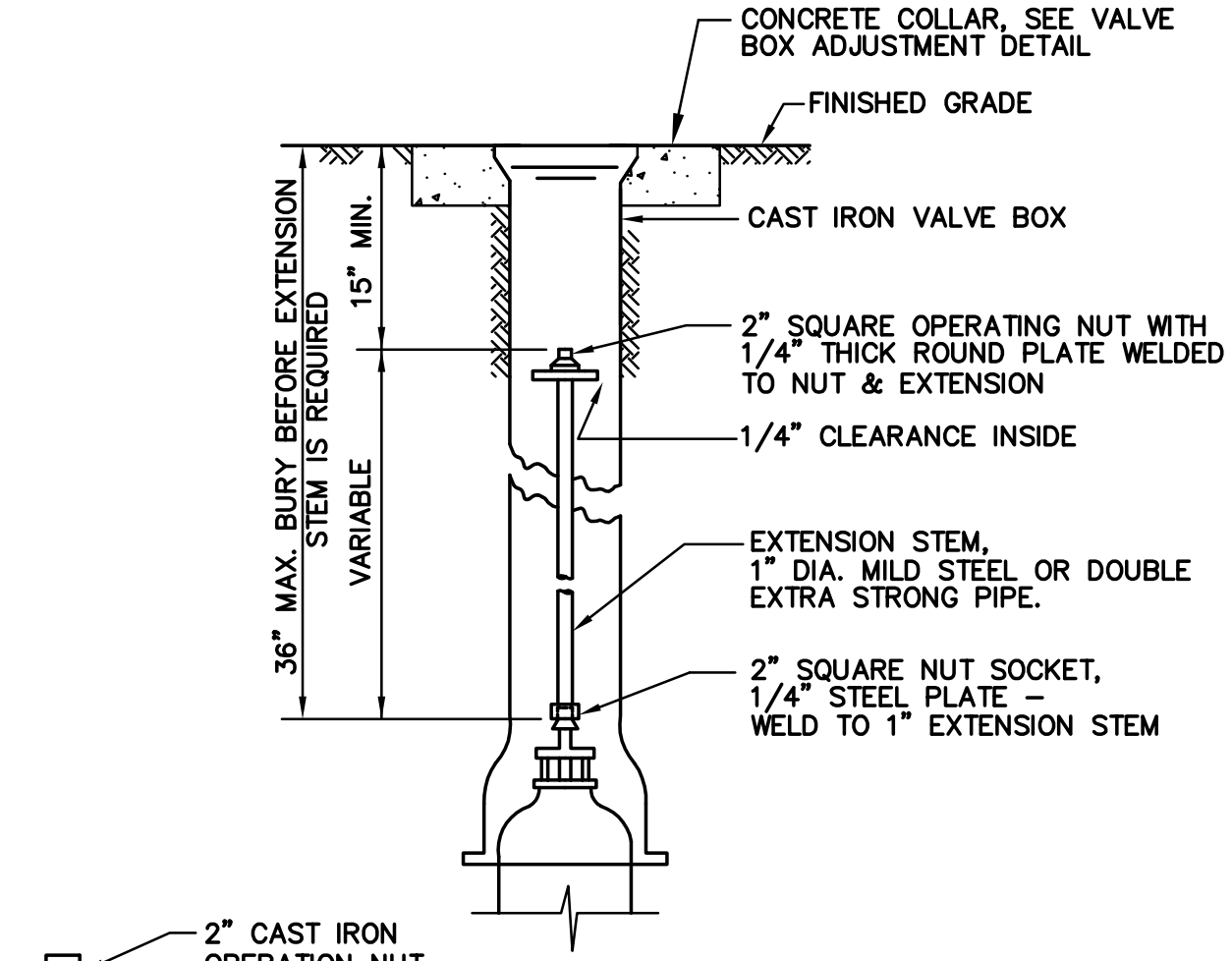
NOTES:

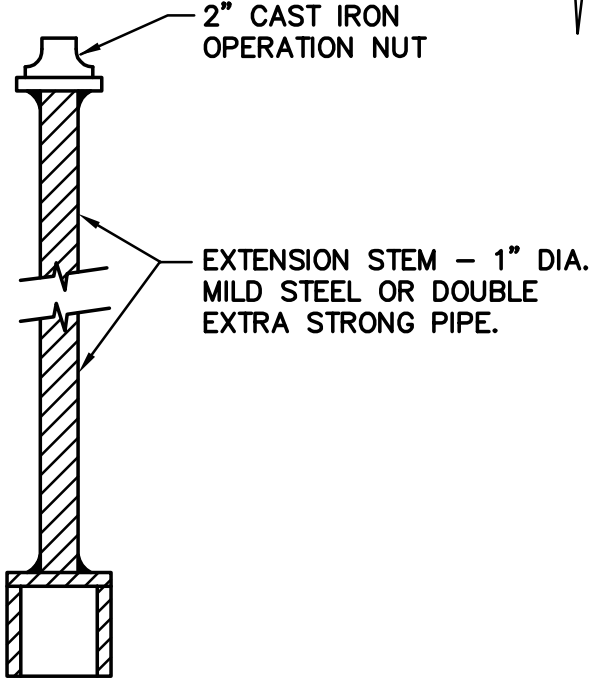
① CONTRACTOR SHALL PROVIDE CONCRETE PIPE ENCASEMENT AT ALL EXISTING UTILITY CROSSINGS IN THE EVENT THAT A 1 FOOT SEPARATION CANNOT BE PROVIDED. THE CONTRACTOR SHALL FAMILIARIZE THEMSELVES WITH THE SITE UTILITIES TO ANTICIPATE PROVIDING AND INSTALLING CONCRETE ENCASEMENTS WHERE NECESSARY.

② CONTRACTOR SHALL NOT CONSTRUCT ANY NEW PIPE JOINT WITHIN 6 FEET OF THE EXISTING CENTERLINE OF THE UTILITY CROSSING.

CONCRETE PIPE ENCASEMENT

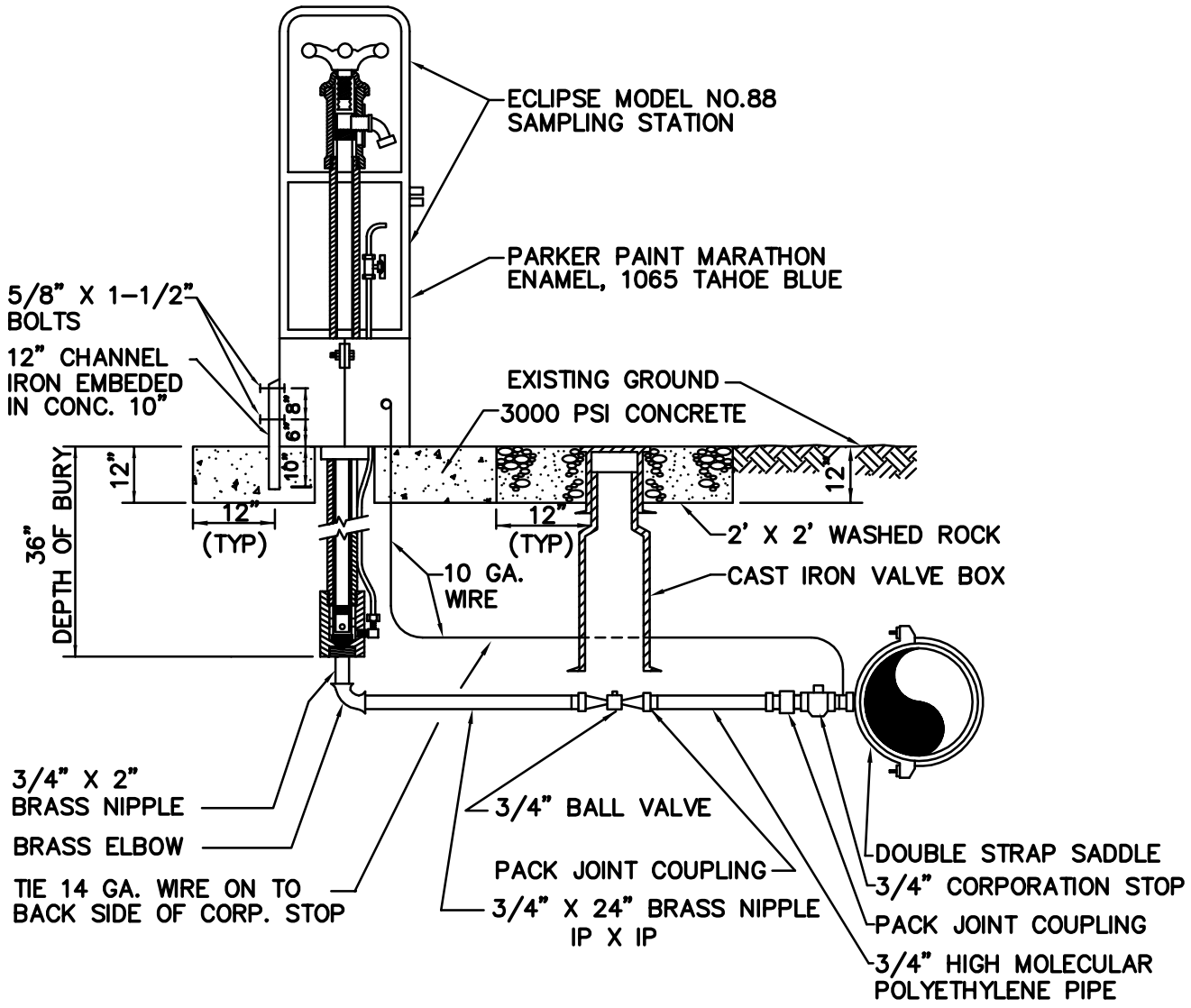
Detail Approval Engineer: N.E.L.	CITY OF ILWACO STANDARD WATER DETAILS February 2011	W–D19





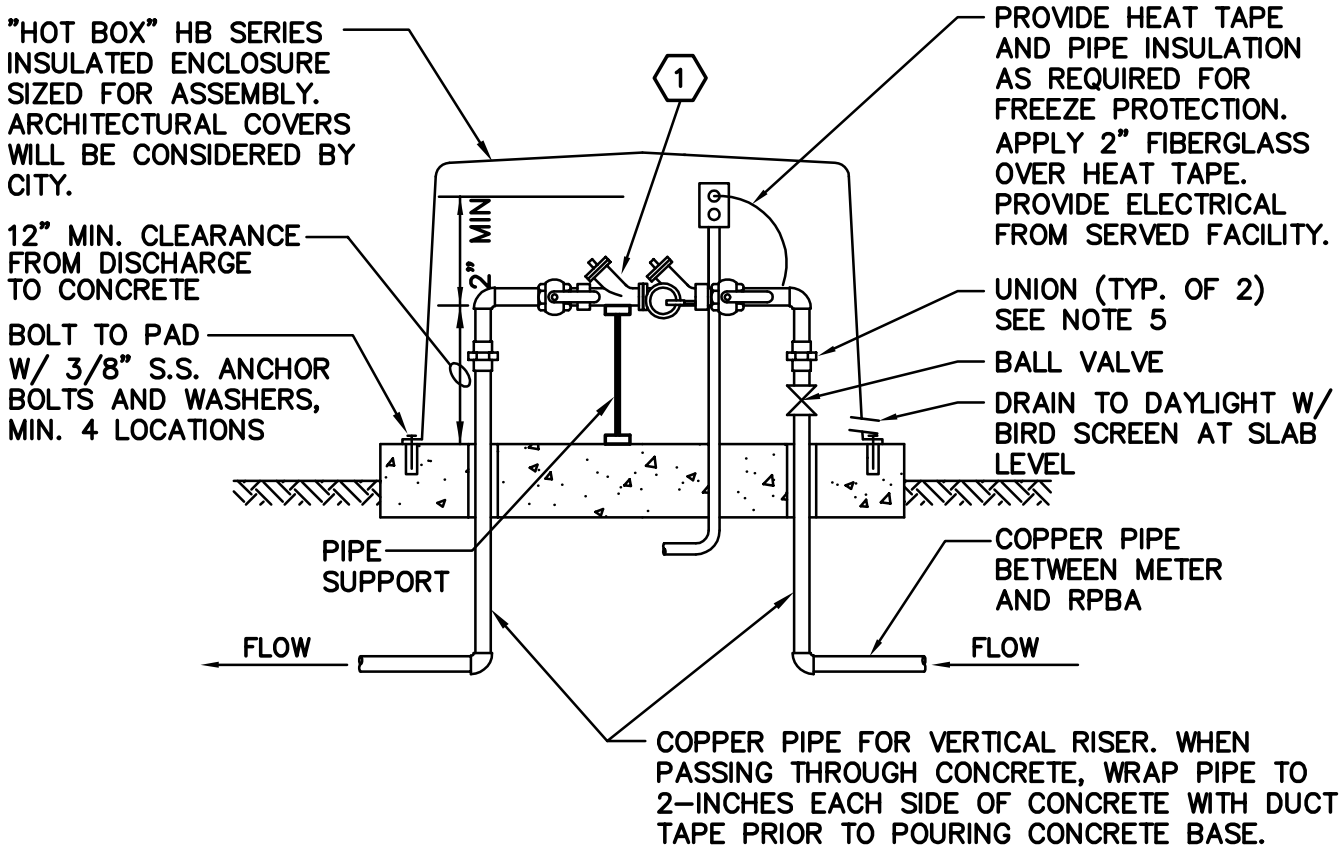
WATER VALVE STEM EXTENSION

Detail Approval Engineer: N.E.L.	CITY OF ILWACO STANDARD WATER DETAILS February 2011	W–D20



WATER SAMPLING STATION

Detail Approval Engineer: N.E.L.	CITY OF ILWACO STANDARD WATER DETAILS February 2011	W-D21



REDUCED PRESSURE BACKFLOW DEVICE

NOT TO SCALE

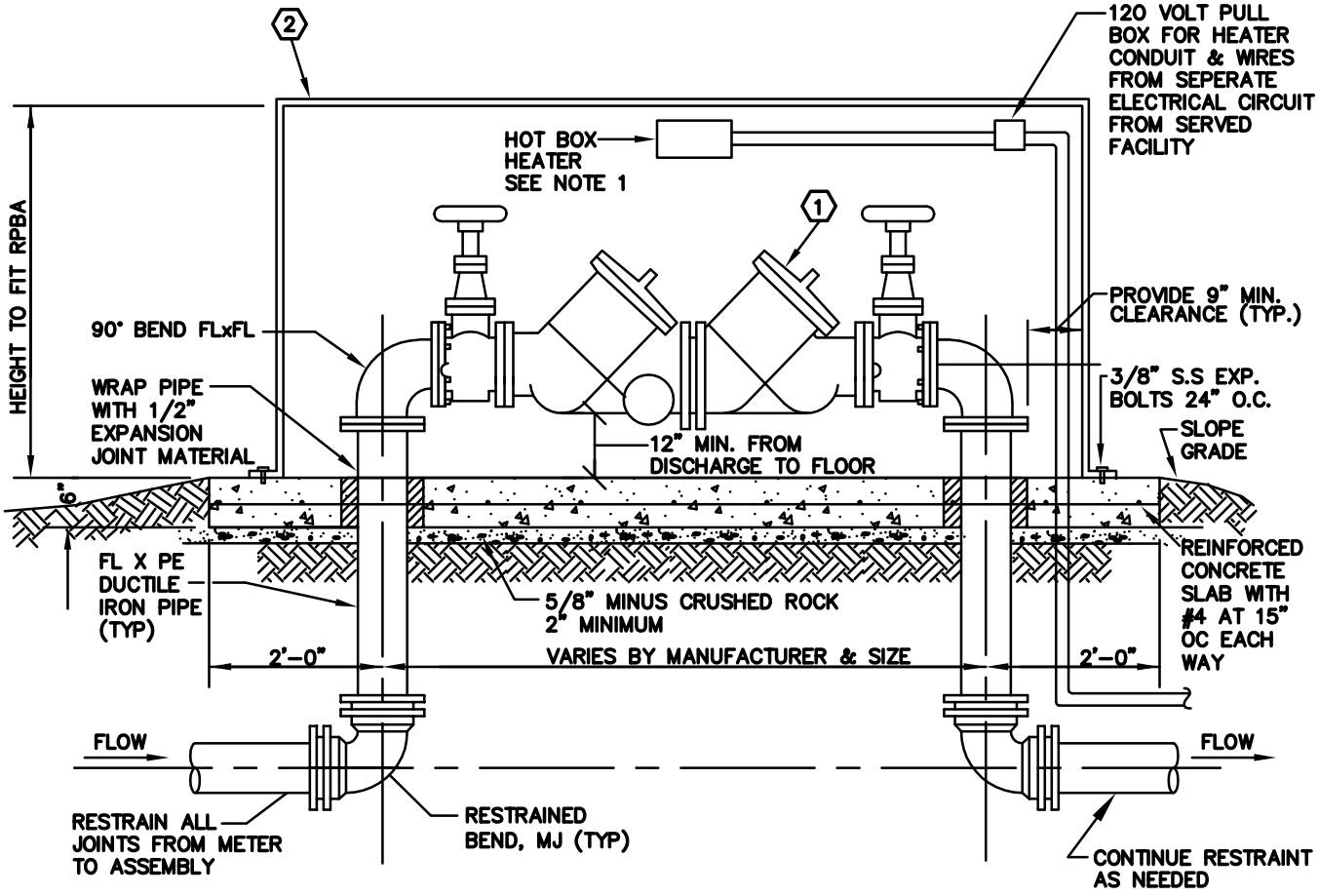
(1) WASHINGTON STATE APPROVED REDUCED PRESSURE BACKFLOW ASSEMBLY (RPBA) WITH TEST COCK PROTECTION AND BRONZE BODY BALL VALVE AT EACH END.

NOTES:

1. CONCRETE TO BE 2500 PSI (MINIMUM) MIX WITH AIR ENTRAINMENT.
2. COMPLETE ALL WORK IN ACCORDANCE WITH STATE, CITY AND MANUFACTURER STANDARDS.
3. SYSTEM SHALL NOT BE PUT INTO SERVICE UNTIL RPBA IS APPROVED BY THE CITY AND TESTED/CERTIFIED BY A WASHINGTON STATE LICENSED TESTER.
4. RPBA IS CONSIDERED PART OF THE PRIVATE SYSTEM AND SHALL BE MAINTAINED BY THE PROPERTY OWNER WITH ANNUAL CERTIFICATION REQUIRED.
5. DIELECTRIC UNIONS SHALL BE USED TO SEPARATE DISSIMILAR MATERIALS.
6. NO BRANCH CONNECTIONS ALLOWED BETWEEN METER AND RPBA.

REDUCED PRESSURE BACKFLOW ASSEMBLY 3/4" TO 2"

Detail Approval Engineer: N.E.L.	CITY OF ILWACO STANDARD WATER DETAILS February 2011	W-D22



(1) WASHINGTON STATE APPROVED REDUCED PRESSURE BACKFLOW ASSEMBLY (RPBA) WITH RESILIENT SEAT GATE VALVE EACH END

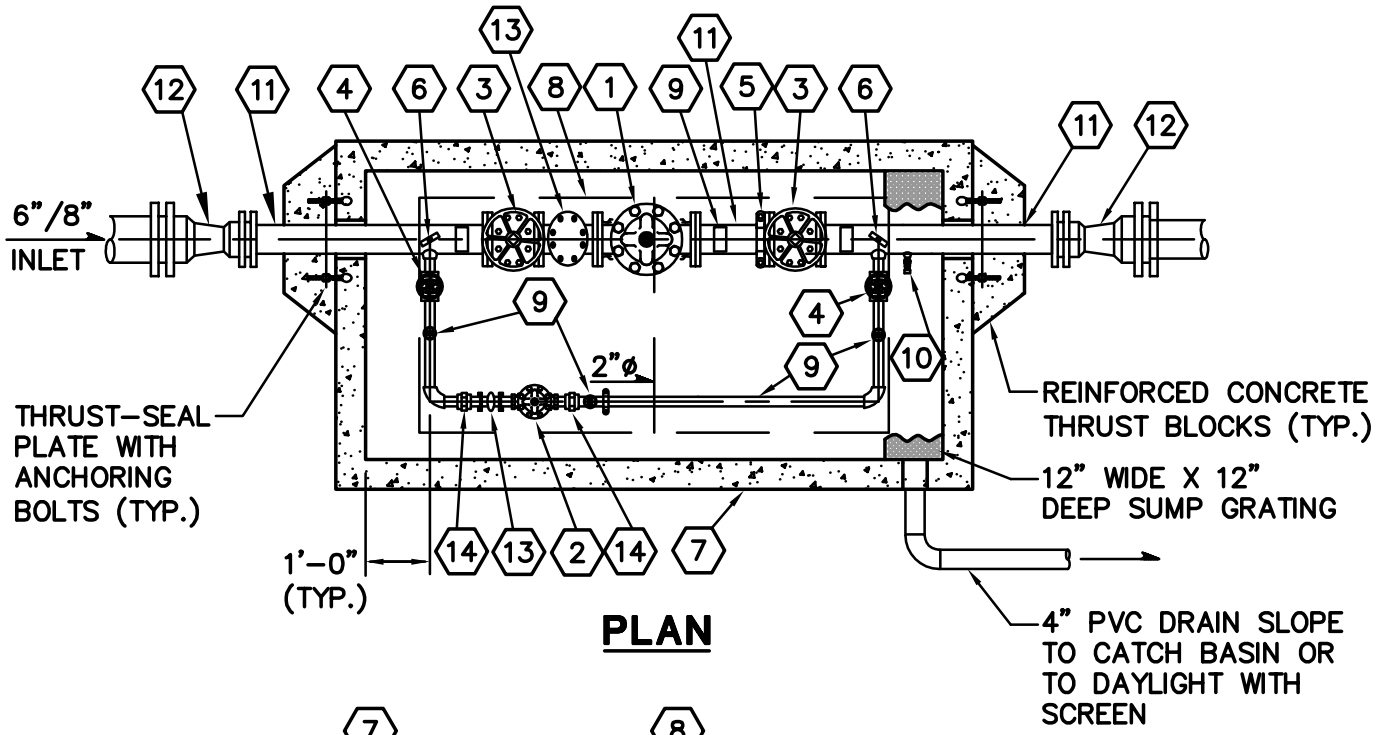
(2) ALUMINUM "HOT BOX" MODELS 4 THROUGH 10 FOR RESPECTIVE SIZE RPBA SHALL BE MODIFIED TO FIT ABOVE HEIGHT REQUIREMENTS. VALVE STEM SHALL NOT EXTEND OUTSIDE OF BOX.

NOTES:

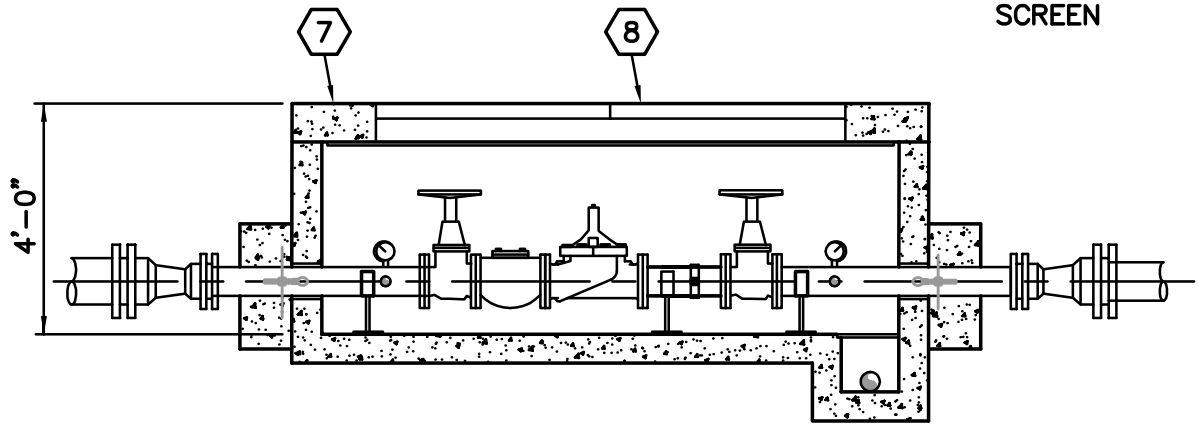
1. "HOT BOX" TO BE LOCATED OUTDOORS AND ACCESSIBLE TO CITY. ALTERNATE LOCATION REQUIRES CITY APPROVAL.
2. HEATERS AND WIRING SHALL BE RATED AT 2,000 WATT FOR 8" AND UNDER: 3,000 WATT FOR 10".
3. CONCRETE TO BE 2500 PSI (MINIMUM) MIX WITH AIR ENTRAINMENT.
4. COMPLETE ALL WORK IN ACCORDANCE WITH STATE, CITY AND MANUFACTURER STANDARDS.
5. SYSTEM SHALL NOT BE PUT INTO SERVICE UNTIL RPBA IS APPROVED BY THE CITY AND TESTED/CERTIFIED BY A WASHINGTON STATE LICENSED TESTER.
6. RPBA IS CONSIDERED PART OF THE PRIVATE SYSTEM AND SHALL BE MAINTAINED BY THE PROPERTY OWNER WITH ANNUAL CERTIFICATION REQUIRED.
7. DRAIN TO DAYLIGHT WITH BIRD SCREEN LOCATED AT SLAB LEVEL (SIZED PER MANUFACTUERS RECOMMENDATION).
8. NO BRANCH CONNECTIONS ALLOWED BETWEEN METER AND RPBA.

REDUCED PRESSURE BACKFLOW ASSEMBLY 3" AND LARGER

Detail Approval Engineer: N.E.L.	CITY OF ILWACO STANDARD WATER DETAILS February 2011	W-D23



PLAN



SECTION

NOTE:

ALTERNATE TO FIELD ASSEMBLED PRV AND VAULT IS SYSTEM AS MANUFACTURED BY GC SYSTEMS.

SEE PAGE 2 FOR CALLOUTS AND NOTES

PRESSURE REDUCING STATION
(1 OF 2)

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PRESSURE REDUCING STATION

(TO BE SIZED BY CITY)

LEGEND - SEE PAGE 1 FOR PLAN AND SECTION

1. 6" CLA-VAL 92G-01BCSY PRESSURE REDUCING VALVE WITH X101 POSITION INDICATOR DI BODY, S.S. TRIM, #150 FL.
2. 2" CLA-VAL 90G-01BC PRESSURE REDUCING VALVE WITH X101 POSITION INDICATOR DI BODY, BRONZE TRIM - THREADED.
3. 6" D.I. RW NRS GATE VALVE WITH HANDWHEEL, #150 FL.
4. 2" MUELLER A2360-6W41 W55 RW NRS GATE VALVE WITH HANDWHEEL, THD.
5. UNIFLANGE
6. 4" 0-300 PSI PRESSURE GAUGE WITH SNUBBER AND GAUGE COCK; TOP OF PIPE.
7. PRECAST CONCRETE VAULT 10'L X 5'W X 3'-7"H INSIDE, SOLID WALL WITH WHITE INTERIOR & BLACK EXTERIOR SEALANT
8. 48" X 96" DOUBLE DOOR ALUMINUM HATCH, LW PRODUCTS OR EQUAL. H-20 RATED. DRAIN HATCH TO VAULT FLOOR.
9. ADJUSTABLE PIPE SUPPORTS
10. 3/4" HOSE BIB ASSEMBLY
11. PIPE SPOOL (FLxPE) LENGTH AS REQUIRED.
12. REDUCER (AS REQUIRED), MJ WITH MEGA-LUGS
13. WATER METER STRAINER, INVENSYS OR EQUAL, FL
14. UNIONS

NOTES:

1. 6" x 2" PRV ASSEMBLY SHOWN. SIZES TO BE DETERMINED BY THE CITY BASED ON DOWNSTREAM DEMANDS.
2. ALL 3" AND LARGER PIPE INSIDE WETTED SURFACES TO BE SANDBLASTED, EPOXY LINED AND COATED TO AWWA C210 AND NSF-61 SPECIFICATION. EXTERIOR COATING SHALL BE BLUE ENAMEL.
3. ALL PIPE 2" AND SMALLER TO BE BRASS.

PRESSURE REDUCING STATION
(2 OF 2)

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APPENDIX E

CROSS-CONNECTION CONTROL PROGRAM

Chapter 8.01
CROSS-CONNECTION CONTROL PROGRAM

Sections:

8.01.010 Purpose.

8.01.020 Definitions.

8.01.030 Cross-connections regulated.

8.01.040 Application and responsibilities.

8.01.050 Backflow prevention assembly requirements.

8.01.060 Irrigation systems.

8.01.070 Fire systems.

8.01.080 Temporary meters and hydrant valves.

8.01.090 Mobile unit.

8.01.100 Right-of-way encroachment.

8.01.110 Plumbing code.

8.01.120 Access to premises.

8.01.130 Testing and repairs.

8.01.140 Responsibilities of backflow prevention assembly testers.

8.01.150 Maintenance of assemblies.

8.01.160 Installation requirements and specifications.

8.01.170 Thermal expansion.

8.01.180 Pressure loss.

8.01.190 Parallel installation.

8.01.200 New construction.

8.01.210 Residential service connections.

8.01.220 Rental properties.

8.01.230 Retrofitting.

8.01.240 Costs of compliance.

8.01.250 Recovery of costs.

8.01.260 Termination of service.

8.01.270 Emergency suspension of service.

8.01.280 Non-emergency suspension of service.

8.01.290 Violation—Penalty.

8.01.300 Falsifying information.

8.01.010 Purpose.

The purpose of this chapter is to protect the water system of the city of Ilwaco from contamination or pollution due to any existing or potential cross-connections as defined in WAC 246-290-010. (Ord. 797 § 1 (part), 2012)

8.01.020 Definitions.

Except where specifically designated herein, all words used in this chapter shall carry their customary meanings. Words used in the present tense include the future, and plural words include the singular. The word “shall” is always mandatory, and the word “may” denotes a use of discretion in making a decision. Any definition not found in this section will take its meaning from the WAC (Chapter 246-290 WAC), or as amended, or in the most recent edition of the *Manual of Cross-Connection Control* published by the Foundation for Cross-Connection Control and Hydraulic Research, University of Southern California.

“Air gap” means a physical separation between the free-flowing end of a potable water supply pipeline and the overflow rim of an open or nonpressure receiving vessel. To be an “approved air gap,” the separation must be at least twice the diameter of the inlet piping (supply pipe) measured vertically, and never be less than one (1) inch.

“Approved backflow prevention assembly” or “backflow assembly” or “assembly” means an assembly to counteract backpressures or prevent backsiphonage. This assembly must appear on the list of approved assemblies issued by the Washington State Department of Health. The assembly must be purchased and installed as a complete unit, including two shut-off valves and test cocks.

“Auxiliary supply” means any water source or system other than the city of Ilwaco’s water.

“Backflow” means the flow of water or other liquids, gases or solids from any source back into the distribution system or the flow of water in the opposite direction of its intended flow.

“Backflow assembly tester” means a person holding a valid BAT certificate issued in accordance with WAC 246-290-490 and Chapters 18.106, 18.27 and 70.119 RCW.

“Backpressure” shall mean backflow due to water pressure on the downstream side of the meter that exceeds the operating pressure of the public potable water supply.

“Backsiphonage” shall mean backflow due to a negative or reduced pressure within the public potable water supply.

“Building inspector” shall mean the building inspector for the city of Ilwaco.

“City” shall mean the city of Ilwaco.

“Closed system” means any water system or portion of a water system in which water is closed to atmosphere.

“Contamination” means the entry into or presence in a public water supply system of any substance that may be harmful to health and/or the quality of water.

“Cross-connection” means any physical arrangement where a public water system is connected, directly or indirectly (actual or potential), with any other nondrinkable water system or auxiliary system, wells, sewer, drain conduit, swimming pool, storage reservoir, plumbing fixture, swamp coolers, or any other device that contains, or may contain, contaminated or polluted water, sewage, used water or other liquid of unknown or unsafe quality which may be capable of imparting contamination or pollution to the public water system as a result of backflow. Bypass arrangements, jumper connections, removable sections, swivel or changeover devices, or other temporary or permanent devices through which, or because of which, backflow may occur are considered to be cross-connections.

“Cross-connection specialist” or “CCS” shall mean a person holding a valid CCS certificate issued in accordance with the Washington Administrative Code.

“Degree of hazard” means the low or high hazard classification that shall be attached to all actual or potential cross-connections.

“DOH” means Washington State Department of Health.

“Double-check valve backflow prevention assembly” or “double-check assembly” or “double check” or “DCVA” or “DC” means an assembly that consists of two independently operating check valves which are spring-loaded or weighted. The assembly comes complete with a shut-off valve on each side of the checks, as well as test cocks.

“Health hazard” means an actual or potential threat of contamination of a physical, toxic or biological nature that would be a danger to health.

“High hazard” means the classification assigned to an actual or potential cross-connection that potentially could allow a substance that may cause illness or death to backflow into the potable water supply.

“In-premises protection” means a method of protecting the health of consumers served by the customer’s plumbing system (i.e., located within the property lines of the customer’s premises) by the installation of an approved air gap, backflow prevention assembly or device at the point of hazard.

“Inspector,” “surveyor” or “specialist” shall mean a person holding a valid CCS certificate issued in accordance with the Washington Administrative Code, who meets the stipulations in this chapter and the most recent edition of the city’s guidance manual.

“Local administrative authority” means the local official, board, department or agency authorized to administer and enforce the provisions of the Uniform Plumbing Code and all other plumbing codes

recognized by the state of Washington.

“Low hazard” means the classification assigned to an actual or potential cross-connection that could allow a substance that may be objectionable, but not hazardous to one’s health, to backflow into the potable water supply.

“Mobile unit” shall mean a unit connecting to the water system through a hydrant, hose bibb or other appurtenance of a permanent nature that is part of the city water system or a permanent water service to a premises. Examples can include, but are not limited to, the following: water trucks, pesticide applicator vehicles, chemical mixing units or tanks, waste or septage hauler trucks or units, sewer cleaning equipment, carpet or steam cleaning equipment, rock quarry or asphalt/concrete batch plants or any other mobile equipment or vessel. Uses that are excluded from this definition are recreational vehicles at assigned sites or parked in accordance with other city ordinances pertaining to recreational vehicles, and homeowner devices that are used by the property owner in accordance with other provisions of this chapter, or other city of Ilwaco ordinances pertaining to provision of water service to a premises.

“Person” means a natural person (individual), corporation, company, association, partnership, firm, limited liability company, joint venture company or association, and other such entity.

“Plumbing hazard” means an internal or plumbing-type cross-connection in a consumer’s potable water system that may be either a pollutional or a contamination-type hazard. This includes, but is not limited to, cross-connections to toilets, sinks, lavatories, wash trays, domestic washing machines and lawn sprinkling systems. Plumbing-type cross-connections can be located in all types of structures, including but not limited to homes, manufactured homes, apartment houses, hotels and commercial or industrial establishments.

“Point-of-use isolation” shall mean the same as “in-premises protection.”

“Pollutional hazard” means an actual or potential threat to the physical properties of the water system or the potability of the public or the consumer’s potable water system but which would not constitute a health or system hazard, as defined. The maximum degree of intensity of pollution to which the potable water system could be degraded under this definition would cause a nuisance or be aesthetically objectionable or could cause minor damage to the system or its appurtenances.

“Potable water supply” means any system of water supply intended or used for human consumption or other domestic use and meets all requirements established by the Safe Drinking Water Act and the DOH regulations.

“Premises” means any piece of property to which water is provided, including but not limited to all improvements, mobile structures and structures located on it.

“Premises isolation” means a method of protecting a public water system by installation of an approved air gap or approved backflow prevention assembly at the point of service (end of purveyor’s service pipe) to separate the customer’s plumbing system from the purveyor’s distribution system.

“Reduced pressure principle backflow prevention assembly” or “reduced pressure principle assembly” or “RP assembly” shall mean an assembly containing two (2) independently acting approved check valves together with a hydraulically operated, mechanically independent pressure

differential relief valve located between the check valves. The assembly shall include properly located test cocks and tightly closing shut-off valves at each end of the assembly.

“Supervisor” means public works supervisor.

“Thermal expansion” means the pressure created by the expansion of heated water.

“Used water” means any water supplied by the city to a customer’s property after it has passed through the service connection and is no longer under the control of the city.

“WAC” means the most recent edition of the Washington Administrative Code. (Ord. 797 § 1 (part), 2012)

8.01.030 Cross-connections regulated.

A. No cross-connections shall be created, installed, used or maintained within the territory served by the city, except in accordance with this chapter.

B. The CCS for the city shall carry out or cause inspections to be carried out to determine if any actual or potential cross-connections exist. If found necessary, an assembly commensurate with the degree of hazard will be required to be installed at the service connection.

C. The owner, occupant or person in control of the property is responsible for all cross-connection control within the premises.

D. All high health hazard premises which are defined by Table 9 of WAC 246-290-490, as amended, are required to have premises isolation by a reduced pressure backflow assembly at the service connection in accordance with this chapter.

E. If there is a change in ownership of any and all property within the city’s service area, it shall be the responsibility of the new owner to determine that all assemblies are in compliance with this chapter. (Ord. 797 § 1 (part), 2012)

8.01.040 Application and responsibilities.

This chapter applies throughout the city and to every premises and property served by the city water system. It applies to any premises, public or private, regardless of date of connection to the city water. Every owner, occupant and/or person in control of any concerned premises is responsible for compliance with the terms and provisions contained herein. (Ord. 797 § 1 (part), 2012)

8.01.050 Backflow prevention assembly requirements.

A CCS employed by or under contract with the city shall determine the type of backflow assembly to be installed within the area served by the city. All assemblies shall be installed at the service connection unless it is determined by the CCS to install the assembly at an alternate location for premises protection or at the point of use. The cross-connection shall be eliminated or an assembly shall be required to be installed in each of the following circumstances, but the CCS is in no way limited to the following circumstances:

A. The nature and extent of any activity on the premises, or the materials used in connection with any activity on the premises, or materials stored on the premises, could contaminate or pollute the potable water supply.

B. Premises having any one (1) or more cross-connections, or potential cross-connections, as

defined in this chapter and the WAC.

C. When a cross-connection survey report form is required by the city to be filled out and returned and it has not been.

D. Internal cross-connections are present that are not correctable.

E. Intricate plumbing arrangements exist or plumbing subject to frequent changes is present that make it impractical to ascertain whether or not cross-connections exist.

F. There is a repeated history of cross-connections being established or re-established.

G. There is unduly restricted entry so that inspections for cross-connections cannot be made with sufficient frequency to ensure that cross-connections do not exist.

H. Materials, chemicals or any substance or apparatus are being used that if backflow occurred contamination would result.

I. Installation of an approved backflow prevention assembly is deemed to be necessary in the judgment of the CCS to accomplish the purpose of these regulations.

J. Any premises having an auxiliary water supply.

K. In the event there is no premises isolation assembly and the point-of-use assembly or assemblies have not been tested or repaired as required by WAC 246-290-490, or as amended, and this chapter.

L. If it is determined that additions or rearrangements have been made to the plumbing system without obtaining proper permits as required by the city building inspector.

M. When a garden hose attachment is connected to the premises plumbing, including but not limited to fertilizer applicators, pesticide applicators and radiator flush kits. (Ord. 797 § 1 (part), 2012)

8.01.060 Irrigation systems.

All irrigation systems shall be protected in accordance with the plumbing code regulations. In the event any system is equipped with an injector system, or has submerged heads, a reduced pressure principle assembly will be required. (Ord. 797 § 1 (part), 2012)

8.01.070 Fire systems.

An approved double-check backflow prevention assembly shall be the minimum protection on all new fire sprinkler systems using piping material that is not approved for potable water use, and/or that does not provide for periodic flow-through. A reduced pressure principle backflow prevention assembly must be installed, if any solution other than the potable water can be introduced into the sprinkler system. Retrofitting on fire sprinkler systems will be required in each of the following circumstances:

A. Where improper maintenance has occurred.

B. On all high hazard systems.

C. Wherever an inspector deems necessary.

D. Wherever required by the WAC. (Ord. 797 § 1 (part), 2012)

8.01.080 Temporary meters and hydrant valves.

Backflow protection will be required on temporary meters and all hydrant valves. The type of assembly will be commensurate with the degree of hazard and will be determined on a case-by-case basis by the city's CCS. (Ord. 797 § 1 (part), 2012)

8.01.090 Mobile unit.

Any mobile unit or apparatus as defined in Section 8.01.020 that uses the city's water from any premises or piping within the distribution system shall first obtain a permit from the city. The mobile unit will be inspected to ensure appropriate backflow protection is installed in accordance with the city's most recent edition of the Guidance Manual. (Ord. 797 § 1 (part), 2012)

8.01.100 Right-of-way encroachment.

A. No person shall install or maintain a backflow prevention assembly upon or within any city right-of-way except as provided in this section.

B. The city reserves the right to have an assembly installed in the right-of-way.

C. A backflow prevention assembly required by the city may be installed upon or within any city right-of-way only if the owner proves to the city that there is no other feasible location for installing the assembly, and installing it in the right-of-way will not interfere with traffic or utilities. The city retains the right to approve the location, height, depth, enclosure and other requisites of the assembly prior to its installation.

D. All permits required by the city code to perform work in the right-of-way shall be obtained.

E. A property owner shall, at the request of the city and at the owner's expense, relocate a backflow prevention assembly that encroaches upon any city right-of-way, when such relocation is necessary for street or utility construction or repairs for purposes of public safety. (Ord. 797 § 1 (part), 2012)

8.01.110 Plumbing code.

As a condition of water service, customers shall install, maintain and operate their piping and plumbing systems in accordance with all Washington State plumbing codes. (Ord. 797 § 1 (part), 2012)

8.01.120 Access to premises.

For cross-connection control purposes, authorized employees or agents of the city of Ilwaco, with proper identification, shall, on reasonable notice, have access during the hours of eight a.m. to four p.m., Monday through Friday, to all parts of a premises and within the building to which water is supplied. However, if any water user refuses access to the premises or to the interior of a structure at these times and on reasonable notice for inspection by a cross-connection specialist appointed by the city, water will only be supplied to the premises once a reduced pressure principle assembly is installed at the service connection to that premises. All costs related to purchase, installation, testing and maintenance of required reduced pressure principle assembly shall be at owner's expense. (Ord. 797 § 1 (part), 2012)

8.01.130 Testing and repairs.

Backflow prevention assemblies shall be tested and repaired in accordance with the requirements

set out in the WAC, this chapter and the most recent edition of the city's Guidance Manual. (Ord. 797 § 1 (part), 2012)

8.01.140 Responsibilities of backflow prevention assembly testers.
All backflow assembly testers operating within the city shall be certified in accordance with all applicable regulations and shall comply with all stipulations in this chapter and the most recent edition of the city's Guidance Manual. (Ord. 797 § 1 (part), 2012)

8.01.150 Maintenance of assemblies.
Backflow prevention assemblies shall be maintained in accordance with the requirements set out in the WAC, or as amended, and the most recent edition of the city's Guidance Manual. (Ord. 797 § 1 (part), 2012)

8.01.160 Installation requirements and specifications.
Backflow prevention assemblies shall be installed in accordance with the requirements set out in the WAC and the most recent edition of the city's Guidance Manual. In the event the CCS allows a premises isolation assembly to be installed at an alternate location, there shall be no connections between the meter and the premises isolation assembly. (Ord. 797 § 1 (part), 2012)

8.01.170 Thermal expansion.
If a closed system has been created by the installation of a backflow prevention assembly, it is the responsibility of the property owner to eliminate the possibility of thermal expansion. (Ord. 797 § 1 (part), 2012)

8.01.180 Pressure loss.
Any reduction in water pressure caused by the installation of a backflow assembly is not the responsibility of the city. The city will give reasonable assistance to the owner regarding information on adequate sizing of assemblies and proper plumbing practices to provide for required pressure and flows for fire protection. (Ord. 797 § 1 (part), 2012)

8.01.190 Parallel installation.
Premises where non-interruption of water supply is critical shall have installed two (2) assemblies of the same type in parallel. They shall be sized in such a manner that either assembly will provide the minimum water requirements, while the two (2) together will provide the maximum water requirements. (Ord. 797 § 1 (part), 2012)

8.01.200 New construction.
A. In all new nonresidential construction, an approved backflow assembly shall be installed at the service connection. The type of the assembly will be commensurate with the degree of hazard as determined by the CCS.

B. When a building is constructed on commercial premises, and the end use of the building is not determined or could change, a reduced pressure principle backflow prevention assembly shall be installed at the service connection to provide protection of the public water supply in the event of the most hazardous use of the building. (Ord. 797 § 1 (part), 2012)

8.01.210 Residential service connections.
Any residential property that has been determined to have an actual or potential cross-connection and/or has violated the plumbing code or this chapter in any way shall be required to install an approved backflow prevention assembly in accordance with this chapter. (Ord. 797 § 1 (part), 2012)

8.01.220 Rental properties.

The property owner is responsible for the installation, testing and repair of all backflow assemblies on their property. When the tenants change, or if the plumbing is altered in any way, it is the responsibility of the owner to notify the city. (Ord. 797 § 1 (part), 2012)

8.01.230 Retrofitting.

Retrofitting shall be required on all service connections where an actual or potential cross-connection exists, and wherever else the city deems retrofitting necessary. (Ord. 797 § 1 (part), 2012)

8.01.240 Costs of compliance.

All costs associated with the purchase, installation, inspections, testing, replacement, maintenance, parts and repairs of the backflow assembly are the financial responsibility of the property owner. All cost associated with any disconnect fees associated with the enforcement of this chapter are the sole responsibility of the user. (Ord. 797 § 1 (part), 2012)

8.01.250 Recovery of costs.

Any water customer violating any of the provisions of this chapter and who causes damage to or impairs the city's water system, including but not limited to allowing contamination, pollution, any other solution or used water to enter the city's water system, shall be liable to the city for any expense, loss or damage caused by such violation. The city shall collect from the violator for the cost incurred by the city for any cleaning, purifying, repair or replacement work or any other expenses caused by the violation. Refusal to pay the assessed costs shall constitute a violation of this chapter and shall result in the termination of service. (Ord. 797 § 1 (part), 2012)

8.01.260 Termination of service.

Failure on the part of any property owner, their renter, agent or personal representative to discontinue the use of all cross-connections, to physically separate cross-connections or to abide by all the conditions of this chapter is sufficient cause for the immediate discontinuance of water service by the city to the premises. (Ord. 797 § 1 (part), 2012)

8.01.270 Emergency suspension of service.

The supervisor or their designee may, without prior notice, suspend water service to any premises when such suspension is necessary to stop the eminent threat of any actual or potential cross-connection as defined in this chapter and the most recent edition of the city's Guidance Manual. (Ord. 797 § 1 (part), 2012)

8.01.280 Non-emergency suspension of service.

The supervisor or their designee may suspend, with twenty-four (24) hours' notice, the water supply to any premises where the conditions of this chapter or the most recent edition of the city's Guidance Manual have been violated. (Ord. 797 § 1 (part), 2012)

8.01.290 Violation—Penalty.

It is unlawful for any person, firm or corporation to violate or fail to comply with any of the provisions of this chapter. A violation of any provision of this chapter will qualify as an infraction. Each violation will be punished by a fine not to exceed two hundred fifty dollars ($250.00) per violation nor to exceed a fine of two hundred fifty dollars ($250.00) per day that violations occur. All proceedings for the civil violation will be in accordance with Section 1.20.020. (Ord. 797 § 1 (part), 2012)

8.01.300 Falsifying information.

Any person who knowingly makes any false statement, representation, record, report or other document filed or required to be maintained pursuant to this chapter or who falsifies, tampers with or knowingly renders inaccurate any backflow assembly, device or method required under this chapter shall, in addition to civil and/or criminal penalties provided by state law, be guilty of a misdemeanor subject to the general penalty clause of the Ilwaco Municipal Code. (Ord. 797 § 1 (part), 2012)

Home < >

The Ilwaco Municipal Code is current through Ordinance 945, passed October 23, 2023.

Disclaimer: The City Clerk's Office has the official version of the Ilwaco Municipal Code. Users should contact the City Clerk's Office for ordinances passed subsequent to the ordinance cited above.

City Website: https://ilwaco-wa.gov/
City Telephone: (360) 642-3145

Code Publishing Company

APPENDIX F

CCR

Ilwaco Water Department CCR
2023 PWSID# 355002

Spanish (Espanol)

Este informe contiene informacion muy importante sobre la calidad de su agua beber. Traduscalo o hable con alguien que lo entienda bien.

Is my water safe?

We are pleased to present this year's Annual Water Quality Report (Consumer Confidence Report) as required by the Safe Drinking Water Act (SDWA). This report is designed to provide details about where your water comes from, what it contains, and how it compares to standards set by regulatory agencies. This report is a snapshot of last year's water quality. We are committed to providing you with information because informed customers are our best allies.

Do I need to take special precautions?

Some people may be more vulnerable to contaminants in drinking water than the general population. Immuno-compromised persons such as persons with cancer undergoing chemotherapy, persons who have undergone organ transplants, people with HIV/AIDS or other immune system disorders, some elderly, and infants can be particularly at risk from infections. These people should seek advice about drinking water from their health care providers. EPA/Centers for Disease Control (CDC) guidelines on appropriate means to lessen the risk of infection by Cryptosporidium and other microbial contaminants are available from the Safe Water Drinking Hotline (800-426-4791).

Where does my water come from?

The source of the water for the City of Ilwaco is from a dam/reservoir across Indian Creek.

Source water assessment and its availability

You can obtain information about the source water by contacting City Hall to obtain a copy of the source water assessment.

Why are there contaminants in my drinking water?

Drinking water, including bottled water, may reasonably be expected to contain at least small amounts of some contaminants. The presence of contaminants does not necessarily indicate that water poses a health risk. More information about contaminants and potential health effects can be obtained by calling the Environmental Protection Agency's (EPA) Safe Drinking Water Hotline (800-426-4791). The sources of drinking water (both tap water and bottled water) include rivers, lakes, streams, ponds, reservoirs, springs, and wells. As water travels over the surface of the land or through the ground, it dissolves naturally occurring minerals and, in some cases, radioactive material, and can pick up substances resulting from the presence of animals or from human activity:
microbial contaminants, such as viruses and bacteria, that may come from sewage treatment plants, septic systems, agricultural livestock operations, and wildlife; inorganic contaminants, such as salts and metals, which can be naturally occurring or result from urban stormwater runoff, industrial, or domestic wastewater discharges, oil and gas production, mining, or farming; pesticides and herbicides, which may come from a variety of sources such as agriculture, urban stormwater runoff, and residential uses; organic Chemical Contaminants, including synthetic and volatile organic chemicals, which are by-products of industrial processes and petroleum production, and can also come from gas stations, urban stormwater runoff, and septic systems; and radioactive contaminants, which can be naturally occurring or be the result of oil and gas production and mining activities. In order to ensure that tap water is safe to drink, EPA prescribes regulations that limit the amount of certain contaminants in water provided by public water systems. Food and Drug Administration (FDA) regulations establish limits for contaminants in bottled water which must provide the same protection for public health.

How can I get involved?

Please contact City Hall for dates and times of our open public meetings.

Water Conservation Tips

Did you know that the average U.S. household uses approximately 400 gallons of water per day or 100 gallons per person per day? Luckily, there are many low-cost and no-cost ways to conserve water. Small changes can make a big difference - try one today and soon it will become second nature.

- Take short showers - a 5 minute shower uses 4 to 5 gallons of water compared to up to 50 gallons for a bath.

- Shut off water while brushing your teeth, washing your hair and shaving and save up to 500 gallons a month.
- Use a water-efficient showerhead. They're inexpensive, easy to install, and can save you up to 750 gallons a month.
- Run your clothes washer and dishwasher only when they are full. You can save up to 1,000 gallons a month.
- Water plants only when necessary.
- Fix leaky toilets and faucets. Faucet washers are inexpensive and take only a few minutes to replace. To check your toilet for a leak, place a few drops of food coloring in the tank and wait. If it seeps into the toilet bowl without flushing, you have a leak. Fixing it or replacing it with a new, more efficient model can save up to 1,000 gallons a month.
- Adjust sprinklers so only your lawn is watered. Apply water only as fast as the soil can absorb it and during the cooler parts of the day to reduce evaporation.
- Teach your kids about water conservation to ensure a future generation that uses water wisely. Make it a family effort to reduce next month's water bill!
- Visit www.epa.gov/watersense for more information.

Cross Connection Control Survey

The purpose of this survey is to determine whether a cross-connection may exist at your home or business. A cross connection is an unprotected or improper connection to a public water distribution system that may cause contamination or pollution to enter the system. We are responsible for enforcing cross-connection control regulations and insuring that no contaminants can, under any flow conditions, enter the distribution system. If you have any of the devices listed below please contact us so that we can discuss the issue, and if needed, survey your connection and assist you in isolating it if that is necessary.

- Boiler/ Radiant heater (water heaters not included)
- Underground lawn sprinkler system
- Pool or hot tub (whirlpool tubs not included)
- Additional source(s) of water on the property
- Decorative pond
- Watering trough

Source Water Protection Tips

Protection of drinking water is everyone's responsibility. You can help protect your community's drinking water source in several ways:

- Eliminate excess use of lawn and garden fertilizers and pesticides - they contain hazardous chemicals that can reach your drinking water source.
- Pick up after your pets.
- If you have your own septic system, properly maintain your system to reduce leaching to water sources or consider connecting to a public water system.
- Dispose of chemicals properly; take used motor oil to a recycling center.
- Volunteer in your community. Find a watershed or wellhead protection organization in your community and volunteer to help. If there are no active groups, consider starting one. Use EPA's Adopt Your Watershed to locate groups in your community, or visit the Watershed Information Network's How to Start a Watershed Team.
- Organize a storm drain stenciling project with your local government or water supplier. Stencil a message next to the street drain reminding people "Dump No Waste - Drains to River" or "Protect Your Water." Produce and distribute a flyer for households to remind residents that storm drains dump directly into your local water body.

Additional Information for Lead

If present, elevated levels of lead can cause serious health problems, especially for pregnant women and young children. Lead in drinking water is primarily from materials and components associated with service lines and home plumbing. Ilwaco Water Department is responsible for providing high quality drinking water, but cannot control the variety of materials used in plumbing components. When your water has been sitting for several hours, you can minimize the potential for lead exposure by flushing your tap for 30 seconds to 2 minutes before using water for drinking or cooking. If you are concerned about lead in your water, you may wish to have your water tested. Information on lead in drinking water, testing methods, and steps you can take to minimize exposure is available from the Safe Drinking Water Hotline or at http://www.epa.gov/safewater/lead.

Water Quality Data Table

In order to ensure that tap water is safe to drink, EPA prescribes regulations which limit the amount of contaminants in water provided by public water systems. The table below lists all of the drinking water contaminants that we detected during the calendar year of this report. Although many more contaminants were tested, only those substances listed below were found in your water. All sources of drinking water contain some naturally occurring contaminants. At low levels, these substances are generally not harmful in our drinking water. Removing all contaminants would be extremely expensive, and in most cases, would not provide increased protection of public health. A few naturally occurring minerals may actually improve the taste of drinking water and have nutritional value at low levels. Unless otherwise noted, the data presented in this table is from testing done in the calendar year of the report. The EPA or the State requires us to monitor for certain contaminants less than once per year because the

concentrations of these contaminants do not vary significantly from year to year, or the system is not considered vulnerable to this type of contamination. As such, some of our data, though representative, may be more than one year old. In this table you will find terms and abbreviations that might not be familiar to you. To help you better understand these terms, we have provided the definitions below the table.

Contaminants	MCLG or MRDLG	MCL, TT, or MRDL	Detect In Your Water	Range		Sample Date	Violation	Typical Source
				Low	High			
Disinfectants & Disinfection By-Products								
(There is convincing evidence that addition of a disinfectant is necessary for control of microbial contaminants)								
Chlorine (as Cl2) (ppm)	4	4	1.8	NA	NA	2023	No	Water additive used to control microbes
Haloacetic Acids (HAA5) (ppb)	NA	60	8.1	NA	NA	2023	No	By-product of drinking water chlorination
TTHMs [Total Trihalomethanes] (ppb)	NA	80	37.7	NA	NA	2023	No	By-product of drinking water disinfection
Inorganic Contaminants								
Nitrate [measured as Nitrogen] (ppm)	10	10	0.28	NA	NA	2023	No	Runoff from fertilizer use; Leaching from septic tanks, sewage; Erosion of natural deposits

Contaminants	MCLG	AL	Your Water	Sample Date	# Samples Exceeding AL	Exceeds AL	Typical Source
Inorganic Contaminants							
Copper - action level at consumer taps (ppm)	1.3	1.3	0.048	2022	0	No	Corrosion of household plumbing systems; Erosion of natural deposits
Lead - action level at consumer taps (ppb)	0	15	1	2022	0	No	Corrosion of household plumbing systems; Erosion of natural deposits

Unit Descriptions	
Term	**Definition**
ppm	ppm: parts per million, or milligrams per liter (mg/L)
ppb	ppb: parts per billion, or micrograms per liter (µg/L)
NA	NA: not applicable
ND	ND: Not detected
NR	NR: Monitoring not required, but recommended.

Important Drinking Water Definitions	
Term	**Definition**
MCLG	MCLG: Maximum Contaminant Level Goal: The level of a contaminant in drinking water below which there is no known or expected risk to health. MCLGs allow for a margin of safety.
MCL	MCL: Maximum Contaminant Level: The highest level of a contaminant that is allowed in drinking water. MCLs are set as close to the MCLGs as feasible using the best available treatment technology.
TT	TT: Treatment Technique: A required process intended to reduce the level of a contaminant in drinking water.
AL	AL: Action Level: The concentration of a contaminant which, if exceeded, triggers treatment or other requirements which a water system must follow.
Variances and Exemptions	Variances and Exemptions: State or EPA permission not to meet an MCL or a treatment technique under certain conditions.
MRDLG	MRDLG: Maximum residual disinfection level goal. The level of a drinking water disinfectant below which there is no known or expected risk to health. MRDLGs do not reflect the benefits of the use of disinfectants to control microbial contaminants.
MRDL	MRDL: Maximum residual disinfectant level. The highest level of a disinfectant allowed in drinking water. There is convincing evidence that addition of a disinfectant is necessary for control of microbial contaminants.
MNR	MNR: Monitored Not Regulated
MPL	MPL: State Assigned Maximum Permissible Level

For more information please contact:

Contact Name: Shane Grant
Address: P.O. Box 548
Ilwaco, WA 98624
Phone: (360) 777-8330

APPENDIX G

WATER QUALITY MONITORING SCHEDULE AND COLIFORM MONITORING PLAN

Coliform Monitoring Plan for: City of Ilwaco

A. System Information

Plan Date: June 2025

Water System Name City of Ilwaco Water System	**County** Pacific	**System I.D. Number** 35500
Name of Plan Preparer Eli Sheaffer	**Position** Operator	**Daytime Phone** 360-777-8330
Sources: DOH Source Number, Source Name, Well Depth, Pumping Capacity	S02 – Long Beach Intertie (emergency) – 600 gpm S03 – Indian Creek (primary) – 1,042 gpm	
Storage: List and Describe	City Center 1 Reservoir – 0.5 MG Steel, Constructed 1996 – Zone 157 City Center 2 Reservoir – 0.5 MG Glass Fused, Constructed 2014 – Zone 157 Indian Creek 1 Reservoir – 159,000 gal Concrete, Constructed 1988 – Zone 160 Indian Creek 2 Reservoir, 159,000 gal Concrete, Constructed 2014 – Zone 160 Discovery Heights Reservoir – 400,000 gal Glass-Fused Steel, Constructed 2003 – Zone 339	
Treatment: Source Number & Process	S03 – Ilwaco Water Treatment Plant Addition of soda ash, polymer, aluminum chlorohydrate. Then flows through US Filter/Microfloc upflow clarifier/mixed media filter units. Chlorine residual of 0.6-0.7 mg/L.	
Pressure Zones: Number and name	City Center Zone – 157 ft Indian Creek Zone – 160 ft Upper City Center Zone – 230 ft Lakeview Estates Zone – 317 ft Discovery Heights Zone – 339 ft Coastal Ridge Zone – 547 ft	
Population by Pressure Zone	City Center Zone – 1,016 Indian Creek Zone – 23 Upper City Center Zone – 18 Lakeview Estates Zone – 43 Discovery Heights Zone – 156 Coastal Ridge Zone – 41	

Number of Routine Samples Required Monthly by Regulation:	3
Number of Sample Sites Needed to Represent the Distribution System:	3
***Request DOH Approval of Triggered Source Monitoring Plan?**	**Yes** ☐ **No** ☒

*If approval is requested a fee will be charged for the review.

B. Laboratory Information

Laboratory Name ALS Environmental - Kelso	**Office Phone 360-577-7222**
Address 1317 13th Ave S Kelso, Wa 98626	**Email** bradley.davis@alsglobal.com Contact on ALS Global Website
Hours of Operation Monday - Friday, 8 AM - 5 PM	
Contact Name Bradley Davis	

C. Wholesaling of Groundwater

	Yes	No
We are a consecutive system and purchase groundwater from another water system.	☐	☒
We sell groundwater to other public water systems.	☐	☒

D. Routine, Repeat, and Triggered Source Sample Locations*

Location/Address for **Routine Sample Sites**	Location/Address for **Repeat Sample Sites**	Groundwater Sources for **Triggered Sample Sites****
X01. Baker Bay Booster Pump Station	**1-1. Stringtown Rd and Hwy 101**	**S03**
	1-2. 3007 Foxglove	
	1-3. 431 Stringtown Rd.	
X02. City Hall	**2-2. 120 First Ave. N.**	**S03**
	2-2. 109 First Ave.	
	2-3. Community Bldg. 158 First Ave.	
X03. City Center 1 Reservoir	**3-1.**	**S03**
	3-2. 510 Whealdon St.	
	3-3. 518 Whealdon St.	
X04. Discovery Booster Pump Station	**4-1. Overlook Loop and Coastal Rdg Rd**	**S03**
	4-2. 3001 Discovery Heights	
	4-3. 3210/3208 Discovery Heights	
X05. Lakeview Booster Pump Station	**5-1. 100 Lakeview Dr.**	**S03**
	5-2. 451 Lakeview Dr.	
	5-3. 605 Hwy 101 @ intertie	

Location/Address for **Routine Sample Sites**	Location/Address for **Repeat Sample Sites**	Groundwater Sources for **Triggered Sample Sites****
X06. Lamontay Pl & ilahee Pl.	**6-1.Lamontay Pl & ilahee Pl.**	**S03**
	6-2. 2150 Klahanee Dr.	
	6-3. 2103 Ilahee Pl.	
X07. Cape D Rd. & Coast Guard Rd.	**Cape D Rd. & Coast Guard Rd.**	**S03**
	Ft Canby Rd. & Campground "A"	
	Port Ln & Coast Guard Rd.	

**** When you collect the repeats, you must sample every groundwater source that was in use when the original routine sample was collected.**

Important Notes for Sample Collector:

Measure the chlorine residual in each sample and note it.

E. Reduced Triggered Source Monitoring Justification (add sheets as needed):

The City is not seeking this at this time.

F. Routine Sample Rotation Schedule

Month	Routine Site(s)	Month	Routine Site(s)
January	X01, X02, X06	July	X01, X02, X06
February	X03, X04, X05	August	X03, X04, X05,X07
March	X01, X02, X06, X07	September	X01, X02, X06
April	X03, X04, X05	October	X03, X04, X05
May	X01, X02, X06	November	X01, X02, X06
June	X03, X04, X05, X07	December	X03, X04, X05

G. Level 1 and Level 2 Assessment Contact Information

Name **Shane Grant**	Office Phone 360-777-8330 After Hours Phone 360-580-0361
Address **120 First Ave N, Ilwaco, WA 98624**	Email Shane.grant@ilwaco-wa.gov
Name **Kacie Seyfert**	Office Phone 564-669-0844
DOH Pacific County	Email swtr.swro@doh.wa.gov

H. *E. coli*-Present Sample Response

Distribution System *E. coli* Response Checklist				
Background Information	**Yes**	**No**	**N/A**	**To Do List**
We inform staff members about activities within the distribution system that could affect water quality.	☒	☐	☐	☐
We document all water main breaks, construction & repair activities, and low pressure and outage incidents.	☒	☐	☐	☐
We can easily access and review documentation on water main breaks, construction & repair activities, and low pressure and outage incidents.	☒	☐	☐	☐
Our Cross-Connection Control Program is up-to-date.	☒	☐	☐	☐
We test all cross-connection control devices annually as required, with easy access to the proper documentation.	☒	☐	☐	☐
We routinely inspect all treatment facilities for proper operation.	☒	☐	☐	☐
We identified one or more qualified individuals who are able to conduct a Level 2 assessment of our water system.	☒	☐	☐	☐
We have procedures in place for disinfecting and flushing the water system if it becomes necessary.	☒	☐	☐	☐
We can activate an emergency intertie with an adjacent water system in an emergency.	☒	☐	☐	☐
We have a map of our service area boundaries.	☒	☐	☐	☐
We have consumers who may not have access to bottled or boiled water.	☒	☐	☐	☐
There is a sufficient supply of bottled water immediately available to our customers who are unable to boil their water.	☐	☒	☐	☐
We have identified the contact person at each day care, school, medical facility, food service, and other customers who may have difficulty responding to a Health Advisory.	☐	☐	☐	☒
We have messages prepared and translated into different languages to ensure our consumers will understand them.	☐	☐	☐	☒
We have the capacity to print and distribute the required number of notices in a short time period.	☒	☐	☐	☐
Policy Direction	**Yes**	**No**	**N/A**	**To Do List**
We have discussed the issue of *E. coli*-present sample results with our policy makers.	☐	☐	☒	☐
If we find *E. coli* in a routine distribution sample, the policy makers want to wait until repeat test results are available before issuing advice to water system customers.	☐	☐	☒	☐
(Cont.)				

Distribution System *E. coli* Response Checklist				
Potential Public Notice Delivery Methods	**Yes**	**No**	**N/A**	**To Do List**
It is feasible to deliver a notice going door-to-door.	☒	☐	☐	☐
We have a list of all of our customers' addresses.	☒	☐	☐	☐
We have a list of customer telephone numbers or access to a Reverse 9-1-1 system.	☒	☐	☐	☐
We have a list of customer email addresses.	☒	☐	☐	☐
We encourage our customers to remain in contact with us using social media.	☒	☐	☐	☐
We have an active website we can quickly update to include important messages.	☒	☐	☐	☐
Our customers drive by a single location where we could post an advisory and expect everyone to see it.	☐	☒	☐	☐
We need a news release to supplement our public notification process.	☒	☐	☐	☐

Distribution System *E. coli* Response Plan

If we have *E. coli* in our distribution system we will immediately:

1. Call DOH.
2. Isolate the infected area, Unidirectional flushing of area. reestablish chlorine levels to the area, and then resample again.
3. Collect repeat and triggered source samples per Part D. Collect additional investigative samples as necessary.
4. Call to see results of repeat samples
5. Discuss with DOH whether to issue a Health Advisory based on the findings of steps 3 and 4.

***E. coli*-Present Triggered Source Sample Response Checklist – All Sources**				
Background Information	**Yes**	**No**	**N/A**	**To Do List**
We review our sanitary survey results and respond to any recommendations affecting the microbial quality of our water supply.	☒	☐	☐	☐
We address any significant deficiencies identified during a sanitary survey.	☒	☐	☐	☐
There are contaminant sources within our Wellhead Protection Area that could affect the microbial quality of our source water, and If yes, we can eliminate them.	☐ ☐	☐ ☐	☒ ☒	☐ ☐
We routinely inspect our well site(s).	☐	☐	☒	☐
We have a good raw water sample tap installed at each source.	☒	☐	☐	☐
After we complete work on a source, we disinfect the source, flush, and collect an investigative sample.	☒	☐	☐	☐
Public Notice	**Yes**	**No**	**N/A**	**To Do List**
We discussed the requirement for immediate public notice of an *E. coli*-present source sample result with our water system's governing body (board of directors or commissioners) and received direction from them on our response plan.	☐	☐	☒	☐
We discussed the requirement for immediate public notice of an *E. coli*-present source sample result with our wholesale customers and encouraged them to develop a response plan.	☐	☐	☒	☐
We have prepared templates and a communications plan that will help us quickly distribute our messages.	☒	☐	☐	☐

E. coli-Present Triggered Source Sample Response Checklist – Source S03*				
Alternate Sources	**Yes**	**No**	**N/A**	**To Do List**
We can stop using this source and still provide reliable water service to our customers.	☒	☐	☐	☐
We have an emergency intertie with a neighboring water system that we can use until corrective action is complete (perhaps for several months).	☒	☐	☐	☐
We can provide bottled water to all or part of the distribution system for an indefinite period.	☒	☐	☐	☐
We can quickly replace our existing source of supply with a more protected new source.	☒	☐	☐	☐
Temporary Treatment	**Yes**	**No**	**N/A**	**To Do List**
This source is continuously chlorinated, and our existing facilities can provide 4-log virus treatment (CT = 6) before the first customer. If yes, at what concentration? _____ mg/L	☐	☒	☐	☐
We can quickly introduce chlorine into the water system and take advantage of the existing contact time to provide 4-log virus treatment to a large portion of the distribution system.	☐	☒	☐	☐
We can reduce the production capacity of our pumps or alter the configuration of our storage quantities (operational storage) to increase the amount of time the water stays in the system before the first customer to achieve CT = 6.	☒	☐	☐	☐
We can alter the demand for drinking water (maximum day or peak hour) through conservation messages to increase the time the water is in the system prior to the first customer in order to achieve 4-log virus treatment with chlorine.	☒	☐	☐	☐

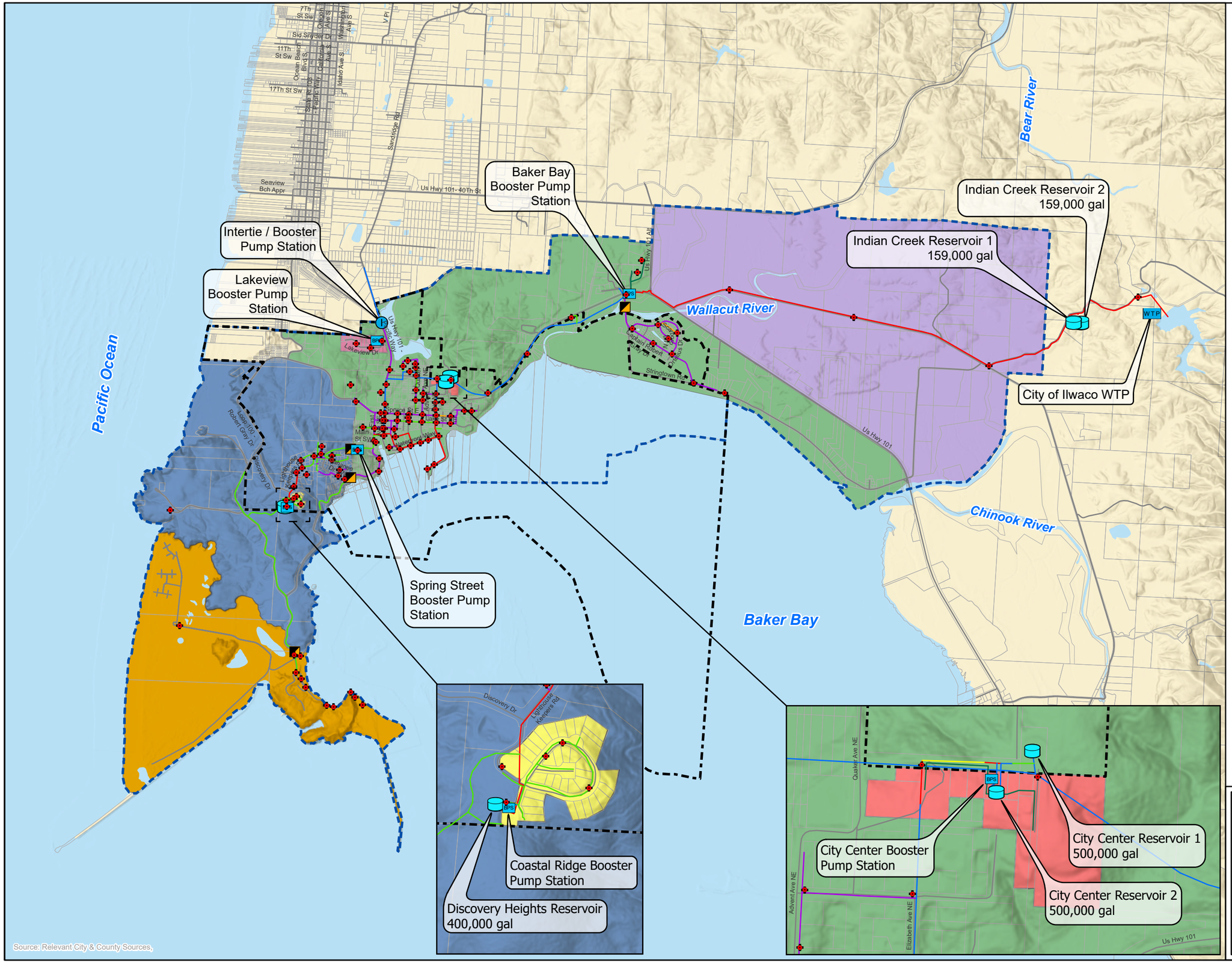
*NOTE: If your system has multiple sources, you may want to complete a separate checklist for each source.

E. coli-Present Triggered Source Sample Response Plan – Source S03

If we have *E. coli* in Source ___ water, we will immediately:

1. Call DOH.
2. Isolate from distribution system, investigate for potential contaminates, chlorinate, and then pump to waste
3. Resample to confirm
4. Reestablish to distribution system

I. System Map



Facilities

- Water Treatment Plant
- Intertie
- Hydrants
- Reservoir
- Booster Pump Station
- Pressure Release Valve

Waterlines (Diameter)

- 2-inch
- 4-inch
- 6-inch
- 8-inch
- 10-inch
- 12-inch
- 16-inch

Pressure Zones

- City Center (157 ft)
- Indian Creek (160 ft)
- Upper City Center (230 ft)
- Lakeview Estates (300 ft)
- Discovery Heights (339 ft)
- Coastal Ridge (574 ft)
- Cape Dissapointment & Coast Guard (269 ft)

Reference

- Retail Service Area
- Ilwaco City Limits
- Parcels
- Surface Water
- Roads

N

0 1,000 2,000 4,000 Feet

CITY OF ILWACO

WATER SYSTEM PLAN UPDATE

FIGURE 1-5

WATER SYSTEM FACILITIES MAP

Gray & Osborne, Inc.
CONSULTING ENGINEERS

Water Quality Monitoring Schedule

System: ILWACO WATER DEPARTMENT CITY OF **PWS ID: 35500 2** **Region: SOUTHWEST**
Contact: Shane D Grant **Group: A - Comm** **County: PACIFIC**

NOTE: To receive credit for compliance samples, you must fill out laboratory and sample paperwork completely, send your samples to a laboratory accredited by Washington State to conduct the analyses, AND ensure the results are submitted to DOH Office of Drinking Water. There is often a lag time between when you collect your sample, when we credit your system with meeting the monitoring requirement, and when we generate the new monitoring requirement.

Coliform Monitoring Requirements

	Jul 2024	Aug 2024	Sep 2024	Oct 2024	Nov 2024	Dec 2024	Jan 2025	Feb 2025	Mar 2025	Apr 2025	May 2025	Jun 2025
Coliform Monitoring Population	2425	2475	2757	2637	2587	2557	2557	2558	2587	2597	2627	2275
Number of Routine Samples Required	2	2	3	3	3	3	3	3	3	3	3	2

- Collect samples from representative points throughout the distribution system.
- Collect required repeat samples following an unsatisfactory sample. In addition, collect a sample from each operating groundwater source.
- For systems that chlorinate, record chlorine residual (measured when the coliform sample is collected) on the coliform lab slip.

Chemical Monitoring Requirements

Distribution Monitoring

Test Panel/Analyte	*# Samples Required*	*Compliance Period*	*Frequency*	*Last Sample Date*	*Next Sample Due*	
Lead and Copper	10	Jan 2023 - Dec 2025	standard - 3 year	01/28/2022	Jun 2025	
Asbestos	1	Jan 2020 - Dec 2028	standard - 9 year	10/02/2018	Oct 2027	
Total Trihalomethane (THM)	1	Jan 2024 - Dec 2024	reduced - 1 year	03/27/2024		
Halo-Acetic Acids (HAA5)	1	Jan 2024 - Dec 2024	reduced - 1 year	03/27/2024		

Water Quality Monitoring Schedule

Notes on Distribution System Chemical Monitoring

For *Lead and Copper*:
- Collect samples from the COLD WATER side of a KITCHEN or BATHROOM faucet that is used daily.
- Before sampling, make sure the water has sat unused in the pipes for at least 6 hours, but we recommend no more than 12 hours (e.g. overnight).
- If your sampling frequency is annual or every 3 years, samples must be collected between June 1 and September 30. Samples collected outside this time frame for systems with an annual or triennial schedule are invalid and may lead to a monitoring violation.

For *Asbestos:* Collect the sample from one of your routine coliform sampling sites in an area of your distribution system that has asbestos concrete pipe.

For *Disinfection Byproducts (HAA5 and THM):* Collect the samples at the locations identified in your Disinfection Byproducts (DBP) monitoring plan.
Reduced DBP monitoring for surface water systems requires:
12 consecutive months of initial, raw water TOC monitoring followed by quarterly TOC monitoring if your running annual TOC average is ≤ 4.0 mg/L and you have appropriate LRAA results for TTHM and HAA5.

Source Monitoring

- Collect 'source' chemical monitoring samples from a tap after all treatment (if any), but before entering the distribution system.
- Washington State grants monitoring waivers for various test panels /analytes. Please note that we may require some monitoring as a condition of some waivers. We have granted complete waivers for dioxin, endothal, glyphosate, diquat, and insecticides.
- Nitrate, arsenic, iron, and other individual inorganics are included as part of a Complete Inorganic (IOC) analysis when it is collected.

Source S03 *INDIAN CREEK* *Surface* *Use - Permanent* *Susceptility - High*

Test Panel/Analyte	*# Samples Required*	*Compliance Period*	*Frequency*	*Last Sample Date*	*Next Sample Due*
Nitrate	1	Jan 2024 - Dec 2024	standard - 1 year	03/27/2024	
Complete Inorganic (IOC)	1	Jan 2020 - Dec 2028	waiver - 9 year	01/14/2019	Feb 2028
Iron	1	Jan 2023 - Dec 2025	standard - 3 year	03/21/2023	
Manganese	1	Jan 2023 - Dec 2025	standard - 3 year	03/21/2023	
Volatile Organics (VOC)	1	Jan 2020 - Dec 2025	waiver - 6 year	10/04/2023	
Herbicides	1	Jan 2023 - Dec 2031	waiver - 9 year	10/13/2015	***Oct 2024***
Pesticides	0	Jan 2023 - Dec 2025	waiver - 3 year	09/14/2006	
PFAS	1	Jan 2023 - Dec 2025	standard - 3 year		Jun 2025
Soil Fumigants	0	Jan 2023 - Dec 2025	waiver - 3 year		
Gross Alpha	1	Jan 2020 - Dec 2025	standard - 6 year	07/06/2022	
Radium 228	1	Jan 2020 - Dec 2025	standard - 6 year	07/06/2022	

Water Quality Monitoring Schedule

Other Information

Other Reporting Schedules	*Due Date*
Measure chlorine residuals and submit monthly reports if your system uses continuous chlorination:	monthly
Submit Consumer Confidence Report (CCR) to customers and ODW (Community systems only):	07/01/2024
Submit CCR certification form to ODW (Community systems only):	10/01/2024
Submit Water Use Efficiency report online to ODW and to customers (Community and other municipal water systems only):	07/01/2024
Send notices of lead and copper sample results to the customers sampled:	30 days after you receive the laboratory results
Submit Certification of customer notification of lead and copper results to ODW:	90 days after you notify customers
Submit Lead Service Line Inventory	10/16/2024
Homeowner notification of LSLI status for those with LSL, GRR or unknown	11/15/2024 or 30 days after completion

Special Notes

Quarterly monitoring for TOCs from surface water sources is necessary to qualify for or maintain reduced DBP monitoring. You must determine if this is right for your system based on your DBP results.

Southwest Regional Water Quality Monitoring Contacts

For questions regarding chemical monitoring:	Sophia Petro: (564) 669-0856 or sophia.petro@doh.wa.gov
For questions regarding DBPs:	Regina Grimm, p.e.: (564) 669-0857 or regina.grimm@doh.wa.gov
For questions regarding coliform bacteria and microbial issues:	Southwest Office: (360) 236-3030 or SWRO.Coli@doh.wa.gov

Additional Notes

The information on this monitoring schedule is valid as of the date in the upper left corner on the first page. However, the information may change with subsequent updates in our water quality monitoring database as we receive new data or revise monitoring schedules. There is often a lag time between when you collect your sample and when we credit your system with meeting the monitoring requirement.

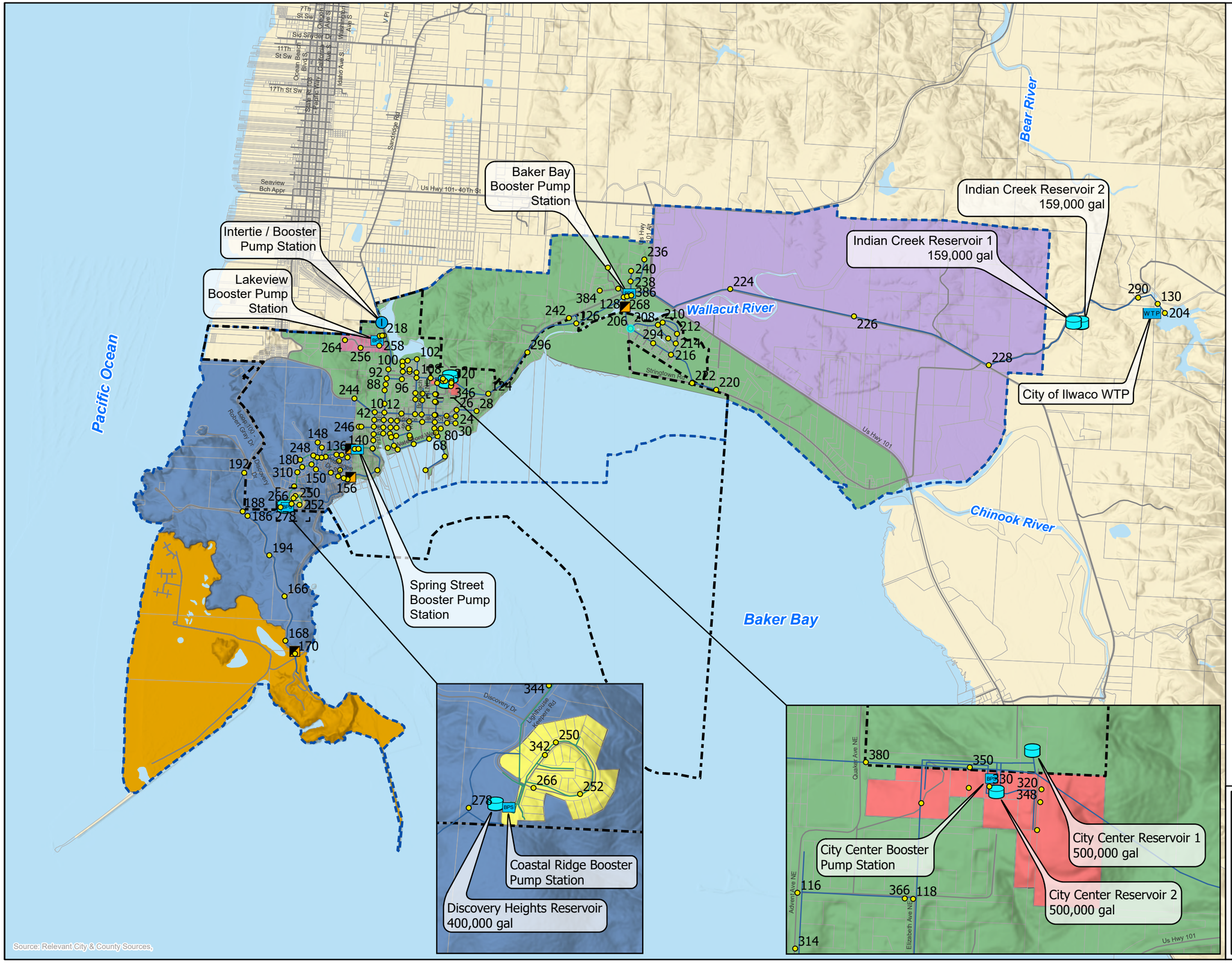
We have not designed this monitoring schedule to display all compliance requirements. The purpose of this schedule is to assist water systems with planning for most water quality monitoring, and to allow systems to compare their records with DOH ODW records. Please be aware that this monitoring schedule does not include constituents that require a special monitoring frequency, such as monitoring affiliated with treatment.

Any inaccuracies on this schedule will not relieve the water system owner and operator of the requirement to comply with applicable regulations.

If you have any questions about your monitoring requirements, please contact the regional office staff listed above.

APPENDIX H

MODELING RESULTS



Facilities

- Water Treatment Plant
- Intertie
- Reservoir
- Booster Pump Station
- Pressure Release Valve

Waterlines (Diameter)

- Ilwaco Water Lines

Pressure Zones

- City Center (157 ft)
- Indian Creek (160 ft)
- Upper City Center (230 ft)
- Lakeview Estates (300 ft)
- Discovery Heights (339 ft)
- Coastal Ridge (574 ft)
- Cape Dissapointment & Coast Guard (269 ft)

Reference

- Retail Service Area
- Ilwaco City Limits
- Parcels
- Surface Water
- Roads

N

0 1,000 2,000 4,000 Feet

CITY OF ILWACO

WATER SYSTEM PLAN UPDATE

FIGURE 3-2

2024 Peak Hour Demand

Gray & Osborne, Inc.
CONSULTING ENGINEERS

2024 Peak Hourly Demand				
ID	Demand (gpm)	Elevation (ft)	Head (ft)	Pressure (psi)
10	6.44	16.95	149.9	57.61
100	6.44	39.12	151.3	48.61
102	6.44	43.43	151.49	46.82
104	6.44	41.69	151.4	47.54
106	6.44	43.91	151.4	46.58
108	6.44	41.9	151.55	47.51
110	6.44	42.01	152.04	47.68
112	6.44	72.26	151.79	34.46
114	6.44	53	151.42	42.64
116	6.44	68.58	151.65	35.99
118	6.44	73.21	152.01	34.14
12	6.44	15.21	150.05	58.43
120	3.15	136.36	153.52	7.44
122	3.15	137	160.27	10.08
124	3.15	102.29	165.83	27.53
126	6.44	10.29	181.99	74.4
128	6.44	6.1	189.41	79.43
130	4.44	37.31	160.11	53.21
134	4.44	228.98	343.54	49.64
136	4.44	237.34	343.54	46.02
138	4.44	208.82	343.54	58.37
14	6.44	14.86	151.22	59.09
140	4.44	66.46	147.13	34.96
142	4.44	229.21	343.55	49.54
144	4.44	259.4	343.55	36.46
146	4.44	239.76	342.27	44.42
148	4.44	230.52	342.27	48.42
150	4.44	260.96	342.27	35.23
154	6.44	48.07	149.21	43.82
156	6.44	51.76	149.19	42.22
158	3.15	94.89	149.19	23.53
16	6.44	14.69	150.67	58.92
160	4.44	155.88	342.25	80.75
166	4.44	102.26	338.32	102.28
168	4.44	57.28	338.15	121.7
170	36.7	22.23	269.17	107
178	4.44	77.11	355.11	120.46
18	6.44	14.76	151.22	59.13
180	4.44	253.87	340.07	37.35
182	4.44	274.52	339.02	27.95
184	4.44	292.91	338.85	19.9
186	4.44	149.73	338.66	81.86
188	4.44	149	338.66	82.18
192	4.44	63.07	338.66	119.41
194	4.44	127.98	338.48	91.21

20	6.44	14.13	150.88	59.25
202	4.44	197.41	343.54	63.32
204	4.44	98.03	225	55.02
206	6.44	9.89	189.04	77.62
208	6.44	8.94	188.95	78
210	6.44	6.79	188.95	78.93
212	6.44	8.74	188.94	78.08
214	6.44	9.46	188.94	77.77
216	6.44	9.8	188.94	77.62
218	6.44	21.75	150.58	55.82
22	6.44	14.63	150.66	58.94
220	6.44	10.89	188.9	77.13
222	6.44	11.16	188.9	77.02
224	2.06	9.16	133.87	54.04
226	2.06	8.84	142.57	57.95
228	2.06	6.42	152.56	63.32
230	0	135.34	160.11	10.73
232	0	132.84	160.11	11.82
234	6.44	16.73	189.4	74.82
236	6.44	32.41	126.42	40.73
238	6.44	38.96	126.42	37.9
24	6.44	14.22	150.65	59.11
240	6.44	35.95	126.42	39.2
242	6.44	11.88	181.99	73.71
244	6.44	50.49	149.9	43.07
246	3.15	74.79	149.65	32.44
248	4.44	251.44	341.16	38.88
250	4.44	312.73	575.14	113.7
252	4.44	317.14	575.14	111.79
254	0	310.78	337.88	11.74
256	6.44	139.38	292.13	66.19
258	6.44	81.12	292.13	91.43
26	6.44	48.72	150.64	44.16
260	0	49.85	292.14	104.98
262	0	40.65	150.57	47.63
264	6.44	135.41	292.13	67.91
266	4.44	308.65	575.14	115.47
268	2.06	3.65	126.16	53.09
276	4.44	263.66	340.62	33.35
278	0	266.29	338.79	31.42
28	6.44	63.32	150.63	37.83
280	4.44	248.77	340.14	39.59
282	3.15	97	153.24	24.37
284	0	109.59	153.4	18.99
286	0	131.91	153.51	9.36
288	3.15	112.72	152.98	17.45
290	0	37.26	160.11	53.23

292	0	9.51	188.95	77.75
294	0	10.39	188.98	77.39
296	0	11.83	173.8	70.18
298	0	53.91	151.37	42.23
30	6.44	14.99	150.65	58.78
300	0	43.41	151.29	46.74
302	0	32.97	150.68	51
304	0	35.59	150.59	49.83
306	0	16.72	150.22	57.85
308	0	14.2	149.24	58.51
310	4.44	252.81	339.81	37.7
312	0	46.05	151.57	45.72
314	0	46.62	151.51	45.45
32	6.44	13.68	150.66	59.35
320	3.15	139.16	256.88	51.01
326	3.15	126.1	256.92	56.68
328	0	135.25	154.16	8.19
330	0	133.91	257.01	53.34
334	4.44	108.41	342.24	101.32
336	4.44	96.92	342.24	106.3
338	1.05	77.08	342.24	114.89
34	6.44	14.83	150	58.57
342	6.44	313.34	575.14	113.44
344	4.44	257.18	339.3	35.58
346	0	130.31	256.91	54.86
348	0	138.77	256.91	51.19
350	0	109.65	256.95	63.83
352	0	112.65	256.95	62.53
354	0	12.27	149.77	59.58
356	0	13.07	149.77	59.23
358	0	12.44	149.77	59.5
36	6.44	14.28	150.19	58.89
360	0	12.99	149.77	59.27
362	0	0	147.74	64.02
364	0	14.17	150.92	59.25
366	0	72.88	151.96	34.27
368	0	52.05	151.59	43.13
370	0	0	150.19	65.08
374	0	0	343.54	148.86
378	0	65.12	149.65	36.63
38	6.44	15.12	149.89	58.39
380	0	83.52	152.87	30.05
382	0	0	189.4	82.07
384	0	0	189.4	82.07
386	0	3.65	126.45	53.21
40	6.44	15.08	149.88	58.41
42	6.44	15.95	149.82	58.01

44	6.44	14.71	149.65	58.47
46	6.44	14.93	149.75	58.42
48	6.44	13.9	149.81	58.89
50	6.44	13.89	149.89	58.93
52	6.44	14.35	150.42	58.96
54	6.44	15.32	149.24	58.03
56	6.44	14.15	149.65	58.71
58	6.44	13.1	149.73	59.2
60	6.44	13.12	149.85	59.24
62	6.44	13.31	149.85	59.16
64	27	12.33	149.92	59.61
66	6.44	12.63	150.11	59.57
68	6.44	12.85	150.31	59.56
70	6.44	13.7	150.42	59.24
72	6.44	11.46	150.42	60.21
74	6.44	5.95	150.42	62.6
76	6.44	13.16	150.61	59.56
78	6.44	13.85	150.54	59.23
80	10.52	12.33	150.61	59.92
84	6.44	14.58	150.65	58.96
86	6.44	15.74	149.24	57.85
88	6.44	33.56	150.47	50.66
92	6.44	35.38	150.71	49.97
96	6.44	33.82	151.08	50.81
98	6.44	48.2	151.27	44.66

2035 Peak Hourly Demand				
ID	Demand (gpm)	Elevation (ft)	Head (ft)	Pressure (psi)
10	7.09	16.95	149.75	57.54
100	7.09	39.12	151.17	48.55
102	7.09	43.43	151.37	46.77
104	7.09	41.69	151.28	47.48
106	7.09	43.91	151.28	46.52
108	7.09	41.9	151.43	47.46
110	7.09	42.01	151.95	47.63
112	7.09	72.26	151.69	34.42
114	7.09	53	151.3	42.59
116	7.09	68.58	151.54	35.95
118	7.09	73.21	151.92	34.11
12	7.09	15.21	149.9	58.36
120	7.09	136.36	153.5	7.43
122	7.09	137	160.26	10.08
124	7.09	102.29	165.77	27.51
126	7.09	10.29	181.65	74.25
128	7.09	6.1	188.96	79.23
130	4.81	37.31	160.11	53.21
134	4.81	228.98	344.05	49.86
136	4.81	237.34	344.04	46.23
138	4.81	208.82	344.04	58.59
14	7.09	14.86	151.1	59.03
140	4.81	66.46	146.99	34.89
142	4.81	229.21	344.05	49.76
144	4.81	259.4	344.05	36.68
146	4.81	239.76	342.79	44.64
148	4.81	230.52	342.79	48.65
150	4.81	260.96	342.79	35.46
154	7.09	48.07	149.07	43.76
156	7.09	51.76	149.06	42.16
158	7.09	94.89	149.06	23.47
16	7.09	14.69	150.53	58.86
160	4.81	155.88	342.78	80.99
166	4.81	102.26	339.32	102.72
168	4.81	57.28	339.32	122.21
170	4.81	22.23	269.17	107
178	4.81	77.11	355.58	120.66
18	7.09	14.76	151.09	59.07
180	4.81	253.87	340.55	37.56
182	4.81	274.52	339.5	28.15
184	4.81	292.91	339.32	20.11
186	4.81	149.73	339.32	82.15
188	4.81	149	339.32	82.47
192	4.81	63.07	339.32	119.7
194	4.81	127.98	339.32	91.57

20	7.09	14.13	150.75	59.2
202	4.81	197.41	344.04	63.54
204	4.81	98.03	225	55.02
206	7.09	9.89	188.52	77.4
208	7.09	8.94	188.41	77.77
210	7.09	6.79	188.41	78.7
212	7.09	8.74	188.41	77.85
214	7.09	9.46	188.41	77.54
216	7.09	9.8	188.41	77.39
218	7.09	21.75	150.4	55.74
22	7.09	14.63	150.51	58.88
220	7.09	10.89	188.35	76.89
222	7.09	11.16	188.36	76.78
224	2.19	9.16	133.7	53.96
226	2.19	8.84	142.46	57.9
228	2.19	6.42	152.51	63.3
230	0	135.34	160.11	10.73
232	0	132.84	160.11	11.82
234	7.09	16.73	188.96	74.63
236	7.09	32.41	126.19	40.64
238	7.09	38.96	126.2	37.8
24	7.09	14.22	150.5	59.05
240	7.09	35.95	126.2	39.1
242	7.09	11.88	181.65	73.56
244	5	50.49	149.75	43.01
246	0	74.79	149.5	32.37
248	4.81	251.44	341.66	39.09
250	4.81	312.73	575.14	113.7
252	4.81	317.14	575.14	111.79
254	0	310.78	338.11	11.84
256	7.09	139.38	292.13	66.18
258	7.09	81.12	292.13	91.43
26	7.09	48.72	150.49	44.1
260	0	49.85	292.14	104.98
262	0	40.65	150.4	47.56
264	7.09	135.41	292.12	67.9
266	4.81	308.65	575.14	115.47
268	2.19	3.65	125.94	52.99
276	4.81	263.66	341.11	33.56
278	0	266.29	339.32	31.64
28	7.09	63.32	150.48	37.77
280	4.81	248.77	340.63	39.8
282	0	97	153.21	24.36
284	0	109.59	153.38	18.98
286	0	131.91	153.49	9.35
288	0	112.72	152.94	17.43
290	0	37.26	160.11	53.23

292	0	9.51	188.41	77.52
294	0	10.39	188.46	77.16
296	0	11.83	173.6	70.09
298	0	53.91	151.25	42.18
30	7.09	14.99	150.5	58.72
300	0	43.41	151.16	46.69
302	0	32.97	150.53	50.94
304	0	35.59	150.44	49.77
306	0	16.72	150.07	57.78
308	0	14.2	149.09	58.45
310	4.81	252.81	340.3	37.91
312	0	46.05	151.47	45.68
314	0	46.62	151.4	45.4
32	7.09	13.68	150.52	59.29
320	0	139.16	258.16	51.56
326	0	126.1	258.16	57.22
328	0	135.25	154.16	8.19
330	0	133.91	258.16	53.84
334	0	108.41	342.78	101.56
336	0	96.92	342.78	106.53
338	0	77.08	342.78	115.13
34	7.09	14.83	149.84	58.5
342	7.09	313.34	575.14	113.44
344	4.81	257.18	339.78	35.79
346	0	130.31	258.16	55.4
348	0	138.77	258.16	51.73
350	0	109.65	258.16	64.35
352	0	112.65	258.16	63.05
354	0	12.27	149.61	59.51
356	0	13.07	149.61	59.16
358	0	12.44	149.61	59.43
36	7.09	14.28	150.04	58.82
360	0	12.99	149.61	59.2
362	0	0	147.6	63.95
364	0	14.17	150.79	59.2
366	0	72.88	151.87	34.23
368	0	52.05	151.49	43.09
370	0	0	150.04	65.01
374	0	0	344.04	149.07
378	0	65.12	149.5	36.56
38	7.09	15.12	149.73	58.33
380	0	83.52	152.82	30.03
382	0	0	188.96	81.88
384	0	0	188.96	81.88
386	0	3.65	126.23	53.12
40	7.09	15.08	149.73	58.34
42	7.09	15.95	149.67	57.94

44	7.09	14.71	149.5	58.41
46	7.09	14.93	149.6	58.35
48	7.09	13.9	149.66	58.82
50	7.09	13.89	149.73	58.86
52	7.09	14.35	150.27	58.9
54	7.09	15.32	149.09	57.96
56	7.09	14.15	149.49	58.64
58	7.09	13.1	149.58	59.14
60	7.09	13.12	149.69	59.18
62	7.09	13.31	149.69	59.09
64	29	12.33	149.76	59.55
66	7.09	12.63	149.96	59.51
68	7.09	12.85	150.16	59.5
70	7.09	13.7	150.27	59.18
72	7.09	11.46	150.27	60.15
74	7.09	5.95	150.27	62.53
76	7.09	13.16	150.47	59.5
78	7.09	13.85	150.39	59.16
80	9	12.33	150.47	59.86
84	7.09	14.58	150.5	58.89
86	7.09	15.74	149.09	57.78
88	7.09	33.56	150.32	50.59
92	7.09	35.38	150.57	49.91
96	7.09	33.82	150.95	50.75
98	7.09	48.2	151.14	44.61

2045 Peak Hourly Demand				
ID	Demand (gpm)	Elevation (ft)	Head (ft)	Pressure (psi)
10	7.65	16.95	149.51	57.44
100	7.65	39.12	150.99	48.47
102	7.65	43.43	151.2	46.7
104	7.65	41.69	151.1	47.41
106	7.65	43.91	151.1	46.45
108	7.65	41.9	151.26	47.39
110	7.65	42.01	151.81	47.58
112	7.65	72.26	151.54	34.35
114	7.65	53	151.13	42.52
116	7.65	68.58	151.39	35.88
118	7.65	73.21	151.79	34.05
12	7.65	15.21	149.67	58.26
120	7.65	136.36	153.46	7.41
122	7.65	137	160.26	10.08
124	7.65	102.29	165.68	27.47
126	7.65	10.29	181.32	74.11
128	7.65	6.1	188.54	79.05
130	5.17	37.31	160.11	53.21
134	5.17	228.98	343.93	49.81
136	5.17	237.34	343.93	46.19
138	5.17	208.82	343.93	58.54
14	7.65	14.86	150.92	58.95
140	5.17	66.46	146.75	34.79
142	5.17	229.21	343.94	49.71
144	5.17	259.4	343.94	36.63
146	5.17	239.76	342.69	44.6
148	5.17	230.52	342.69	48.6
150	5.17	260.96	342.69	35.41
154	7.65	48.07	148.82	43.66
156	7.65	51.76	148.81	42.05
158	7.65	94.89	148.81	23.36
16	7.65	14.69	150.32	58.77
160	5.17	155.88	342.68	80.94
166	5.17	102.26	339.27	102.7
168	5.17	57.28	339.27	122.18
170	5.17	22.23	269.17	107
178	5.17	77.11	355.46	120.61
18	7.65	14.76	150.91	58.99
180	5.17	253.87	340.48	37.53
182	5.17	274.52	339.44	28.13
184	5.17	292.91	339.27	20.09
186	5.17	149.73	339.27	82.12
188	5.17	149	339.27	82.44
192	5.17	63.07	339.27	119.68
194	5.17	127.98	339.27	91.55

20	7.65	14.13	150.55	59.11
202	5.17	197.41	343.93	63.49
204	5.17	98.03	225	55.02
206	7.65	9.89	188.03	77.19
208	7.65	8.94	187.91	77.55
210	7.65	6.79	187.91	78.48
212	7.65	8.74	187.91	77.63
214	7.65	9.46	187.91	77.32
216	7.65	9.8	187.91	77.17
218	7.65	21.75	150.17	55.64
22	7.65	14.63	150.3	58.78
220	7.65	10.89	187.84	76.67
222	7.65	11.16	187.85	76.56
224	2.3	9.16	133.54	53.9
226	2.3	8.84	142.35	57.85
228	2.3	6.42	152.46	63.28
230	0	135.34	160.11	10.73
232	0	132.84	160.11	11.82
234	7.65	16.73	188.54	74.45
236	7.65	32.41	125.99	40.55
238	7.65	38.96	126	37.72
24	7.65	14.22	150.28	58.96
240	7.65	35.95	126	39.02
242	7.65	11.88	181.32	73.42
244	7	50.49	149.5	42.9
246	0	74.79	149.26	32.27
248	5.17	251.44	341.57	39.05
250	5.17	312.73	575.14	113.7
252	5.17	317.14	575.14	111.79
254	0	310.78	338.08	11.83
256	7.65	139.38	292.12	66.18
258	7.65	81.12	292.13	91.43
26	7.65	48.72	150.27	44
260	0	49.85	292.14	104.98
262	0	40.65	150.16	47.45
264	7.65	135.41	292.12	67.9
266	5.17	308.65	575.14	115.47
268	2.3	3.65	125.75	52.91
276	5.17	263.66	341.03	33.52
278	0	266.29	339.27	31.62
28	7.65	63.32	150.27	37.67
280	5.17	248.77	340.55	39.77
282	0	97	153.16	24.33
284	0	109.59	153.33	18.95
286	0	131.91	153.45	9.33
288	0	112.72	152.87	17.4
290	0	37.26	160.11	53.23

292	0	9.51	187.91	77.3
294	0	10.39	187.96	76.94
296	0	11.83	173.39	70
298	0	53.91	151.07	42.1
30	7.65	14.99	150.28	58.62
300	0	43.41	150.98	46.61
302	0	32.97	150.32	50.85
304	0	35.59	150.23	49.68
306	0	16.72	149.84	57.68
308	0	14.2	148.85	58.34
310	5.17	252.81	340.23	37.88
312	0	46.05	151.31	45.61
314	0	46.62	151.24	45.33
32	7.65	13.68	150.31	59.2
320	0	139.16	258.16	51.56
326	0	126.1	258.16	57.22
328	0	135.25	154.16	8.19
330	0	133.91	258.16	53.84
334	0	108.41	342.68	101.51
336	0	96.92	342.68	106.49
338	0	77.08	342.68	115.08
34	7.65	14.83	149.61	58.4
342	7.65	313.34	575.14	113.44
344	5.17	257.18	339.72	35.77
346	0	130.31	258.16	55.4
348	0	138.77	258.16	51.73
350	0	109.65	258.16	64.35
352	0	112.65	258.16	63.05
354	0	12.27	149.37	59.41
356	0	13.07	149.37	59.06
358	0	12.44	149.37	59.33
36	7.65	14.28	149.81	58.73
360	0	12.99	149.37	59.1
362	0	0	147.36	63.85
364	0	14.17	150.59	59.11
366	0	72.88	151.74	34.17
368	0	52.05	151.33	43.02
370	0	0	149.81	64.91
374	0	0	343.93	149.03
378	0	65.12	149.26	36.46
38	7.65	15.12	149.5	58.22
380	0	83.52	152.74	29.99
382	0	0	188.54	81.69
384	0	0	188.54	81.69
386	0	3.65	126.04	53.03
40	7.65	15.08	149.49	58.24
42	7.65	15.95	149.43	57.84

44	7.65	14.71	149.26	58.3
46	7.65	14.93	149.36	58.25
48	7.65	13.9	149.42	58.72
50	7.65	13.89	149.5	58.76
52	7.65	14.35	150.05	58.8
54	7.65	15.32	148.85	57.86
56	7.65	14.15	149.26	58.54
58	7.65	13.1	149.34	59.03
60	7.65	13.12	149.46	59.07
62	7.65	13.31	149.46	58.99
64	31	12.33	149.53	59.45
66	7.65	12.63	149.73	59.41
68	7.65	12.85	149.94	59.4
70	7.65	13.7	150.05	59.08
72	7.65	11.46	150.05	60.05
74	7.65	5.95	150.05	62.44
76	7.65	13.16	150.26	59.41
78	7.65	13.85	150.18	59.07
80	9	12.33	150.26	59.76
84	7.65	14.58	150.29	58.8
86	7.65	15.74	148.85	57.68
88	7.65	33.56	150.11	50.5
92	7.65	35.38	150.36	49.82
96	7.65	33.82	150.75	50.67
98	7.65	48.2	150.96	44.53

2024 Fire Flow				
ID	Total Demand (gpm)	Critical Node ID for Design Run	Critical Pressure for Design Run (psi)	Hydrant Design Flow (gpm)
10	1,003.15	244	20	1,963.27
100	1,003.15	100	20	2,741.14
102	1,003.15	102	20	2,537.31
104	1,003.15	282	20	2,820.74
106	1,003.15	282	20	2,820.74
108	1,003.15	282	20	2,812.24
110	1,003.15	282	20	2,774.82
112	1,003.15	112	20	1,816.91
114	1,003.15	114	20	2,241.27
116	1,003.15	116	20	1,326.75
118	1,003.15	282	20	2,785.47
12	3,003.15	378	20	2,744.76
124	1,003.15	124	20	1,184.73
134	1,002.51	136	20	1,606.74
136	1,002.51	136	20	1,474.71
138	1,002.51	136	20	1,505.49
14	1,003.15	112	20	2,631.98
142	1,002.51	144	20	1,785.53
144	1,002.51	144	20	925.93
146	1,002.51	150	20	1,824.39
148	1,002.51	148	20	1,831.91
150	1,002.51	150	20	1,277.29
154	1,003.15	154	20	1,473.99
156	1,003.15	150	20	1,328.51
16	1,003.15	16	20	2,398.55
170	1,013.83	170	20	1,374.53
18	1,003.15	116	20	2,563.43
180	1,002.51	276	20	2,095.60
20	1,003.15	282	20	2,864.97
202	1,002.51	136	20	1,576.23
206	1,003.15	222	20	994.42
210	1,003.15	210	20	846.4
212	1,003.15	212	20	828.02
216	1,003.15	222	20	830.17
218	1,003.15	218	20	736.87
22	1,003.15	28	20	951.87
220	1,003.15	220	20	521.58
222	1,003.15	222	20	594.82
224	1,001.17	240	20	774.96
226	1,001.17	240	20	1,051.60
228	1,001.17	240	20	1,907.66

236	1,003.15	236	20	395.15
24	1,003.15	28	20	890.45
240	1,003.15	240	20	443.78
242	1,003.15	124	20	1,236.23
244	1,005.95	244	20	676.56
248	1,002.51	276	20	1,976.19
250	1,002.51	252	20	223.08
252	1,002.51	252	20	223.03
256	1,003.15	256	20	73.91
258	1,003.15	256	20	73.94
26	1,003.15	28	20	718.01
264	1,003.15	256	20	73.91
266	1,002.51	252	20	223.1
28	1,003.15	28	20	507.3
280	1,002.51	276	20	2,083.31
282	1,003.15	282	20	2,646.86
30	1,003.15	28	20	998.76
302	1,000.00	302	20	1,441.59
308	1,000.00	378	20	2,644.99
310	1,000.00	276	20	2,160.98
312	1,000.00	282	20	2,816.59
32	1,003.15	282	20	2,879.54
334	1,001.05	150	20	1,275.81
336	1,001.05	150	20	1,275.82
34	1,003.15	378	20	2,856.59
344	1,000.00	276	20	2,325.32
356	1,000.00	356	20	1,178.50
358	1,003.15	378	20	2,707.98
36	1,003.15	282	20	2,901.91
360	1,000.00	360	20	1,260.37
362	1,000.00	378	20	2,685.09
378	1,000.00	378	20	1,413.71
38	1,003.15	378	20	2,744.13
40	3,003.15	378	20	2,667.25
42	1,003.15	378	20	2,373.22
44	1,003.15	378	20	1,966.58
46	3,003.15	378	20	2,628.81
48	1,003.15	378	20	2,716.67
50	1,003.15	378	20	2,779.22
52	1,003.15	282	20	2,892.23
54	1,003.15	378	20	2,630.22
56	3,003.15	378	20	2,655.07
58	3,003.15	378	20	2,687.81
60	3,003.15	378	20	2,755.54
62	1,003.15	378	20	2,755.53
64	3,036.28	378	20	2,825.07
66	3,003.15	378	20	2,881.81

68	3,003.15	282	20	2,906.88
70	3,003.15	282	20	2,899.36
72	1,003.15	282	20	2,899.35
74	1,003.15	282	20	2,899.35
76	1,003.15	282	20	2,884.71
78	1,003.15	282	20	2,891.81
80	1,010.52	282	20	2,892.08
84	1,003.15	28	20	1,216.19
86	1,003.15	378	20	2,671.79
88	3,003.15	282	20	2,883.83
92	3,003.15	282	20	2,863.44
96	1,003.15	282	20	2,839.90
98	1,003.15	282	20	2,828.98

2035 Fire Flow				
ID	Total Demand (gpm)	Critical Node ID for Design Run	Critical Pressure for Design Run (psi)	Hydrant Design Flow (gpm)
10	1,003.47	244	20	1,960.01
100	1,003.47	100	20	2,737.16
102	1,003.47	102	20	2,533.67
104	1,003.47	282	20	2,815.11
106	1,003.47	282	20	2,815.11
108	1,003.47	282	20	2,806.64
110	1,003.47	282	20	2,769.24
112	1,003.47	112	20	1,812.91
114	1,003.47	114	20	2,237.95
116	1,003.47	116	20	1,324.75
118	1,003.47	282	20	2,779.72
12	3,003.47	378	20	2,735.86
124	1,000.00	124	20	1,181.73
134	1,002.72	136	20	1,609.69
136	1,002.72	136	20	1,477.16
138	1,002.72	136	20	1,508.04
14	1,003.47	112	20	2,625.07
142	1,002.72	144	20	1,791.89
144	1,002.72	144	20	927.6
146	1,002.72	150	20	1,832.43
148	1,002.72	148	20	1,835.92
150	1,002.72	150	20	1,283.54
154	1,003.47	154	20	1,473.09
156	1,003.47	150	20	1,334.80
16	1,003.47	16	20	2,396.38
170	1,000.00	170	20	1,379.39
18	1,003.47	116	20	2,557.52
180	1,002.72	276	20	2,106.04
20	1,003.47	282	20	2,859.20
202	1,002.72	136	20	1,579.03
206	1,003.47	222	20	992.14
210	1,003.47	210	20	844.41
212	1,003.47	212	20	826.05
216	1,003.47	222	20	828.12
218	1,003.47	218	20	735.53
22	1,003.47	28	20	949.09
220	1,003.47	220	20	520.5
222	1,003.47	222	20	593.48
224	1,001.24	240	20	773.03
226	1,001.24	240	20	1,049.18
228	1,001.24	240	20	1,903.93

236	1,003.47	236	20	394.47
24	1,003.47	28	20	888.01
240	1,003.47	240	20	442.87
242	1,003.47	124	20	1,236.51
244	1,006.00	244	20	675.88
248	1,002.72	276	20	1,985.56
250	1,002.72	252	20	219.18
252	1,002.72	252	20	219.14
256	1,003.47	256	20	73.26
258	1,003.47	256	20	73.28
26	1,003.47	28	20	716.2
264	1,003.47	256	20	73.26
266	1,002.72	252	20	219.21
28	1,003.47	28	20	506.27
280	1,002.72	276	20	2,093.65
282	1,000.00	282	20	2,637.54
30	1,003.47	28	20	995.82
302	1,000.00	302	20	1,439.09
308	1,000.00	378	20	2,636.73
310	1,002.72	276	20	2,174.59
312	1,000.00	282	20	2,810.57
32	1,003.47	282	20	2,873.75
334	1,000.00	150	20	1,280.79
336	1,000.00	150	20	1,280.79
34	1,003.47	378	20	2,846.93
344	1,002.72	276	20	2,340.89
356	1,000.00	356	20	1,177.86
358	1,000.00	378	20	2,695.57
36	1,003.47	282	20	2,896.02
360	1,000.00	360	20	1,259.67
362	1,000.00	378	20	2,676.61
378	1,000.00	378	20	1,412.65
38	1,003.47	378	20	2,735.03
40	3,003.47	378	20	2,658.73
42	1,003.47	378	20	2,367.32
44	1,003.47	378	20	1,962.73
46	3,003.47	378	20	2,620.34
48	1,003.47	378	20	2,707.85
50	1,003.47	378	20	2,770.01
52	1,003.47	282	20	2,886.37
54	1,003.47	378	20	2,622.40
56	3,003.47	378	20	2,646.58
58	3,003.47	378	20	2,679.01
60	3,003.47	378	20	2,746.30
62	1,003.47	378	20	2,746.30
64	3,040.00	378	20	2,819.01
66	3,003.47	378	20	2,871.84

68	3,003.47	282	20	2,900.99
70	3,003.47	282	20	2,893.48
72	1,003.47	282	20	2,893.47
74	1,003.47	282	20	2,893.47
76	1,003.47	282	20	2,878.90
78	1,003.47	282	20	2,885.97
80	1,011.00	282	20	2,886.43
84	1,003.47	28	20	1,212.33
86	1,003.47	378	20	2,663.69
88	3,003.47	282	20	2,878.01
92	3,003.47	282	20	2,857.69
96	1,003.47	282	20	2,834.17
98	1,003.47	282	20	2,823.29

2045 Fire Flow				
ID	Total Demand (gpm)	Critical Node ID for Design Run	Critical Pressure for Design Run (psi)	Hydrant Design Flow (gpm)
10	1,003.74	244	20	1,956.76
100	1,003.74	100	20	2,732.85
102	1,003.74	102	20	2,529.69
104	1,003.74	282	20	2,802.63
106	1,003.74	282	20	2,802.63
108	1,003.74	282	20	2,794.20
110	1,003.74	282	20	2,756.88
112	1,003.74	112	20	1,808.43
114	1,003.74	114	20	2,234.33
116	1,003.74	116	20	1,322.50
118	1,003.74	282	20	2,767.09
12	3,003.74	378	20	2,724.92
124	1,000.00	124	20	1,178.73
134	1,002.92	136	20	1,604.51
136	1,002.92	136	20	1,472.34
138	1,002.92	136	20	1,503.04
14	1,003.74	112	20	2,617.32
142	1,002.92	144	20	1,785.13
144	1,002.92	144	20	925.9
146	1,002.92	150	20	1,825.07
148	1,002.92	148	20	1,832.14
150	1,002.92	150	20	1,279.00
154	1,003.74	154	20	1,472.02
156	1,003.74	150	20	1,329.61
16	1,003.74	16	20	2,394.02
170	1,000.00	170	20	1,379.15
18	1,003.74	116	20	2,550.98
180	1,002.92	276	20	2,098.06
20	1,003.74	282	20	2,846.37
202	1,002.92	136	20	1,573.74
206	1,003.74	222	20	990.13
210	1,003.74	210	20	842.67
212	1,003.74	212	20	824.33
216	1,003.74	222	20	826.35
218	1,003.74	218	20	734.27
22	1,003.74	28	20	946.47
220	1,003.74	220	20	519.52
222	1,003.74	222	20	592.29
224	1,001.30	240	20	771.28
226	1,001.30	240	20	1,046.96
228	1,001.30	240	20	1,900.53

236	1,003.74	236	20	393.84
24	1,003.74	28	20	885.7
240	1,003.74	240	20	442.04
242	1,003.74	124	20	1,233.50
244	1,005.00	244	20	675.01
248	1,002.92	276	20	1,978.05
250	1,002.92	252	20	218.5
252	1,002.92	252	20	218.46
256	1,003.74	256	20	72.7
258	1,003.74	256	20	72.73
26	1,003.74	28	20	714.47
264	1,003.74	256	20	72.7
266	1,002.92	252	20	218.53
28	1,003.74	28	20	505.29
280	1,002.92	276	20	2,085.82
282	1,000.00	282	20	2,624.98
30	1,003.74	28	20	993.04
302	1,000.00	302	20	1,436.61
308	1,000.00	378	20	2,625.68
310	1,002.92	276	20	2,166.35
312	1,000.00	282	20	2,797.65
32	1,003.74	282	20	2,860.87
334	1,000.00	150	20	1,276.05
336	1,000.00	150	20	1,276.07
34	1,003.74	378	20	2,835.72
344	1,002.92	276	20	2,332.09
356	1,000.00	356	20	1,176.97
358	1,000.00	378	20	2,684.81
36	1,003.74	282	20	2,883.00
360	1,000.00	360	20	1,258.69
362	1,000.00	378	20	2,665.31
378	1,002.74	378	20	1,410.05
38	1,003.74	378	20	2,724.44
40	3,003.74	378	20	2,648.42
42	1,003.74	378	20	2,357.97
44	1,003.74	378	20	1,955.77
46	3,003.74	378	20	2,610.39
48	1,003.74	378	20	2,697.34
50	1,003.74	378	20	2,759.18
52	1,003.74	282	20	2,873.34
54	1,003.74	378	20	2,611.74
56	3,003.74	378	20	2,636.33
58	3,003.74	378	20	2,668.64
60	3,003.74	378	20	2,735.52
62	1,003.74	378	20	2,735.51
64	3,031.00	378	20	2,798.76

66	3,003.74	378	20	2,860.42
68	3,003.74	282	20	2,887.93
70	3,003.74	282	20	2,880.40
72	1,003.74	282	20	2,880.40
74	1,003.74	282	20	2,880.40
76	1,003.74	282	20	2,865.99
78	1,003.74	282	20	2,873.00
80	1,009.00	282	20	2,871.25
84	1,003.74	28	20	1,208.68
86	1,003.74	378	20	2,652.74
88	3,003.74	282	20	2,865.22
92	3,003.74	282	20	2,845.01
96	1,003.74	282	20	2,821.57
98	1,003.74	282	20	2,810.74

2045 Fire Flow With CIPs				
ID	Total Demand (gpm)	Critical Node ID for Design Run	Critical Pressure for Design Run (psi)	Hydrant Design Flow (gpm)
10	1,003.74	244	20	2,080.52
100	1,003.74	100	20	2,847.16
102	1,003.74	102	20	2,631.09
104	1,003.74	282	20	3,282.65
106	1,003.74	282	20	3,282.65
108	1,003.74	282	20	3,267.11
110	1,003.74	282	20	3,203.71
112	1,003.74	112	20	1,924.80
114	1,003.74	114	20	2,336.55
116	1,003.74	116	20	1,387.56
118	1,003.74	282	20	3,270.14
12	3,003.74	378	20	3,186.01
124	1,000.00	124	20	986.56
134	1,002.92	136	20	1,614.54
136	1,002.92	136	20	1,480.74
138	1,002.92	136	20	1,511.81
14	1,003.74	112	20	2,849.87
142	1,002.92	144	20	1,804.95
144	1,002.92	144	20	930.81
146	1,002.92	150	20	1,849.63
148	1,002.92	148	20	1,844.09
150	1,002.92	150	20	1,300.48
154	1,003.74	154	20	1,499.25
156	1,003.74	150	20	1,363.96
16	1,003.74	16	20	2,470.58
170	1,000.00	170	20	1,379.82
18	1,003.74	116	20	2,792.08
180	1,002.92	276	20	2,121.85
20	1,003.74	282	20	3,464.18
202	1,002.92	136	20	1,583.38
206	1,003.74	222	20	983.76
210	1,003.74	210	20	839.38
212	1,003.74	212	20	821.23
216	1,003.74	222	20	823.14
218	1,003.74	218	20	744.1
22	1,003.74	282	20	3,593.42
220	1,003.74	220	20	515.76
222	1,003.74	222	20	588.73
224	1,001.30	240	20	760.71
226	1,001.30	240	20	1,033.81
228	1,001.30	240	20	1,880.56

236	1,003.74	236	20	544.73
24	1,003.74	282	20	3,720.27
240	1,003.74	240	20	555.65
242	1,003.74	124	20	1,034.77
244	1,005.00	244	20	691.88
248	1,002.92	276	20	2,000.69
250	1,002.92	252	20	1,156.81
252	1,002.92	252	20	1,152.38
256	1,003.74	256	20	668.93
258	1,003.74	256	20	681.84
26	1,003.74	26	20	2,200.10
264	1,003.74	264	20	664.5
266	1,002.92	252	20	1,159.83
28	1,003.74	124	20	1,540.79
280	1,002.92	276	20	2,109.15
282	1,000.00	282	20	2,994.64
30	1,003.74	282	20	3,638.92
302	1,000.00	302	20	1,477.12
308	1,000.00	378	20	3,055.10
310	1,002.92	276	20	2,190.80
312	1,000.00	282	20	3,342.22
32	1,003.74	282	20	3,486.15
334	1,000.00	150	20	1,297.53
336	1,000.00	150	20	1,297.53
34	1,003.74	378	20	3,351.60
344	1,002.92	276	20	2,358.05
356	1,000.00	282	20	3,497.31
358	1,000.00	378	20	3,245.10
36	1,003.74	378	20	3,475.20
360	1,000.00	360	20	3,506.80
362	1,000.00	378	20	3,105.63
378	1,002.74	378	20	1,509.63
38	1,003.74	378	20	3,201.88
40	3,003.74	378	20	3,084.77
42	1,003.74	378	20	2,677.12
44	1,003.74	378	20	2,159.90
46	3,003.74	378	20	3,047.58
48	1,003.74	378	20	3,169.94
50	1,003.74	50	20	3,128.78
52	1,003.74	282	20	3,489.18
54	1,003.74	378	20	3,035.08
56	3,003.74	378	20	3,080.32
58	3,003.74	378	20	3,136.21
60	3,003.74	378	20	3,233.56
62	1,003.74	378	20	3,233.58
64	3,031.00	378	20	3,307.05
66	3,003.74	378	20	3,388.30

68	3,003.74	378	20	3,484.72
70	3,003.74	282	20	3,503.00
72	1,003.74	282	20	3,503.01
74	1,003.74	282	20	3,503.01
76	1,003.74	282	20	3,490.80
78	1,003.74	282	20	3,496.62
80	1,009.00	282	20	3,496.05
84	1,003.74	282	20	3,565.24
86	1,003.74	378	20	3,089.91
88	3,003.74	282	20	3,392.94
92	3,003.74	282	20	3,359.38
96	1,003.74	282	20	3,320.62
98	1,003.74	282	20	3,298.61

APPENDIX I

WUE PRESENTATION AND MEETING MINUTES

APPENDIX J

WUE PUBLIC DOCUMENTS

APPENDIX K

WATERSHED LETTER

CITY OF ILWACO

120 First Avenue North
PO Box 548 • Ilwaco, WA 98624
Phone: 360.642.3145
Fax: 360.642.3155
www.ilwaco-wa.gov

The City of Ilwaco is an equal opportunity provider and employer.

September 15, 2025

Name of Land Owner
Address of Land Owner

RE:

Dear *Land Owner*:

Watershed Protection Information for Land Owners Within the Watershed.

To protect the drinking water supply for the customers of the City's Water Department, the City has developed a Watershed Control Program as required by state law, Washington Administrative Code (WAC) 246-290-135. The City's water originates from Indian Creek, which is located east of Ilwaco city limits. The Watershed Protection Plan includes protection zones, identifying areas where water will eventually flow to the creek. The attached figure (Figure 5-1) indicates that your land ownership is within the City of Ilwaco's Watershed Boundary Area. This letter was developed to advocate for the protection of the City's primary water source.

The City's and the Department of Health's goal is to promote awareness so that any activities that may have the potential to affect drinking water quality can be addressed. Activities could include but are not limited to a leaking underground storage tank, added erosion through logging, fuel and oil spills related to logging equipment operations, and spilling of agriculture chemicals. The City realizes you are careful to protect the environment. We hope that informing you of our watershed boundary area and the impacts you have on the water system will result in added awareness to *Land Owner*.

If you have any questions regarding this letter, please call or email Shane Grant at (360) 642-8330 or water@ilwaco-wa.gov.

Sincerely,

Samantha Baker
City Clerk
clerk@ilwaco-wa.gov

CITY OF ILWACO

The City of Ilwaco is an equal opportunity provider and employer.

120 First Avenue North
PO Box 548 • Ilwaco, WA 98624
Phone: 360.642.3145
Fax: 360.642.3155
www.ilwaco-wa.gov

September 25, 2025

Chief Jeff Archer
City of Ilwaco Fire Department
PO Box 342
Ilwaco, WA 98624

SUBJECT: WHEALDON STREET AND MARY ANN AVENUE NE HYDRANT

Dear Chief Archer:

The City of Ilwaco is notifying the Fire Department of a fire hydrant located at Whealdon Street and Mary Ann Avenue NE that does not meet pressure requirements and shall not be used in firefighting efforts.

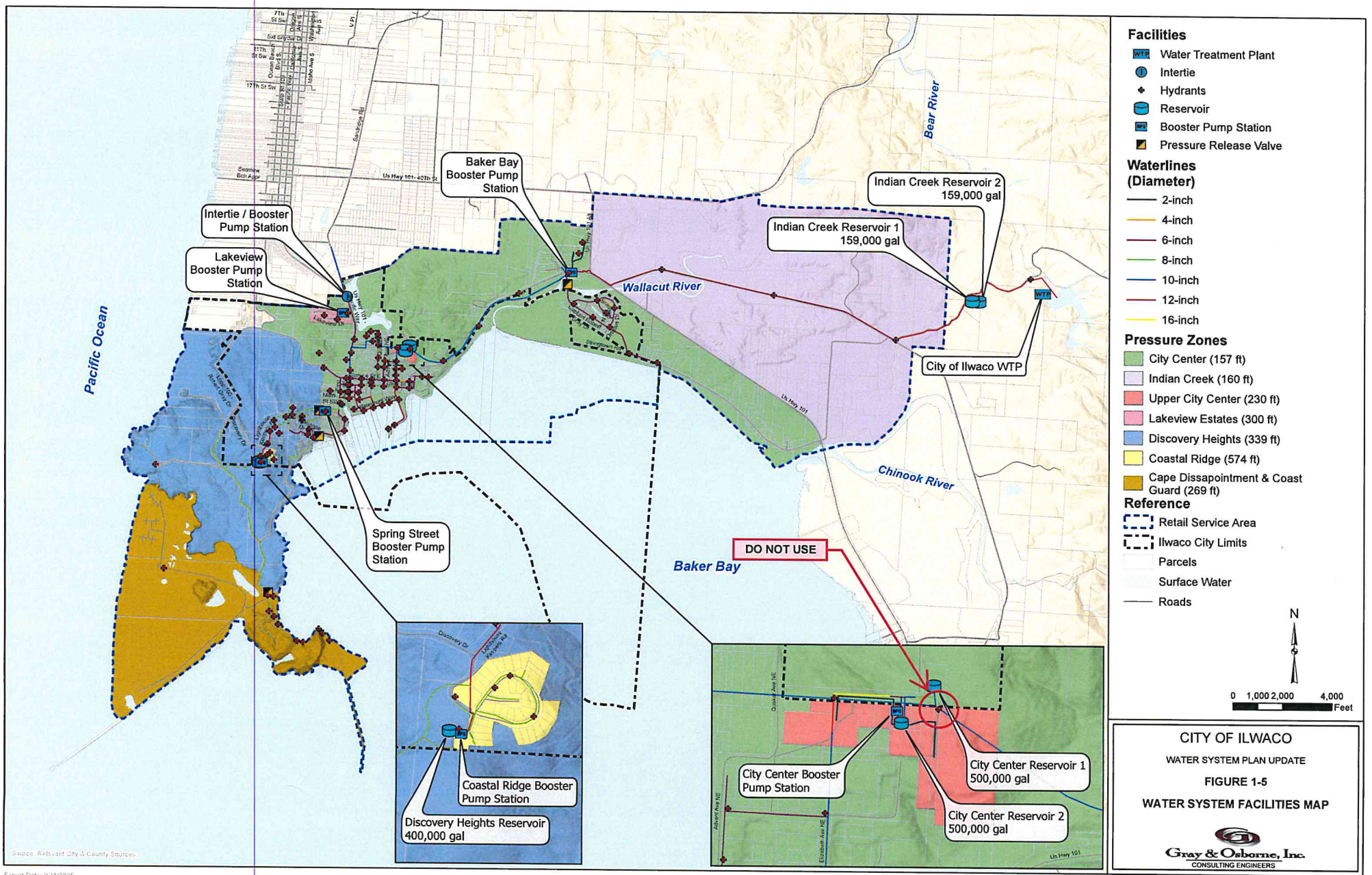
According to the Washington State Department of Health's 2020 *Water System Design Manual*, water distribution systems must maintain at least 20 psi throughout the distribution system under fire flow conditions during maximum day demand (WAC 246-290-230(6)). During hydrant testing performed in January of 2025, it was found that the fire hydrant near the corner of Whealdon Street and Mary Ann Ave NE had a static pressure of 12 psi due to its close proximity to the City Center Reservoirs. As this is well below the pressure requirement outlined above, the City is requesting that the Fire Department does not use this hydrant in firefighting efforts. The City plans to take corrective measures by bagging, signage, distinctive painting, or removing the hydrant in question in the near future.

Sincerely,

CITY OF ILWACO

/
Encl.

cc: Shane Grant, Water Operator and Department Supervisor, City of Ilwaco
Eli Sheaffer, Water Treatment Plant Operator, City of Ilwaco
Holly Beller, City Administrator, City of Ilwaco



CITY OF ILWACO

WATER SYSTEM PLAN UPDATE

FIGURE 1-5

WATER SYSTEM FACILITIES MAP

Gray & Osborne, Inc.
CONSULTING ENGINEERS

Export Date: 9/11/2025

L:\Ilwaco\24460.09 Water System Plan Update\GIS\APRX\IlwacoWater-IlwacoWater.aprx

APPENDIX L

PUBLIC NOTIFICATION FORMS

DRINKING WATER WARNING

City of Ilwaco water is contaminated with [fecal coliform/*E. coli*]

BOIL YOUR WATER BEFORE USING

[Fecal coliform or *E. coli*] bacteria were found in the water supply on [date]. These bacteria can make you sick, and are a particular concern for people with weakened immune systems.

What should I do?

- **DO NOT DRINK THE WATER WITHOUT BOILING IT FIRST.** Bring all water to a boil, let it boil for one minute, and let it cool before using, or use bottled water. Boiled or bottled water should be used for drinking, making ice, brushing teeth, washing dishes, and food preparation **until further notice**. Boiling kills bacteria and other organisms in the water.

  Fecal coliforms and E. coli are bacteria whose presence indicates that the water may be contaminated with human or animal wastes. Microbes in these wastes can cause diarrhea, cramps, nausea, headaches, or other symptoms. They may pose a special health risk for infants, young children, and people with severely compromised immune systems.

- The symptoms above are not caused only by organisms in drinking water. If you experience any of these symptoms and they persist, you may want to seek medical advice. People at increased risk should seek advice about drinking water from their health care providers.

What happened? What is being done?

Bacterial contamination can occur when increased run-off enters the drinking water source (for example, following heavy rains). It can also happen due to a break in the distribution system (pipes) or a failure in the water treatment process.

[Describe corrective action.] We will inform you when tests show no bacteria and you no longer need to boil your water. We anticipate resolving the problem within [estimated time frame].

For more information, please contact [name of contact] at [phone number] or [mailing address]. General guidelines on ways to lessen the risk of infection by microbes are available from the EPA Safe Drinking Water Hotline at 1(800) 426-4791.

Please share this information with all the other people who drink this water, especially those who may not have received this notice directly (for example, people in apartments, nursing homes, schools, and businesses). You can do this by posting this notice in a public place or distributing copies by hand or mail.

This notice is being sent to you by **City of Ilwaco**. State Water System ID#: **355002**. Date distributed: [date]

DRINKING WATER WARNING

City of Ilwaco water has high levels of nitrate –

DO NOT GIVE THE WATER TO INFANTS UNDER 6 MONTHS OLD OR USE IT TO MAKE INFANT FORMULA

Water sample results received [date] showed nitrate levels of [level and units]. This is above the nitrate standard, or maximum contaminant level (MCL), of 10 milligrams per liter. Nitrate in drinking water is a serious health concern for infants less than six months old.

What should I do?

- **DO NOT GIVE THE WATER TO INFANTS.** ***Infants below the age of six months who drink water containing nitrate in excess of the MCL could become seriously ill and, if untreated, may die. Symptoms include shortness of breath and blue baby syndrome.*** Blue baby syndrome is indicated by blueness of the skin. Symptoms in infants can develop rapidly, with health deteriorating over a period of days. If symptoms occur, seek medical attention immediately.
- Water, juice, and formula for children under six months of age should not be prepared with tap water. Bottled water or other water low in nitrates should be used for infants until further notice.
- **DO NOT BOIL THE WATER.** Boiling, freezing, filtering, or letting water stand does not reduce the nitrate level. Excessive boiling can make the nitrates more concentrated, because nitrates remain behind when the water evaporates.
- Adults and children older than six months can drink the tap water (nitrate is a concern for infants because they can't process nitrates in the same way adults can). However, if you are pregnant or have specific health concerns, you may wish to consult your doctor.

What happened? What is being done?

Nitrate in drinking water can come from natural, industrial, or agricultural sources (including septic systems and run-off). Levels of nitrate in drinking water can vary throughout the year. We'll let you know when the amount of nitrate is again below the limit.

[Describe corrective action, seasonal fluctuations, and when system expects to return to compliance.]

For more information, please contact [name of contact] at [phone number] or [mailing address].

Please share this information with all the other people who drink this water, especially those who may not have received this notice directly (for example, people in apartments, nursing homes, schools, and businesses). You can do this by posting this notice in a public place or distributing copies by hand or mail.

This notice is being sent to you by the City of Ilwaco Water System (ID#: 355002).
Date distributed: [date]

DRINKING WATER WARNING

City of Ilwaco has high turbidity levels

BOIL YOUR WATER BEFORE USING

We routinely monitor your water for turbidity (cloudiness). This tells us whether we are effectively filtering the water supply. A water sample taken [date] showed turbidity levels of [number] turbidity units. This is above the standard of [standard depending on treatment technique] turbidity units. Because of these high levels of turbidity, there is an increased chance that the water may contain disease-causing organisms.

What should I do?

- **DO NOT DRINK THE WATER WITHOUT BOILING IT FIRST.** Bring all water to a boil, let it boil for one minute, and let it cool before using, or use bottled water. Boiled or bottled water should be used for drinking, making ice, washing dishes, brushing teeth, and food preparation until further notice.

- *Turbidity has no health effects. However, turbidity can interfere with disinfection and provide a medium for microbial growth. Turbidity may indicate the presence of disease causing organisms. These organisms include bacteria, viruses, and parasites, which can cause symptoms such as nausea, cramps, diarrhea, and associated headaches.*

- People with severely compromised immune systems, infants, and some elderly may be at increased risk. These people should seek advice about drinking water from their health care providers. The symptoms above are not caused only by organisms in drinking water. If you experience any of these symptoms and they persist, you may want to seek medical advice.

What happened? What is being done?

[Describe reason for the high turbidity, corrective action, and when the system expects to return to compliance.]

We will inform you when turbidity returns to appropriate levels and when you no longer need to boil your water.

For more information, please contact [name of contact] at [phone number] or [mailing address]. General guidelines on ways to lessen the risk of infection by microbes are available from the EPA Safe Drinking Water Hotline at 1(800) 426-4791.

> *Please share this information with all the other people who drink this water, especially those who may not have received this notice directly (for example, people in apartments, nursing homes, schools, and businesses). You can do this by posting this notice in a public place or distributing copies by hand or mail.*

This notice is being sent to you by **City of Ilwaco**. State Water System ID#: **355002**. Date distributed: [date]

IMPORTANT INFORMATION ABOUT YOUR DRINKING WATER
Tests Showed Coliform Bacteria in City of Ilwaco Water

Our water system recently violated a drinking water standard. Although this incident was not an emergency, as our customers, you have a right to know what happened and what we did to correct this situation.

We routinely monitor for drinking water contaminants. We took [number] samples to test for the presence of coliform bacteria during [month]. [Number/percentage] of our samples showed the presence of total coliform bacteria. The standard is that no more than [1 sample per month/5 percent of samples] may do so.

What should I do?

- You do not need to boil your water or take other corrective actions. However, if you have specific health concerns, consult your doctor.
- People with severely compromised immune systems, infants, and some elderly may be at increased risk. These people should seek advice about drinking water from their health care providers. General guidelines on ways to lessen the risk of infection by microbes are available from EPA's Safe Drinking Water Hotline at 1 (800) 426-4791.

What does this mean?

This is not an emergency. If it had been, you would have been notified immediately. Coliform bacteria are generally not harmful themselves. *Coliforms are bacteria which are naturally present in the environment and are used as an indicator that other potentially-harmful bacteria may be present. Coliforms were found in more samples than allowed and this was a warning of potential problems.*

Usually, coliforms are a sign that there could be a problem with the system's treatment or distribution system (pipes). Whenever we detect coliform bacteria in any sample, we do follow-up testing to see if other bacteria of greater concern, such as fecal coliform or *E. coli*, are present. **We did not find any of these bacteria in our subsequent testing, and further testing shows that this problem has been resolved.**

What happened? What was done?

[Describe corrective action.]

For more information, please contact [name of contact] at [phone number] or [mailing address].

> *Please share this information with all the other people who drink this water, especially those who may not have received this notice directly (for example, people in apartments, nursing homes, schools, and businesses). You can do this by posting this notice in a public place or distributing copies by hand or mail.*

This notice is being sent to you by **City of Ilwaco**. State Water System ID#: **355002**. Date distributed: [date]

IMPORTANT INFORMATION ABOUT YOUR DRINKING WATER
Tests Show Coliform Bacteria in City of Ilwaco Water

Our water system recently violated a drinking water standard. Although this is not an emergency, as our customers, you have a right to know what happened, what you should do, and what we are doing to correct this situation.

We routinely monitor for the presence of drinking water contaminants. We took [number] samples for coliform bacteria during [month]. [Number/percentage] of those samples showed the presence of coliform bacteria. The standard is that no more than [1 sample per month/5 percent of our samples] may do so.

What should I do?

- You do not need to boil your water or take other corrective actions. However, if you have specific health concerns, consult your doctor.
- People with severely compromised immune systems, infants, and some elderly may be at increased risk. These people should seek advice about drinking water from their health care providers. General guidelines on ways to lessen the risk of infection by microbes are available from EPA's Safe Drinking Water Hotline at 1 (800) 426-4791.

What does this mean?

This is not an emergency. If it had been you would have been notified immediately. Total coliform bacteria are generally not harmful themselves. *Coliforms are bacteria which are naturally present in the environment and are used as an indicator that other, potentially-harmful, bacteria may be present. Coliforms were found in more samples than allowed and this was a warning of potential problems.*

Usually, coliforms are a sign that there could be a problem with the treatment or distribution system (pipes). Whenever we detect coliform bacteria in any sample, we do follow-up testing to see if other bacteria of greater concern, such as fecal coliform or *E. coli*, are present. **We did not find any of these bacteria in our subsequent testing.** If we had, we would have notified you immediately. However, we are still finding coliforms in the drinking water.

What happened? What is being done?

[Describe corrective action.]

We are still detecting coliform bacteria. We will inform you when our sampling shows that no bacteria are present. We anticipate resolving the problem within [estimated time frame].
For more information, please contact [name of contact] at [phone number] or [mailing address].

Please share this information with all the other people who drink this water, especially those who may not have received this notice directly (for example, people in apartments, nursing homes, schools, and businesses). You can do this by posting this notice in a public place or distributing copies by hand or mail.

This notice is being sent to you by **City of Ilwaco**. State Water System ID#: **355002**. Date distributed: [date]

IMPORTANT INFORMATION ABOUT YOUR DRINKING WATER

The City of Ilwaco Has Levels of [Contaminant] Above Drinking Water Standards

Our water system recently violated a drinking water standard. Although this is not an emergency, as our customers, you have a right to know what happened, what you should do, and what we are doing to correct this situation.

We routinely monitor for the presence of drinking water contaminants. Testing results we received on [date] show that our system exceeds the standard or maximum contaminant level (MCL), for [contaminant]. The standard for [contaminant] is [MCL]. The average level of [contaminant] over the last year was [level]. *or* [Contaminant] was found at [level].

What should I do?

- **You do not need to use an alternative (e.g., bottled) water supply.** However, if you have specific health concerns, consult your doctor.

What does this mean?

This is not an immediate risk. If it had been, you would have been notified immediately. However, [Insert relevant health effects language from Appendix B.]

What happened? What is being done?

[Describe corrective action.] We anticipate resolving the problem within [estimated time frame]. For more information, please contact [name of contact] at [phone number] or [mailing address].

> *Please share this information with all the other people who drink this water, especially those who may not have received this notice directly (for example, people in apartments, nursing homes, schools, and businesses). You can do this by posting this notice in a public place or distributing copies by hand or mail.*

This notice is being sent to you by **City of Ilwaco**. State Water System ID#: **355002**. Date distributed: [date]

IMPORTANT INFORMATION ABOUT YOUR DRINKING WATER

Monitoring Requirements Not Met for City of Ilwaco

Our water system violated several drinking water standards over the past year. Even though these were not emergencies, as our customers, you have a right to know what happened and what we did to correct these situations.

We are required to monitor your drinking water for specific contaminants on a regular basis. Results of regular monitoring are an indicator of whether or not our drinking water meets health standards. During [compliance period] we ['did not monitor or test' or 'did not complete all monitoring or testing'] for [contaminant(s)] and therefore cannot be sure of the quality of our drinking water during that time.

What should I do?

There is nothing you need to do at this time.

The table below lists the [contaminant/ contaminants] we did not properly test for during the last year and how often we are supposed to sample for [this contaminant/these contaminants]. Also shown are how many samples we are supposed to take, how many samples we took, when samples should have been taken, and the date on which follow-up samples were (or will be) taken.

Contaminant	Required sampling frequency	Number of samples taken	When all samples should have been taken	When samples were or will be taken
VOCs[1] (example)	1 sample every three years	0	1996-1998	February 1999

What happened? What is being done?

[Describe corrective action.]

For more information, please contact [name of contact] at [phone number] or [mailing address].

Please share this information with all the other people who drink this water, especially those who may not have received this notice directly (for example, people in apartments, nursing homes, schools, and businesses). You can do this by posting this notice in a public place or distributing copies by hand or mail.

This notice is being sent to you by **City of Ilwaco**. State Water System ID#: **355002**. Date distributed: [date]

[1] VOCs, also known as volatile organic compounds, are tested by collecting one sample and testing that sample for all the VOCs. VOCs are commonly used in industrial and manufacturing processes and include benzene, carbon tetrachloride, chlorobenzene, 1,2-dichlorobenzene, 1,4-dichlorobenzene, 1,2-dichloroethane, cisdichloroethylene, trans-dichloroethylene, dichloromethane, 1,2-dichloropropane, ethylbenzene, styrene, tetrachlorethylene, 1,1,1-trichloroethane, trichloroethylene, toluene, 1,2,4-trichlorobenzene, 1,1-dichloroethylene, 1,1,2-trichloroethane, vinyl chloride, and xylene.

Standard Health Effects Language for Public Notification

(From Appendix B of 40 CFR 141, Subpart Q)

Contaminant	MCLG[1] mg/L	MCL[2] mg/L	Standard Health Effects Language for Public Notification
National Primary Drinking Water Regulations (NPDWR):			
A. Microbiological Contaminants			
1a. Total coliform	Zero	See footnote[3]	Coliforms are bacteria that are naturally present in the environment and are used as an indicator that other, potentially-harmful, bacteria may be present. Coliforms were found in more samples than allowed and this was a warning of potential problems.
1b. Fecal coliform/*E. coli*	Zero	Zero	Fecal coliforms and *E. coli* are bacteria whose presence indicates that the water may be contaminated with human or animal wastes. Microbes in these wastes can cause short-term effects, such as diarrhea, cramps, nausea, headaches, or other symptoms. They may pose a special health risk for infants, young children, and people with severely compromised immune systems.
2a. Turbidity (MCL)[4]	None	1 NTU[5]/ 5 NTU	Turbidity has no health effects. However, turbidity can interfere with disinfection and provide a medium for microbial growth. Turbidity may indicate the presence of disease-causing organisms. These organisms include bacteria, viruses, and parasites that can cause symptoms such as nausea, cramps, diarrhea and associated headaches.
2b. Turbidity (SWTR TT)[6]	None	TT [7]	Turbidity has no health effects. However, turbidity can interfere with disinfection and provide a medium for microbial growth. Turbidity may indicate the presence of disease-causing organisms. These organisms include bacteria, viruses, and parasites that can cause symptoms such as nausea, cramps, diarrhea and associated headaches.
2c. Turbidity (IESWTR TT)[8]	None	TT	Turbidity has no health effects. However, turbidity can interfere with disinfection and provide a medium for microbial growth. Turbidity may indicate the presence of disease-causing organisms. These organisms include bacteria, viruses, and parasites that can cause symptoms such as nausea, cramps, diarrhea and associated headaches.

Standard Health Effects Language for Public Notification

(From Appendix B of 40 CFR 141, Subpart Q)

Contaminant	MCLG[1] mg/L	MCL[2] mg/L	Standard Health Effects Language for Public Notification
B. Surface Water Treatment Rule (SWTR) and Interim Enhanced Surface Water Treatment Rule (IESWTR)			
3. *Giardia lamblia* (SWTR/IESWTR) 4. Viruses (SWTR/IESWTR) 5. Heterotrophic plate count (HPC) bacteria[9] (SWTR/IESWTR) 6. Legionella (SWTR/IESWTR) 7. Cryptosporidium (IESWTR)	Zero	TT[10]	Inadequately treated water may contain disease-causing organisms. These organisms include bacteria, viruses, and parasites which can cause symptoms such as nausea, cramps, diarrhea, and associated headaches.
C. Inorganic Chemicals (IOCs)			
8. Antimony	0.006	0.006	Some people who drink water containing antimony well in excess of the MCL over many years could experience increases in blood cholesterol and decreases in blood sugar.
9. Arsenic	None	0.05	Some people who drink water containing arsenic in excess of the MCL over many years could experience skin damage or problems with their circulatory system, and may have an increased risk of getting cancer.
10. Asbestos (>10 µm)	7 MFL[11]	7 MFL	Some people who drink water containing asbestos in excess of the MCL over many years may have an increased risk of developing benign intestinal polyps.
11. Barium	2	2	Some people who drink water containing barium in excess of the MCL over many years could experience an increase in their blood pressure.
12. Beryllium	0.004	0.004	Some people who drink water containing beryllium well in excess of the MCL over many years could develop intestinal lesions.
13. Cadmium	0.005	0.005	Some people who drink water containing cadmium in excess of the MCL over many years could experience kidney damage.
14. Chromium (total)	0.1	0.1	Some people who use water containing chromium well in excess of the MCL over many years could experience allergic dermatitis.
15. Cyanide	0.2	0.2	Some people who drink water containing cyanide well in excess of the MCL over many years could experience nerve damage or problems with their thyroid.

Standard Health Effects Language for Public Notification

(From Appendix B of 40 CFR 141, Subpart Q)

Contaminant	MCLG[1] mg/L	MCL[2] mg/L	Standard Health Effects Language for Public Notification
16. Fluoride	4.0	4.0	Some people who drink water containing fluoride in excess of the MCL over many years could get bone disease, including pain and tenderness of the bones. Fluoride in drinking water at half the MCL or more may cause mottling of children's teeth, usually in children less than nine years old. Mottling, also known as dental fluorosis, may include brown staining and/or pitting of the teeth, and occurs only in developing teeth, before they erupt from the gums.
17. Mercury (inorganic)	0.002	0.002	Some people who drink water containing inorganic mercury well in excess of the MCL over many years could experience kidney damage.
18. Nitrate	10	10	Infants below the age of six months who drink water containing nitrate in excess of the MCL could become seriously ill and, if untreated, may die. Symptoms include shortness of breath and blue-baby syndrome.
19. Nitrite	1	1	Infants below the age of six months who drink water containing nitrite in excess of the MCL could become seriously ill and, if untreated, may die. Symptoms include shortness of breath and blue-baby syndrome.
20. Total Nitrate and Nitrite	10	10	Infants below the age of six months who drink water containing nitrate and nitrite in excess of the MCL could become seriously ill and, if untreated, may die. Symptoms include shortness of breath and blue baby syndrome.
21. Selenium	0.05	0.05	Selenium is an essential nutrient. However, some people who drink water containing selenium in excess of the MCL over many years could experience hair or fingernail losses, numbness in fingers or toes, or problems with their circulation.
22. Thallium	0.0005	0.002	Some people who drink water containing thallium in excess of the MCL over many years could experience hair loss, changes in their blood, or problems with their kidneys, intestines, or liver.
D. Lead and Copper Rule			
23. Lead	Zero	TT[12]	Infants and children who drink water containing lead in excess of the action level could experience delays in their physical or mental development. Children could show slight deficits in attention span and learning abilities. Adults who drink this water over many years could develop kidney problems or high blood pressure.

Standard Health Effects Language for Public Notification

(From Appendix B of 40 CFR 141, Subpart Q)

Contaminant	MCLG[1] mg/L	MCL[2] mg/L	Standard Health Effects Language for Public Notification
24. Copper	1.3	TT[13]	Copper is an essential nutrient, but some people who drink water containing copper in excess of the action level over a relatively short amount of time could experience gastrointestinal distress. Some people who drink water containing copper in excess of the action level over many years could suffer liver or kidney damage. People with Wilson's Disease should consult their personal doctor.
E. Synthetic Organic Chemicals (SOCs)			
25. 2,4-D	0.07	0.07	Some people who drink water containing the weed killer 2,4-D well in excess of the MCL over many years could experience problems with their kidneys, liver, or adrenal glands.
26. 2,4,5-TP (Silvex)	0.05	0.05	Some people who drink water containing silvex in excess of the MCL over many years could experience liver problems.
27. Alachlor	Zero	0.002	Some people who drink water containing alachlor in excess of the MCL over many years could have problems with their eyes, liver, kidneys, or spleen, or experience anemia, and may have an increased risk of getting cancer.
28. Atrazine	0.003	0.003	Some people who drink water containing atrazine well in excess of the MCL over many years could experience problems with their cardiovascular system or reproductive difficulties.
29. Benzo(a)pyrene (PAHs)	Zero	0.0002	Some people who drink water containing benzo(a)pyrene in excess of the MCL over many years may experience reproductive difficulties and may have an increased risk of getting cancer.
30. Carbofuran	0.04	0.04	Some people who drink water containing carbofuran in excess of the MCL over many years could experience problems with their blood, or nervous or reproductive systems.
31. Chlordane	Zero	0.002	Some people who drink water containing chlordane in excess of the MCL over many years could experience problems with their liver, or nervous system, and may have an increased risk of getting cancer.
32. Dalapon	0.2	0.2	Some people who drink water containing dalapon well in excess of the MCL over many years could experience minor kidney changes.
33. Di (2-ethylhexyl) adipate	0.4	0.4	Some people who drink water containing di (2-ethylhexyl) adipate well in excess of the MCL over many years could experience general toxic effects or reproductive difficulties.

Standard Health Effects Language for Public Notification

(From Appendix B of 40 CFR 141, Subpart Q)

Contaminant	MCLG[1] mg/L	MCL[2] mg/L	Standard Health Effects Language for Public Notification
34. Di(2-ethylhexyl) phthalate	Zero	0.006	Some people who drink water containing di (2-ethylhexyl) phthalate in excess of the MCL over many years may have problems with their liver, or experience reproductive difficulties, and may have an increased risk of getting cancer.
35. Dibromochloropropane (DBCP)	Zero	0.0002	Some people who drink water containing DBCP in excess of the MCL over many years could experience reproductive difficulties and may have an increased risk of getting cancer.
36. Dinoseb	0.007	0.007	Some people who drink water containing dinoseb well in excess of the MCL over many years could experience reproductive difficulties.
37. Dioxin (2,3,7,8-TCDD)	Zero	3×10^{-8}	Some people who drink water containing dioxin in excess of the MCL over many years could experience reproductive difficulties and may have an increased risk of getting cancer.
38. Diquat	0.02	0.02	Some people who drink water containing diquat in excess of the MCL over many years could get cataracts.
39. Endothall	0.1	0.1	Some people who drink water containing endothall in excess of the MCL over many years could experience problems with their stomach or intestines.
40. Endrin	0.002	0.002	Some people who drink water containing endrin in excess of the MCL over many years could experience liver problems.
41. Ethylene dibromide	Zero	0.00005	Some people who drink water containing ethylene dibromide in excess of the MCL over many years could experience problems with their liver, stomach, reproductive system, or kidneys, and may have an increased risk of getting cancer.
42. Glyphosate	0.7	0.7	Some people who drink water containing glyphosate in excess of the MCL over many years could experience problems with their kidneys or reproductive difficulties.
43. Heptachlor	Zero	0.0004	Some people who drink water containing heptachlor in excess of the MCL over many years could experience liver damage and may have an increased risk of getting cancer.
44. Heptachlor epoxide	Zero	0.0002	Some people who drink water containing heptachlor epoxide in excess of the MCL over many years could experience liver damage, and may have an increased risk of getting cancer.

Standard Health Effects Language for Public Notification

(From Appendix B of 40 CFR 141, Subpart Q)

Contaminant	MCLG[1] mg/L	MCL[2] mg/L	Standard Health Effects Language for Public Notification
45. Hexachlorobenzene	Zero	0.001	Some people who drink water containing hexachlorobenzene in excess of the MCL over many years could experience problems with their liver or kidneys, or adverse reproductive effects, and may have an increased risk of getting cancer.
46. Hexachlorocyclo-pentadiene	0.05	0.05	Some people who drink water containing hexachlorocyclopentadiene well in excess of the MCL over many years could experience problems with their kidneys or stomach.
47. Lindane	0.0002	0.0002	Some people who drink water containing lindane in excess of the MCL over many years could experience problems with their kidneys or liver.
48. Methoxychlor	0.04	0.04	Some people who drink water containing methoxychlor in excess of the MCL over many years could experience reproductive difficulties.
49. Oxamyl (Vydate)	0.2	0.2	Some people who drink water containing oxamyl in excess of the MCL over many years could experience slight nervous system effects.
50. Pentachlorophenol	Zero	0.001	Some people who drink water containing pentachlorophenol in excess of the MCL over many years could experience problems with their liver or kidneys, and may have an increased risk of getting cancer.
51. Picloram	0.5	0.5	Some people who drink water containing picloram in excess of the MCL over many years could experience problems with their liver.
52. Polychlorinated biphenyls (PCBs)	Zero	0.0005	Some people who drink water containing PCBs in excess of the MCL over many years could experience changes in their skin, problems with their thymus gland, immune deficiencies, or reproductive or nervous system difficulties, and may have an increased risk of getting cancer.
53. Simazine	0.004	0.004	Some people who drink water containing simazine in excess of the MCL over many years could experience problems with their blood.
54. Toxaphene	Zero	0.003	Some people who drink water containing toxaphene in excess of the MCL over many years could have problems with their kidneys, liver, or thyroid, and may have an increased risk of getting cancer.
F. Volatile Organic Chemicals (VOCs)			
55. Benzene	Zero	0.005	Some people who drink water containing benzene in excess of the MCL over many years could experience anemia or a decrease in blood platelets, and may have an increased risk of getting cancer.

Standard Health Effects Language for Public Notification

(From Appendix B of 40 CFR 141, Subpart Q)

Contaminant	MCLG[1] mg/L	MCL[2] mg/L	Standard Health Effects Language for Public Notification
56. Carbon tetrachloride	Zero	0.005	Some people who drink water containing carbon tetrachloride in excess of the MCL over many years could experience problems with their liver and may have an increased risk of getting cancer.
57. Chlorobenzene (monochlorobenzene)	0.1	0.1	Some people who drink water containing chlorobenzene in excess of the MCL over many years could experience problems with their liver or kidneys.
58. *o*-Dichlorobenzene	0.6	0.6	Some people who drink water containing o-dichlorobenzene well in excess of the MCL over many years could experience problems with their liver, kidneys, or circulatory systems.
59. *p*-Dichlorobenzene	0.075	0.075	Some people who drink water containing p-dichlorobenzene in excess of the MCL over many years could experience anemia, damage to their liver, kidneys, or spleen, or changes in their blood.
60. 1,2-Dichloroethane	Zero	0.005	Some people who drink water containing 1,2-dichloroethane in excess of the MCL over many years may have an increased risk of getting cancer.
61. 1,1-Dichloroethylene	0.007	0.007	Some people who drink water containing 1,1-dichloroethylene in excess of the MCL over many years could experience problems with their liver.
62. *cis*-1,2-Dichloroethylene	0.07	0.07	Some people who drink water containing cis-1,2-dichloroethylene in excess of the MCL over many years could experience problems with their liver.
63. *trans*-1,2-Dichloroethylene	0.1	0.1	Some people who drink water containing trans-1,2-dichloroethylene well in excess of the MCL over many years could experience problems with their liver.
64. Dichloromethane	Zero	0.005	Some people who drink water containing dichloromethane in excess of the MCL over many years could have liver problems and may have an increased risk of getting cancer.
65. 1,2-Dichloropropane	Zero	0.005	Some people who drink water containing 1,2-dichloropropane in excess of the MCL over many years may have an increased risk of getting cancer.
66. Ethylbenzene	0.7	0.7	Some people who drink water containing ethylbenzene well in excess of the MCL over many years could experience problems with their liver or kidneys.
67. Styrene	0.1	0.1	Some people who drink water containing styrene well in excess of the MCL over many years could have problems with their liver, kidneys, or circulatory system.

Standard Health Effects Language for Public Notification

(From Appendix B of 40 CFR 141, Subpart Q)

Contaminant	MCLG[1] mg/L	MCL[2] mg/L	Standard Health Effects Language for Public Notification
68. Tetrachloroethylene	Zero	0.005	Some people who drink water containing tetrachloroethylene in excess of the MCL over many years could have problems with their liver, and may have an increased risk of getting cancer.
69. Toluene	1	1	Some people who drink water containing toluene well in excess of the MCL over many years could have problems with their nervous system, kidneys, or liver.
70. 1,2,4-Trichlorobenzene	0.07	0.07	Some people who drink water containing 1,2,4-trichlorobenzene well in excess of the MCL over many years could experience changes in their adrenal glands.
71. 1,1,1-Trichloroethane	0.2	0.2	Some people who drink water containing 1,1,1-trichloroethane in excess of the MCL over many years could experience problems with their liver, nervous system, or circulatory system.
72. 1,1,2-Trichloroethane	0.003	0.005	Some people who drink water containing 1,1,2-trichloroethane well in excess of the MCL over many years could have problems with their liver, kidneys, or immune systems.
73. Trichloroethylene	Zero	0.005	Some people who drink water containing trichloroethylene in excess of the MCL over many years could experience problems with their liver and may have an increased risk of getting cancer.
74. Vinyl chloride	Zero	0.002	Some people who drink water containing vinyl chloride in excess of the MCL over many years may have an increased risk of getting cancer.
75. Xylenes (total)	10	10	Some people who drink water containing xylenes in excess of the MCL over many years could experience damage to their nervous system.
G. Radioactive Contaminants			
76. Beta/photon emitters	Zero	4 mrem/yr[14]	Certain minerals are radioactive and may emit forms of radiation known as photons and beta radiation. Some people who drink water containing beta and photon emitters in excess of the MCL over many years may have an increased risk of getting cancer.
77. Alpha emitters (Gross alpha)	Zero	15 pCi/L[15]	Certain minerals are radioactive and may emit a form of radiation known as alpha radiation. Some people who drink water containing alpha emitters in excess of the MCL over many years may have an increased risk of getting cancer.
78. Combined radium (226 & 228)	Zero	5 pCi/L	Some people who drink water containing radium 226 or 228 in excess of the MCL over many years may have an increased risk of getting cancer.

Standard Health Effects Language for Public Notification

(From Appendix B of 40 CFR 141, Subpart Q)

Contaminant	MCLG[1] mg/L	MCL[2] mg/L	Standard Health Effects Language for Public Notification
H. Disinfection Byproducts (DBPs), Byproduct Precursors, and Disinfectant Residuals*:* Where disinfection is used in the treatment of drinking water, disinfectants combine with organic and inorganic matter present in water to form chemicals called disinfection byproducts (DBPs). EPA sets standards for controlling the levels of disinfectants and DBPs in drinking water, including trihalomethanes (THMs) and haloacetic acids (HAAs).[16]			
79. Total trihalomethanes (TTHMs)	N/A	0.10/ 0.080[17,18]	Some people who drink water containing trihalomethanes in excess of the MCL over many years may experience problems with their liver, kidneys, or central nervous system, and may have an increased risk of getting cancer.
80. Haloacetic Acids (HAA)	N/A	0.060[19]	Some people who drink water containing haloacetic acids in excess of the MCL over many years may have an increased risk of getting cancer.
81. Bromate	Zero	0.010	Some people who drink water containing bromate in excess of the MCL over many years may have an increased risk of getting cancer.
82. Chlorite	0.08	1.0	Some infants and young children who drink water containing chlorite in excess of the MCL could experience nervous system effects. Similar effects may occur in fetuses of pregnant women who drink water containing chlorite in excess of the MCL. Some people may experience anemia.
83. Chlorine	4 (MRDLG)[20]	4.0 (MRDL)[21]	Some people who use drinking water containing chlorine well in excess of the MRDL could experience irritating effects to their eyes and nose. Some people who drink water containing chlorine well in excess of the MRDL could experience stomach discomfort.
84. Chloramines	4 (MRDLG)	4.0 (MRDL)	Some people who use drinking water containing chloramines well in excess of the MRDL could experience irritating effects to their eyes and nose. Some people who drink water containing chloramines well in excess of the MRDL could experience stomach discomfort or anemia.

(From Appendix B of 40 CFR 141, Subpart Q)

Contaminant	MCLG[1] mg/L	MCL[2] mg/L	Standard Health Effects Language for Public Notification
85a. Chlorine dioxide, where any 2 consecutive daily samples taken at the entrance to the distribution system are above the MRDL	0.8 (MRDLG)	0.8 (MRDL)	Some infants and young children who drink water containing chlorine dioxide in excess of the MRDL could experience nervous system effects. Similar effects may occur in fetuses of pregnant women who drink water containing chlorine dioxide in excess of the MRDL. Some people may experience anemia. *Add for public notification only*: The chlorine dioxide violations reported today are the result of exceedances at the treatment facility only, not within the distribution system which delivers water to consumers. Continued compliance with chlorine dioxide levels within the distribution system minimizes the potential risk of these violations to consumers.
85b. Chlorine dioxide, where one or more distribution system samples are above the MRDL	0.8 (MRDLG)	0.8 (MRDL)	Some infants and young children who drink water containing chlorine dioxide in excess of the MRDL could experience nervous system effects. Similar effects may occur in fetuses of pregnant women who drink water containing chlorine dioxide in excess of the MRDL. Some people may experience anemia. *Add for public notification only*: The chlorine dioxide violations reported today include exceedances of the EPA standard within the distribution system which delivers water to consumers. Violations of the chlorine dioxide standard within the distribution system may harm human health based on short-term exposures. Certain groups, including fetuses, infants, and young children, may be especially susceptible to nervous system effects from excessive chlorine dioxide exposure.
86. Control of DBP precursors (TOC)	None	TT	Total organic carbon (TOC) has no health effects. However, total organic carbon provides a medium for the formation of disinfection byproducts. These byproducts include trihalomethanes (THMs) and haloacetic acids (HAAs). Drinking water containing these byproducts in excess of the MCL may lead to adverse health effects, liver or kidney problems, or nervous system effects, and may lead to an increased risk of getting cancer.

(From Appendix B of 40 CFR 141, Subpart Q)

Contaminant	MCLG[1] mg/L	MCL[2] mg/L	Standard Health Effects Language for Public Notification
I. Other Treatment Techniques			
87. Acrylamide	Zero	TT	Some people who drink water containing high levels of acrylamide over a long period of time could have problems with their nervous system or blood, and may have an increased risk of getting cancer.
88. Epichlorohydrin	Zero	TT	Some people who drink water containing high levels of epichlorohydrin over a long period of time could experience stomach problems, and may have an increased risk of getting cancer.

Endnotes

1. MCLG - Maximum contaminant level goal

2. MCL - Maximum contaminant level

3. For water systems analyzing at least 40 samples per month, no more than 5.0 percent of the monthly samples may be positive for total coliforms. For systems analyzing fewer than 40 samples per month, no more than one sample per month may be positive for total coliforms.

4. There are various regulations that set turbidity standards for different types of systems, including 40 CFR 141.13, the 1989 Surface Water Treatment Rule, and the 1998 Interim Enhanced Surface Water Treatment Rule. The MCL for the monthly turbidity average is 1 NTU; the MCL for the 2-day average is 5 NTU for systems that are required to filter but have not yet installed filtration (40 CFR 141.13).

5. NTU - Nephelometric turbidity unit

6. There are various regulations that set turbidity standards for different types of systems, including 40 CFR 141.13, the 1989 Surface Water Treatment Rule (SWTR), and the 1998 Interim Enhanced Surface Water Treatment Rule (IESWTR). Systems subject to the Surface Water Treatment Rule (both filtered and unfiltered) may not exceed 5 NTU. In addition, in filtered systems, 95 percent of samples each month must not exceed 0.5 NTU in systems using conventional or direct filtration and must not exceed 1 NTU in systems using slow sand or diatomaceous earth filtration or other filtration technologies approved by the primacy agency.

7. TT - Treatment technique

8. There are various regulations that set turbidity standards for different types of systems, including 40 CFR 141.13, the 1989 Surface Water Treatment Rule (SWTR), and the 1998 Interim Enhanced Surface Water Treatment Rule (IESWTR). For systems subject to the IESWTR (systems serving at least 10,000 people, using surface water or ground water under the direct influence of surface water), that use conventional filtration or direct filtration, after January 1, 2002, the turbidity level of a system's combined filter effluent may not exceed 0.3 NTU in at least 95 percent of monthly measurements, and the turbidity level of a system's combined filter effluent must not exceed 1 NTU at any time. Systems subject to the IESWTR using technologies other than conventional, direct, slow sand, or diatomaceous earth filtration must meet turbidity limits set by the primacy agency.

9. The bacteria detected by heterotrophic plate count (HPC) are not necessarily harmful. HPC is simply an alternative method of determining disinfectant residual levels. The number of such bacteria is an indicator of whether there is enough disinfectant in the distribution system.

10. SWTR and IESWTR treatment technique violations that involve turbidity exceedances may use the health effects language for turbidity instead.

11. Millions of fibers per liter

12. Action Level = 0.015 mg/L

13. Action Level = 1.3 mg/L

14. Millirems per year

15. Picocuries per liter

16. Surface water systems and ground water systems under the direct influence of surface water are regulated under Subpart H of 40 CFR 141. Subpart H community and non-transient non-community systems serving $10,000 must comply with DBP MCLs and disinfectant maximum residual disinfectant levels (MRDLs) beginning January 1, 2002. All other community and non-transient noncommunity systems must meet the MCLs and MRDLs beginning January 1, 2004. Subpart H transient non-community systems serving 10,000 or more persons and using chlorine dioxide as a disinfectant or oxidant must comply with the chlorine dioxide MRDL beginning January 1, 2002. Subpart H transient non-community systems serving fewer than 10,000 persons and systems using only ground water not under the direct influence of surface water and using chlorine dioxide as a disinfectant or oxidant must comply with the chlorine dioxide MRDL beginning January 1, 2004.

17. The MCL of 0.10 mg/l for TTHMs is in effect until January 1, 2002 for Subpart H community water systems serving 10,000 or more. This MCL is in effect until January 1, 2004 for community water systems with a population of 10,000 or more using only ground water not under the direct influence of surface water. After these deadlines, the MCL will be 0.080 mg/l. On January 1, 2004, all systems serving less than 10,000 will have to comply with the new MCL as well.

18. The MCL for total trihalomethanes is the sum of the concentrations of the individual trihalomethanes.

19. The MCL for haloacetic acids is the sum of the concentrations of the individual haloacetic acids.

20. MRDLG - Maximum residual disinfectant level goal

21. MRDL - Maximum residual disinfectant level

APPENDIX M

EMERGENCY RESPONSE AND PLANNING DOCUMENTS

Questions & Answers

Responding to a Pressure-loss event

331-338 • 6/28/2024

What is a pressure-loss event and what causes it?

A pressure-loss event occurs when pressure in the water distribution system drops significantly below normal. These events may be planned or unplanned and they can happen at any time, day or night. For example, system operators may intentionally reduce pressure in the distribution system when they install, replace, or repair water lines. Broken water mains, failed pumping systems, power outages, leaking storage reservoirs, and high demand, such as fire flow, can cause unplanned pressure loss within parts of the distribution system, or throughout the system.

Should water system operators be concerned about pressure-loss events?

Yes. Pressure loss events can pose a serious threat to public health. A significant reduction or complete loss of pressure in a part of the distribution system may allow contaminants from an end-user or the environment to enter the distribution system. Microbial, chemical, or physical contaminants that enter the distribution system through unprotected cross connections, or through openings in the underground piping system, may cause widespread illness, injury, or worse.

What should water system operators do if a pressure-loss event occurs?

- **Identify** who is in charge.
- **Find** the cause of the pressure-loss problem. Call us if you need help (see page 2).
- **Identify** the affected area and work to restore pressure as soon as possible.
- **Call** our regional office (working hours) or our after-hours number (see page 2). We'll help you decide which customers to contact and whether to issue a health advisory. Your first priority is to protect your customers' health.
- **Communicate** with affected customers about what happened. Tell them what they should do to protect their health, and what system operators are doing to correct the situation.
- **Flush** affected parts of the distribution system to remove any contaminants. Your flushing plan should effectively move any known contaminants to the nearest point of discharge without unnecessarily spreading contamination through the distribution system.
- **Disinfect** affected parts of the system to reduce the risk of waterborne disease. If you don't normally disinfect, you should notify your customers before adding a disinfectant.

- **Sample** the distribution system after you restore normal operating pressure, including coliform samples and possibly certain chemical samples, to confirm your system meets drinking water standards.

Should operators prepare customers for unexpected pressure loss?

Yes. Educate your customers beforehand so they are prepared for a water system emergency. Let your customers know that:

- **Customers** who experience water pressure loss should first determine whether the cause is a failure in their building plumbing system. If so, they should contact a plumber. If not, they should contact you to report where and when the pressure loss occurred.
- **You** will keep them informed of the situation, make necessary repairs, and sample following an unexpected pressure-loss event. In the absence of immediate information from you, customers should plan to use bottled water in place of tap water.
- **Everyone** should prepare for a water system emergency by planning to use bottled water in place of tap water for at least 72 hours. The American Red Cross recommends storing at least one gallon of water per person per day.

Should water system operators provide public notification?

Yes. If your system experiences a loss of pressure, or you plan a water outage associated with repairing a water main, you should promptly notify affected customers and describe:

1. The cause of the pressure loss.
2. The affected area.
3. What you are doing to solve the pressure-loss problem.
4. What consumers should do as their system begins to re-pressurize, before they use the water for drinking, making ice, brushing teeth, washing dishes, and food preparation.
5. How consumers will know when the water is safe to use.

If the pressure loss is system-wide, contact all customers. If the pressure loss is localized, notify only affected customers.

If you are certain the risk is limited to microbial contamination, use the *Drinking Water Warning: Loss of Pressure* (331-493-F) public notice referenced below. If the risk assessment points to possible chemical contamination due to backflow, use the *Drinking Water Warning: Backflow Incident* (331-495-F) public notice referenced below.

For More Information

Find more resources on our Publications and Forms webpage.

Contact our nearest regional office from 8 AM to 5 PM, Monday through Friday. If you have an after-hours emergency, call 877-481-4901.

Eastern Region, Spokane Valley 509-329-2100.

Northwest Region, Kent 253-395-6750.

Southwest Region, Tumwater 360-236-3030.

Other ODW Publications

News Release Announce Boil Water Advisory Template (331-260-2)

News Release Cancel Boil Water Advisory Template (331-260-3)

Emergency Disinfection of Small Systems (331-242)

Responding to a Backflow Incident (331-494)

Drinking Water Warning: Loss of Pressure (331-493-F)

Drinking Water Warning: Backflow Incident (331-495-F)

To request this document in another format, call 1-800-525-0127. Deaf or hard of hearing customers, please call 711 (Washington Relay) or email doh.information@doh.wa.gov. If in need of translation services, call 1-800-525-0127.

What resources can I use to develop a cross-connection control program?

Please review our Cross-Connection Control and Backflow Prevention webpage for additional resources. Below is a list of helpful publications.

For More Information

Find more resources on our Publications and Forms webpage.

Contact our nearest regional office from 8 AM to 5 PM, Monday through Friday. If you have an after-hours emergency, call 877-481-4901.

Eastern Region, Spokane Valley 509-329-2100.

Northwest Region, Kent 253-395-6750.

Southwest Region, Tumwater 360-236-3030.

Other DOH Publications

Cross Connection Control for Small Water Systems (331-234) webpage
Small Water System Management Program Guide (331-134)
Noncommunity Small Water System Management Program Guide (331-474)
Responding to a Pressure-Loss Event (331-338)
Drinking Water Warning: Loss of Pressure (331-493-F)
Drinking Water Warning: Backflow Incident (331-495-F)
News Release Announce Boil Water Advisory Template (331-260-2)
News Release Cancel Boil Water Advisory Template (331-260-3)
Emergency Disinfection of Small Systems (331-242)

To request this document in another format, call 1-800-525-0127. Deaf or hard of hearing customers, please call 711 (Washington Relay) or email doh.information@doh.wa.gov. If in need of translation services, call 1-800-525-0127.

Main Break Categories

Type I Break	Type II Break	Type III Break	Type IV Break
Positive pressure maintained through completion of repair.	Controlled pipe repair with limited depressurization during pipe segment shutdown.	Uncontrolled loss of pressure at break site or depressurization elsewhere in the system.	Catastrophic main break or water loss event resulting in the complete loss of water service.
Pressure maintained in pipe during repair, and pressure maintained throughout the distribution system.	Pressure maintained at break site until pipe is exposed and trench dewatered. Shutdown limited to immediate valved off area. No loss of pressure elsewhere.	Pressure loss at break site while pipe is still buried or submerged and/or pressure loss elsewhere in the system.	Extensive water loss compared to system capacity, with no pressure/no water. Storage loss leaves limited flushing capacity.
Contamination is unlikely.	Limited possibility of contamination.	Significant possibility of contamination.	Contamination likely or certain.

Type I Main Break Response
Assess environmental impacts and respond accordingly.
Call Washington 811.
Excavate to below break. Maintain pit water level below break.
Disinfect repair parts and repair site by swab/spray with 1% chlorine solution.
Complete repair with pipe still pressurized.
Restore residual disinfectant level at break to background levels by flushing.
Boil Water Advisory (BWA) and bacteriological sampling not needed.

Type II Main Break Response
Assess environmental impacts and respond accordingly.
Call Washington 811.
Excavate to below break. Maintain pit water level below break.
Isolate/shut off customer services in affected area.
Provide customer notification using door hanger, personal contact, email, or reverse 911.
Follow established utility procedures to perform controlled shutdown of broken pipe segment.
Disinfect repair parts and repair site by swab/spray with 1% chlorine solution. If pipe replacement, disinfect from both ends by swabbing.
Complete repair.
Conduct low velocity flush to displace water in affected piping. Discharge to waste.
Flush to restore residual disinfectant level at the break to background levels.
Advise customers to flush plumbing when water service returns. Verify service is restored to all isolated customers.
If utility shuts off customer services in affected area and positive pressure is maintained throughout the system prior to depressurizing the break site, a boil water advisory is not needed.
Collect bacteriological/heterotrophic plate count samples to validate repair procedures. The utility may restore service before getting results.

APPENDIX N

CIP COST ESTIMATES

City of Ilwaco
PRELIMINARY PROJECT COST ESTIMATE
SOURCE IMPROVEMENT SO-1
Floating Intake Replacement

NO.	ITEM	QUANTITY		UNIT PRICE	AMOUNT
1	Mobilization, Cleanup, and Demobilization	1	LS	$ 70,000	$ 70,000
2	Utility Locates	1	LS	$4,000	$4,000
3	Erosion Control	1	LS	$5,000	$5,000
4	Unsuitable Excavation	10	CY	$300	$3,000
5	12-Inch HDPE Pipe	1,000	LF	$200	$200,000
6	Raw Water Pumps & Building	1	LS	$275,000	$275,000
7	Surface Restoration	1	LS	$6,000	$6,000
8	Intake Structure	1	LS	$50,000	$50,000
9	Instrumentatino and Controls	1	LS	$100,000	$100,000
10	Electrical	1	LS	$175,000	$175,000
	Subtotal……				$888,000
	Tax Rate (8.2%)…….…….…….……...…..				$73,000
	Subtotal……				$961,000
	Contingency (20%)……...…….……				$193,000
	TOTAL ESTIMATED PROJECT COST:.....				$ 1,154,000
	Engineering, Permitting, Construction, and Administrative Costs (30%):.....…				$ 346,000
	TOTAL ESTIMATED CONSTRUCTION COST:……				$1,500,000

City of Ilwaco
PRELIMINARY PROJECT COST ESTIMATE
SOURCE IMPROVEMENT SO-2
Impoundment Dam Drainage Improvements

NO.	ITEM	QUANTITY		UNIT PRICE	AMOUNT
1	Mobilization and Demobilization	1	LS	$30,000	$30,000
2	Minor Changes	1	CALC	$20,000	$20,000
3	Temporary Erosion and Sediment Control	1	LS	$2,000	$2,000
4	Trench Safety Systems	1	LS	$40,000	$40,000
5	10' Deep 6" Perforated PVC Pipe, Including Fittings	830	LF	$220	$182,600
6	3' Deep 6"Perforated PVC Pipe, Including Fittings	340	LF	$100	$34,000
7	Gravel Backfill (WSDOT 9-03.12(4))	936	TN	$30	$28,100
8	Quarry Spalls (WSDOT 9-13.1(5))	242	TN	$30	$7,300
9	Removal of Unsuitable Material (Trench)	100	CY	$100	$10,000
10	Decommisioning Standing Wells	6	EA	$4,000	$24,000
11	Exhume Blanket Drain	1	LS	$5,000	$5,000
12	Cleanout Risers	9	EA	$5,000	$45,000
13	General Restoration	1	LS	$4,000	$4,000
	Subtotal……				$432,000
	Tax Rate (8.2%)…….…….…….…….…….…….....…..				$36,000
	Subtotal……				$468,000
	Contingency (20%)……...…….…….				$94,000
	TOTAL ESTIMATED CONSTRUCTION COST:……				$562,000

City of Ilwaco
PRELIMINARY PROJECT COST ESTIMATE
BOOSTER PUMP STATION IMPROVEMENT BPS-1
New 500 gpm Discovery Heights Booster Pump

NO.	ITEM	QUANTITY	UNIT PRICE	AMOUNT
1	Mobilization, Cleanup, and Demobilization	1 LUMP SUM	$35,000	$35,000
2	Minor Changes	1 LUMP SUM	$20,000	$20,000
3	Locate Utilities	1 LUMP SUM	$5,000	$5,000
4	Trench Safety Systems	1 LUMP SUM	$7,000	$7,000
5	Erosion Control	1 LUMP SUM	$7,000	$7,000
6	Piping and Appurtenances	1 LUMP SUM	$100,000	$100,000
7	Site Piping	1 LUMP SUM	$50,000	$50,000
8	Booster Station Building	1 LUMP SUM	$48,000	$48,000
9	Booster Pump	1 EA	$18,000	$18,000
10	Electrical	1 LUMP SUM	$100,000	$100,000
11	Site Restoration	1 LUMP SUM	$10,000	$10,000
	Subtotal.....			$ 224,000
	Tax rate (8.2%)…..……..…..…..……..…….			18,368
	Subtotal:.....			$ 242,368
	Contingency (20%)……..…...…….……..…….			$ 48,632
	TOTAL ESTIMATED CONSTRUCTION COST:.....			$ 291,000
	Engineering, Permitting, Construction, and Administrative Costs (30%):.....….....			$ 88,000
	TOTAL ESTIMATED PROJECT COST:.....			$ 379,000

City of Ilwaco
PRELIMINARY PROJECT COST ESTIMATE
BOOSTER PUMP STATION IMPROVEMENT BPS-2
New 500 gpm Lakeview Estates Booster Pump and Building

NO.	ITEM	QUANTITY	UNIT PRICE	AMOUNT
1	Mobilization, Cleanup, and Demobilization	1 LUMP SUM	$35,000	$35,000
2	Minor Changes	1 LUMP SUM	$20,000	$20,000
3	Locate Utilities	1 LUMP SUM	$5,000	$5,000
4	Trench Safety Systems	1 LUMP SUM	$7,000	$7,000
5	Erosion Control	1 LUMP SUM	$7,000	$7,000
6	Piping and Appurtenances	1 LUMP SUM	$100,000	$100,000
7	Site Piping	1 LUMP SUM	$50,000	$50,000
8	Booster Station Building	1 LUMP SUM	$48,000	$48,000
9	Booster Pump	1 EA	$18,000	$18,000
10	Electrical	1 LUMP SUM	$100,000	$100,000
11	Site Restoration	1 LUMP SUM	$10,000	$10,000
	Subtotal.....			$ 224,000
	Tax rate (8.2%)…..……..…..…..……..…….			18,368
	Subtotal:.....			$ 242,368
	Contingency (20%)……..…...…….……..…….			$ 48,632
	TOTAL ESTIMATED CONSTRUCTION COST:.....			$ 291,000
	Engineering, Permitting, Construction, and Administrative Costs (30%):.....….....			$ 88,000
	TOTAL ESTIMATED PROJECT COST:.....			$ 379,000

City of Ilwaco
PRELIMINARY PROJECT COST ESTIMATE
BOOSTER PUMP STATION IMPROVEMENT BPS-3
Backup Power Generator Installations

NO.	ITEM	QUANTITY	UNIT PRICE	AMOUNT
1	Mobilization, Cleanup, and Demobilization	1 LUMP SUM	$26,000	$26,000
2	Baker Bay Outdoor Generator and ATS	1 LUMP SUM	$75,000	$75,000
3	City Center Outdoor Generator and ATS	1 LUMP SUM	$50,000	$50,000
4	Spring Street Outdoor Generator and ATS	1 LUMP SUM	$75,000	$75,000
5	Discovery Heights Outdoor Generator and ATS	1 LUMP SUM	$60,000	$60,000
6	Lakeview Estates Outdoor Generator and ATS	1 LUMP SUM	$60,000	$60,000
7	Intertie Portable Generator Connection	1 LUMP SUM	$15,000	$15,000
	Subtotal.....			$ 361,000
	Tax rate (8.2%)…..……..…..…..……..…….			29,602
	Subtotal:.....			$ 390,602
	Contingency (20%)……..…..…..……..…….			$ 78,398
	TOTAL ESTIMATED CONSTRUCTION COST:.....			$ 469,000
	Engineering, Permitting, Construction, and Administrative Costs (30%):.....….....			$ 141,000
	TOTAL ESTIMATED PROJECT COST:.....			$ 610,000

City of Ilwaco
PRELIMINARY PROJECT COST ESTIMATE
DISTRIBUTION SYSTEM IMPROVEMENT D-1
Spruce Street and Lake Street AC Main Replacement and Upsizing

NO.	ITEM	QUANTITY		UNIT PRICE	AMOUNT
1	Mobilization, Cleanup, and Demobilization	1	LUMP SUM	$ 52,000	$ 52,000
2	Locate Existing Utilities	1	LUMP SUM	$ 26,000	$ 26,000
3	Erosion Control	1	LUMP SUM	$ 13,000	$ 13,000
4	8-inch DI Water Main, Including Fittings	1,800	LF	$ 160	$ 288,000
5	Additional Fittings	900	LB	$ 5.00	$ 4,500
6	Trench Safety Systems	1	LUMP SUM	$ 9,000	$ 9,000
7	8-inch Gate Valves	5	EA	$ 2,500	$ 12,500
8	Fire Hydrants	4	EA	$ 10,000	$ 40,000
9	Gravel Backfill	990	TN	$ 35	$ 34,650
10	Connections to Existing System	2	EA	$ 6,000	$ 12,000
11	Traffic Control	150	HRS	$ 260	$ 39,000
12	Sawcutting	3,600	LF	$ 5	$ 18,000
13	Crushed Surfacing Top Course	90	TN	$ 45	$ 4,050
14	Crushed Surfacing Base Course	170	TN	$ 40	$ 6,800
15	Concrete Pavement	0	SY	$ 175	$ -
16	HMA Restoration	100	TN	$ 220	$ 22,000
17	HMA Overlay	160	TN	$ 175	$ 28,000
18	1" Service Connections	35	EA	$ 2,500	$ 87,500
	Subtotal.....				$ 697,000
	Tax rate (8.2%)…..……...…..…..……..……..				57,154
	Subtotal:.....				$ 754,154
	Contingency (20%)……..…...……..…….				$ 150,846
	TOTAL ESTIMATED CONSTRUCTION COST:.....				$ 905,000
	Engineering, Permitting, Construction, and Administrative Costs (30%):.....				$ 272,000
	TOTAL ESTIMATED PROJECT COST:.....				$ 1,177,000

City of Ilwaco
PRELIMINARY PROJECT COST ESTIMATE
DISTRIBUTION SYSTEM IMPROVEMENT D-2
China Hill Improvements

NO.	ITEM	QUANTITY		UNIT PRICE	AMOUNT
1	Mobilization, Cleanup, and Demobilization	1	LUMP SUM	$ 47,000	$ 47,000
2	Locate Existing Utilities	1	LUMP SUM	$ 24,000	$ 24,000
3	Erosion Control	1	LUMP SUM	$ 12,000	$ 12,000
4	8-inch DI Water Main, Including Fittings	1,800	LF	$ 160	$ 288,000
5	Additional Fittings	900	LB	$ 5.00	$ 4,500
6	Trench Safety Systems	1	LUMP SUM	$ 9,000	$ 9,000
7	8-inch Gate Valves	5	EA	$ 2,500	$ 12,500
8	Fire Hydrants	3	EA	$ 10,000	$ 30,000
9	Gravel Backfill	990	TN	$ 35	$ 34,650
10	Connections to Existing System	1	EA	$ 6,000	$ 6,000
11	Traffic Control	150	HRS	$ 260	$ 39,000
12	Sawcutting	2,100	LF	$ 5	$ 10,500
13	Crushed Surfacing Top Course	50	TN	$ 45	$ 2,250
14	Crushed Surfacing Base Course	100	TN	$ 40	$ 4,000
15	HMA Restoration	60	TN	$ 220	$ 13,200
16	HMA Overlay	90	TN	$ 175	$ 15,750
17	Landscaping Restoration	210	SY	$ 5	$ 1,050
18	Topsoil	105	CY	$ 50	$ 5,250
	Subtotal.....				$ 573,650
	Tax rate (8.2%)…..……...…..…..……..……..				47,039
	Subtotal:.....				$ 620,689
	Contingency (20%)……..…...…..……..…….				$ 124,311
	TOTAL ESTIMATED CONSTRUCTION COST:.....				$ 745,000
	Engineering, Permitting, Construction, and Administrative Costs (30%):.....				$ 224,000
	TOTAL ESTIMATED PROJECT COST:.....				$ 969,000

City of Ilwaco
PRELIMINARY PROJECT COST ESTIMATE
DISTRIBUTION SYSTEM IMPROVEMENT D-3
Kiaqua Place and Nesadi Drive SW Looping

NO.	ITEM	QUANTITY		UNIT PRICE	AMOUNT
1	Mobilization, Cleanup, and Demobilization	1	LUMP SUM	$ 9,000	$ 9,000
2	Locate Existing Utilities	1	LUMP SUM	$ 5,000	$ 5,000
3	Erosion Control	1	LUMP SUM	$ 3,000	$ 3,000
4	8-inch DI Water Main, Including Fittings	250	LF	$ 160	$ 40,000
5	Additional Fittings	200	LB	$ 5.00	$ 1,000
6	Trench Safety Systems	1	LUMP SUM	$ 1,250	$ 1,250
7	8-inch Gate Valves	1	EA	$ 2,500	$ 2,500
8	Fire Hydrants	1	EA	$ 10,000	$ 10,000
9	Gravel Backfill	140	TN	$ 35	$ 4,900
10	Connections to Existing System	2	EA	$ 6,000	$ 12,000
11	Traffic Control	20	HRS	$ 260	$ 5,200
12	Sawcutting	400	LF	$ 5	$ 2,000
13	Crushed Surfacing Top Course	10	TN	$ 45	$ 450
14	Crushed Surfacing Base Course	20	TN	$ 40	$ 800
15	HMA Restoration	20	TN	$ 220	$ 4,400
16	HMA Overlay	20	TN	$ 175	$ 3,500
17	1" Service Connections	4	EA	$ 2,500	$ 10,000
18	Landscaping Restoration	20	SY	$ 5	$ 100
19	Topsoil	10	CY	$ 50	$ 500
	Subtotal.....				$ 115,600
	Tax rate (8.2%)…..……..…..…….……..…….				9,479
	Subtotal:.....				$ 125,079
	Contingency (20%)……..…..…..…….……..…….				$ 25,921
	TOTAL ESTIMATED CONSTRUCTION COST:.....				$ 151,000
	Engineering, Permitting, Construction, and Administrative Costs (30%):.....				$ 46,000
	TOTAL ESTIMATED PROJECT COST:.....				$ 197,000

City of Ilwaco
PRELIMINARY PROJECT COST ESTIMATE
DISTRIBUTION SYSTEM IMPROVEMENT D-4
Cooks Hill Road Waterline Extension

NO.	ITEM	QUANTITY		UNIT PRICE	AMOUNT
1	Mobilization, Cleanup, and Demobilization	1	LUMP SUM	$ 19,000	$ 19,000
2	Locate Existing Utilities	1	LUMP SUM	$ 10,000	$ 10,000
3	Erosion Control	1	LUMP SUM	$ 5,000	$ 5,000
4	8-inch DI Water Main, Including Fittings	590	LF	$ 160	$ 94,400
5	Additional Fittings	300	LB	$ 5.00	$ 1,500
6	Trench Safety Systems	1	LUMP SUM	$ 2,950	$ 2,950
7	8-inch Gate Valves	2	EA	$ 2,500	$ 5,000
8	Fire Hydrants	2	EA	$ 10,000	$ 20,000
9	Gravel Backfill	330	TN	$ 35	$ 11,550
10	Connections to Existing System	2	EA	$ 6,000	$ 12,000
11	Traffic Control	50	HRS	$ 260	$ 13,000
12	Sawcutting	800	LF	$ 5	$ 4,000
13	Crushed Surfacing Top Course	20	TN	$ 45	$ 900
14	Crushed Surfacing Base Course	40	TN	$ 40	$ 1,600
15	HMA Restoration	30	TN	$ 220	$ 6,600
16	HMA Overlay	40	TN	$ 175	$ 7,000
17	1" Service Connections	3	EA	$ 2,500	$ 7,500
18	Landscaping Restoration	60	SY	$ 5	$ 300
19	Topsoil	30	CY	$ 50	$ 1,500
	Subtotal.....				$ 223,800
	Tax rate (8.2%)…..……..…..…….…….				18,352
	Subtotal:.....				$ 242,152
	Contingency (20%)……..…..…..…….…….				$ 48,848
	TOTAL ESTIMATED CONSTRUCTION COST:.....				$ 291,000
	Engineering, Permitting, Construction, and Administrative Costs (30%):.....				$ 88,000
	TOTAL ESTIMATED PROJECT COST:.....				$ 379,000

City of Ilwaco
PRELIMINARY PROJECT COST ESTIMATE
DEVELOPER EXTENSION IMPROVEMENTS DE-1
Stringtown Loop

NO.	ITEM	QUANTITY		UNIT PRICE	AMOUNT
1	Mobilization, Cleanup, and Demobilization	1	LUMP SUM	$ 429,000	$ 429,000
2	Locate Existing Utilities	1	LUMP SUM	$ 215,000	$ 215,000
3	Erosion Control	1	LUMP SUM	$ 108,000	$ 108,000
4	12-inch DI Water Main, Including Fittings	15,000	LF	$ 200	$ 3,000,000
5	Additional Fittings	8,300	LB	$ 5.00	$ 41,500
6	Trench Safety Systems	1	LUMP SUM	$ 75,000	$ 75,000
7	12-inch Gate Valves	38	EA	$ 5,000	$ 190,000
8	Fire Hydrants	30	EA	$ 10,000	$ 300,000
9	Gravel Backfill	9,900	TN	$ 35	$ 346,500
10	Connections to Existing System	3	EA	$ 6,000	$ 18,000
11	Traffic Control	1,200	HRS	$ 260	$ 312,000
	Subtotal.....				$ 5,035,000
	Tax rate (8.2%)…..……...…..…..……..…….				412,870
	Subtotal:.....				$ 5,447,870
	Contingency (20%)……..…...…..……..…….				$ 1,090,130
	TOTAL ESTIMATED CONSTRUCTION COST:.....				$ 6,538,000
	Engineering, Permitting, Construction, and Administrative Costs (30%):.....				$ 1,962,000
	TOTAL ESTIMATED PROJECT COST:.....				$ 8,500,000

City of Ilwaco
PRELIMINARY PROJECT COST ESTIMATE
DEVELOPER EXTENSION IMPROVEMENTS DE-2
Old Railroad Loop

NO.	ITEM	QUANTITY		UNIT PRICE	AMOUNT
1	Mobilization, Cleanup, and Demobilization	1	LUMP SUM	$ 286,000	$ 286,000
2	Locate Existing Utilities	1	LUMP SUM	$ 143,000	$ 143,000
3	Erosion Control	1	LUMP SUM	$ 72,000	$ 72,000
4	12-inch DI Water Main, Including Fittings	10,000	LF	$ 200	$ 2,000,000
5	Additional Fittings	5,500	LB	$ 5.00	$ 27,500
6	Trench Safety Systems	1	LUMP SUM	$ 50,000	$ 50,000
7	12-inch Gate Valves	25	EA	$ 5,000	$ 125,000
8	Fire Hydrants	20	EA	$ 10,000	$ 200,000
9	Gravel Backfill	6,600	TN	$ 35	$ 231,000
10	Connections to Existing System	2	EA	$ 6,000	$ 12,000
11	Traffic Control	800	HRS	$ 260	$ 208,000
12	1" Service Connections	2	EA	$ 2,500	$ 5,000
	Subtotal.....				$ 3,359,500
	Tax rate (8.2%)…...……...…...…..……..…….				275,479
	Subtotal:.....				$ 3,634,979
	Contingency (20%)……..…...…..……..…….				$ 727,021
	TOTAL ESTIMATED CONSTRUCTION COST:.....				$ 4,362,000
	Engineering, Permitting, Construction, and Administrative Costs (30%):.....				$ 1,309,000
	TOTAL ESTIMATED PROJECT COST:.....				$ 5,671,000

City of Ilwaco
PRELIMINARY PROJECT COST ESTIMATE
DEVELOPER EXTENSION IMPROVEMENTS DE-3
Pearl Avenue to Elizabeth Avenue Watermain Loop

NO.	ITEM	QUANTITY		UNIT PRICE	AMOUNT
1	Mobilization, Cleanup, and Demobilization	1	LUMP SUM	$ 28,000	$ 28,000
2	Locate Existing Utilities	1	LUMP SUM	$ 14,000	$ 14,000
3	Erosion Control	1	LUMP SUM	$ 7,000	$ 7,000
4	12-inch DI Water Main, Including Fittings	960	LF	$ 200	$ 192,000
5	Additional Fittings	600	LB	$ 5.00	$ 3,000
6	Trench Safety Systems	1	LUMP SUM	$ 4,800	$ 4,800
7	12-inch Gate Valves	3	EA	$ 5,000	$ 15,000
8	Fire Hydrants	1	EA	$ 10,000	$ 10,000
9	Gravel Backfill	640	TN	$ 35	$ 22,400
10	Connections to Existing System	2	EA	$ 6,000	$ 12,000
11	Traffic Control	80	HRS	$ 260	$ 20,800
12	1" Service Connections	1	EA	$ 2,500	$ 2,500
	Subtotal.....				$ 331,500
	Tax rate (8.2%)…..……..…..…..……..…….				27,183
	Subtotal:.....				$ 358,683
	Contingency (20%)……..…..…..……..…….				$ 72,317
	TOTAL ESTIMATED CONSTRUCTION COST:.....				$ 431,000
	Engineering, Permitting, Construction, and Administrative Costs (30%):.....				$ 130,000
	TOTAL ESTIMATED PROJECT COST:.....				$ 561,000

City of Ilwaco
PRELIMINARY PROJECT COST ESTIMATE
DEVELOPER EXTENSION IMPROVEMENTS G-1
SCADA Improvements and Treatment Upgrades

NO.	ITEM	QUANTITY		UNIT PRICE	AMOUNT
1	PLC Integration and Programming at WTP	1	LUMP SUM	$ 40,000	$ 40,000
2	PLC Integration and Programming at Additional Sites	8	EA	$ 20,000	$ 160,000
3	Vichem Polymer Pumps	3	EA	$ 3,500	$ 10,500
4	Raw Sodium Hypochlorite Pumps	1	EA	$ 3,500	$ 3,500
5	Soda Ash Pumps	1	EA	$ 3,500	$ 3,500
6	Electrician Costs	1	LUMP SUM	$ 6,000	$ 6,000
7	Additional Software	1	LUMP SUM	$ 10,000	$ 10,000
	Subtotal.....				$ 233,500
	Tax rate (8.2%)…..……...…..…..……..……..				19,147
	Subtotal:.....				$ 252,647
	Contingency (20%)……..…...…..……..…….				$ 51,353
	TOTAL ESTIMATED CONSTRUCTION COST:.....				$ 304,000
	Engineering, Permitting, Construction, and Administrative Costs (10%):.....				$ 31,000
	TOTAL ESTIMATED PROJECT COST:.....				$ 335,000

City of Ilwaco
PRELIMINARY PROJECT COST ESTIMATE
DEVELOPER EXTENSION IMPROVEMENTS G-3
Water Treatment Plant Building Refurbishment

NO.	ITEM	QUANTITY		UNIT PRICE	AMOUNT
1	Mobilization/Demobilization	1	LUMP SUM	$46,000	$ 46,000
2	Demolition	1	LUMP SUM	$ 35,000	$ 35,000
3	Vinyl Windows, 4'x4'	9	EA	$ 2,500	$ 22,500
4	Exterior Personnel Doors, 3'x7'	2	EA	$ 3,500	$ 7,000
5	Metal Roofing	6,000	SF	$ 40	$ 240,000
6	Metal Siding	5,000	SF	$ 25	$ 125,000
7	Miscellaneous Interior Structural Repairs	1	LUMP SUM	$ 30,000	$ 30,000
	Subtotal.....				$ 505,500
	Tax rate (8.2%)…..……...…..…..……..…….				41,451
	Subtotal:.....				$ 546,951
	Contingency (20%)……..…...…..……..…….				$ 110,049
	TOTAL ESTIMATED CONSTRUCTION COST:.....				$ 657,000
	Engineering, Permitting, Construction, and Administrative Costs (30%):.....				$ 198,000
	TOTAL ESTIMATED PROJECT COST:.....				$ 855,000

APPENDIX O

DOH FINANCIAL VIABILITY

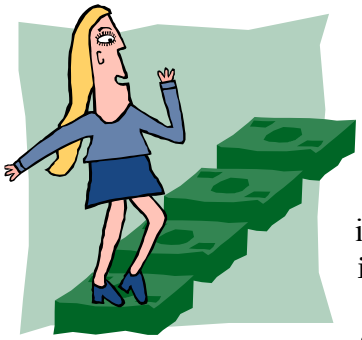
Aug. 2013
DOH 331-405
Revised

Financial viability for small water systems

Financial viability is the ability to obtain sufficient funds to develop, construct, operate, maintain, and manage a public water system in full compliance with local, state, and federal requirements on a continuous basis. In short, that means you should run your water system like a business.

Water systems should manage their finances to ensure they have enough funds for future needs as well as daily ones. However, many small water systems in Washington struggle with aging and failing infrastructure because their owners and operators did not run them like businesses. When you have enough money, you are better able to ensure safe and reliable drinking water now and in the future.

You can work toward financial viability one step at a time, using the following guidelines.



Five steps to financial viability

1. Develop an operating budget

Develop a six-year operating budget with enough income to pay for all regular maintenance and operations needs. Make sure to factor-in inflation by multiplying each year's line-item costs by a 2 to 5 percent inflation factor. Remember, inflation is cumulative. You should add inflation to each year's costs based on the previous year's costs. To select the most realistic inflation factor for your area, check the Consumer Price Index that your county or nearest city uses. Your budget should also include debt payments and contributions to your reserves (see steps three, four, and five).

Reserve accounts are a vital part of your water system's financial health. Because all water systems are different, there is no set formula for how much goes toward each reserve account. Your water system's operator and board should decide together how much to contribute annually to each reserve based on the water system's needs.

2. Take another look at your rates

Your rates may be keeping you from being financially healthy. Use your six-year operating budget to decide whether to raise your rates to cover projected costs. Many water systems are not charging enough to pay for basic maintenance and operations, contributions to reserve accounts, and debt payments.

Customers who use more water have a greater financial impact on the water system. Consider a rate structure that encourages customers to use water efficiently. Remember, you should always present rate change proposals to your customers in an open forum. For help developing your rates, see the resources on page four.

3. Create and fund an operating cash reserve

An operating cash reserve is extra money set aside to handle problems with cash flow. When you have enough funds set aside for your water system, you can continue paying your bills even if there is a lag in income. One approach is to fund an operating reserve equal to the amount of cash needed to pay for 30 to 45 days of water system costs.



You can fund your operating cash reserve with a one-time charge to customers, move funds from an existing reserve, or gradually set aside funds over a few years. Then be sure to add funds over time as needed.

4. Create and fund an emergency reserve

An emergency reserve account lets you respond to a true emergency such as vandalism, earthquake, storm damage, or flooding. It should have enough funds at all times to replace the most vulnerable part of the water system. You decide which part is most vulnerable as part of your water system planning. Vulnerable parts of your system include:

- A primary production well or other primary water source.
- Pumping equipment.
- Key transmission lines.

You should not use the emergency reserve to fund capital improvements or deferred maintenance problems. You can fund the emergency reserve the same way as the operating cash reserve, or by pre-qualifying for an emergency loan through a local bank or other lender.

5. Create and fund reserves for capital improvements and equipment replacement

You should have some savings to ensure that aging equipment and infrastructure do not become a financial burden for your water system. Use your capital improvement plan (done as part of your Water System Plan or Small Water System Management Program) to determine how much to save in your capital improvement and equipment replacement reserve.

In your capital improvement plan, you develop a list of equipment and infrastructure you will have to replace within the next six years. Make a “best guess” at how many years remain for each item and its replacement cost. You can use the Short-Lived Asset Component Inventory and Assessment table in the *Small Water System Management Program Guide* (331-134) to make these estimates.

You can use a "straight line depreciation" method to calculate a monthly amount to charge for replacing each item. Just add the totals together to determine monthly and annual contributions to this reserve fund.

1. Start with the item's improvement or replacement cost.
2. Divide by the years of useful life that remain.
3. Divide by 12 months.
4. Divide again by the number of water system connections.
5. Repeat for all the items on your replacement list.
6. Add the charges together.

You may also consider assessing fees, or applying for grants and loans as part of your financial plan to pay for capital improvements. Be aware that grant and loan funds are becoming more limited, and you will need to have a solid financial foundation to be competitive for these funds. In addition, if you decide to take out a loan, you might need to adjust your rates to repay the loan.

Benefits of financial viability

Predictable funding for capital improvements
Having available funding and a plan for capital improvements will keep your water system running smoothly and efficiently.

Improved system efficiency
Financially healthy water systems have well maintained and regularly replaced equipment that runs better, saving water, electricity, and wear and tear.

Cost savings
Deferred repair or replacement costs are often much higher when you let equipment age and fail.

Eligibility for grants and loans
Most grant and loan programs require water systems to demonstrate sound finances. If you spend time up front improving financial health, you are more likely to receive grants or loans.

Emergency response
Earthquakes, windstorms, electrical outages, flooding, and vandalism are examples of unforeseen emergencies. Water systems must have adequate cash reserves available to pay the costs associated with emergencies, such as providing bottled water to customers and returning to normal operations.

Peace of mind
When water systems have enough funds to pay for daily maintenance and operations, capital improvements, and unforeseen emergencies, their operators, board members, and customers do not have to worry or struggle to find means of payment.

Financial viability resources

Rural Community Assistance Corporation has free *Financial Viability Software* available online at http://www.rcac.org/home

The U.S. Environmental Protection Agency (EPA) offers the Check Up Program for Small Systems (CUPSS) (816-K-08-002). A free, easy-to-use, asset management tool for small drinking water and wastewater utilities, CUPSS is online at http://water.epa.gov/infrastructure/drinkingwater/pws/cupss/index.cfm

The following Office of Drinking Water publications are online at https://fortress.wa.gov/doh/eh/dw/publications/publications.cfm

Small Water System Management Program Guide (331-134)

Water Rates: Paying for drinking water (331-327)

Asset Management for Small Water Systems (331-445)

Setting Small Drinking Water System Rates for a Sustainable Future (EPA 816-R-05-006)

Department of Health Office of Drinking Water's Regional Offices

- Eastern Region: Spokane Valley 509-329-2100
- Northwest Region: Kent 253-395-6750
- Southwest Region: Tumwater 360-236-3030

Free technical assistance

- Evergreen Rural Water of Washington: 800-272-5981
- Public Works Board: 360-586-4120
- Rural Community Assistance Corporation: 509-860-5846

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