CITY OF BINGEN

KLICKITAT COUNTY WASHINGTON

WATER SYSTEM PLAN

G&O #13257
JULY 2015

Gray & Osborne, Inc.
CONSULTING ENGINEERS

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EXECUTIVE SUMMARY

INTRODUCTION

This is an update to the 2008 water system planning document that the City had prepared to meet the provisions of WAC 246-290-100.

Previous related planning efforts included the 1993 City of Bingen Comprehensive Plan, the City of Bingen Water System Plan prepared by Gray & Osborne in 2008, the 1995 Multijurisdictional Water Plan, the 2005 Klickitat County Comprehensive Plan, and the 2012 City of White Salmon Water System Plan. All of these documents were reviewed in conjunction with the preparation of this draft of the City of Bingen Water System Plan.

Per Chapter 246-290-100(1) WAC, this plan is required for the following reasons:

1. Demonstrate the City of Bingen water system's operational, technical, managerial, and financial capability to achieve and maintain compliance with relevant local, state, and federal plans and regulations.

2. Demonstrate how the City of Bingen water system will address present and future needs in a manner consistent with other relevant plans and local, state, and federal laws, including applicable land use plans.

3. Establish eligibility for funding of water system improvements per Chapter 246-296 WAC.

In accordance with the WAC, water system plans must be updated every 6 years. Analysis of a water system's capabilities must be done on both a 6-year and 20-year planning period. The 6-year planning period should address issues and system deficiencies that have a health and safety impact. The 20-year planning period addresses issues and system deficiencies that are likely to become more pertinent future planning efforts.

WATER SYSTEM DESCRIPTION

The City of Bingen operates a water system consisting of four wells, a hypochlorination disinfection system, two reservoirs, and a distribution system. At the present time, only three of the City's four wells are active. The City has three interties with the City of White Salmon, one of which is used exclusively and continuously for 13 residential connections. The other two interties are used on an as-needed basis to supplement the City's groundwater sources.

The City's service area includes everything within the City limits as well as three areas outside the City limits: (1) the Washington State Department of Transportation (WSDOT) maintenance facility; (2) the Port of Klickitat at Bingen Point; and (3) a small

residential area east of the City. Under the provisions of the Municipal Water Law, the City has designated its retail service area as all of the water rights place of use less the residential area east of and outside the city limits. This designation indicates the City's duty to serve within the retail service area. Within the residential area east and outside the city limits are six homes currently served by the City's water system. The City has no intention of expanding the retail service to allow other existing or future adjacent homes within this area to be served by City water unless a private developer is willing to pay for upgrades to the water system to serve additional water connections.

The City has water rights associated with its four groundwater sources that are summarized in Table E-1.

TABLE E-1

City of Bingen Water Rights

Source	Certificate Number	Priority Date	Maximum Instantaneous Withdrawal[1]	Maximum Annual Withdrawal[2]
Maple Street Well (S02)[3]	G4-01205C	July 20, 1970	130 gpm	185 acre-feet per year
Reservoir Well (S03)[4]	G4-01175C	May 6, 1976	50 gpm	80 acre-feet per year
Park Well (S05)[5]	G4-25406C	July 27, 1977	260 gpm	420 acre-feet per year
Dry Creek Well (S06)[6]	G4-28360C	December 23, 1983	140 gpm	226 acre-feet per year
Regional Well Field (Well No. 1 and No. 2)[7]	G4-33106	November 21, 2013	200 gpm	223 acre-feet per year

(1) The total instantaneous withdrawal amount is 580 gpm.
(2) The total maximum withdrawal amount shall not exceed 450 acre-feet/year
(3) G4-01205C is additive for the instantaneous amount of 130 gpm. It is an alternate primary right (not supplemental) for up to 185 af/yr. This certificate authorizes the use of two wells: Maple Street well and Dry Creek well.
(4) G4-01175C is additive for the instantaneous amount of 50 gpm. It is an alternate primary right for up to 80 af/yr; 185 af/yr maximum between it and G4-01205C.
(5) G4-25406C is additive for the instantaneous amount of 260 gpm. It is an alternate primary right for up to 420 af/yr.
(6) G4-28360C is additive for the instantaneous amount of 140 gpm. The annual quantity is divided as follows; 30 af/yr is additional primary right to bring the total yearly volume under all existing rights to a maximum amount of 450 af/yr and 196 af/yr is alternate.
(7) G4-33106 is non-additive to the previous four certificates for the instantaneous amount of 200 gpm and annual amount of 223 af/y. Information from Report of Examination for Water Right Application on file with department of Ecology.

In order to protect its right to continue using the City of White Salmon as a water supply, the City has received a new water right (G4-33106) to recognize the City of White Salmon's Wells No. 1 and No. 2 as additional points of withdrawal for Water Rights Certificate G4-01205C (Maple Street Well, Source 02). With the help of a hydrogeologist

the City was able to demonstrate to the Department of Ecology the hydraulic connectivity between the Maple Street Well and Wells No. 1 and 2 in the Regional Well Field. This water rights is non-additive and does not change the total instantaneous withdrawal of 580 gpm or the annual amount of 450 acre-feet/year.

PLANNING DATA

The City is required to document historical water demands and forecast future water demands in order to demonstrate the adequacy of its water system. Water demand forecasting requires an assessment of the City's growth patterns and past water usage patterns as well as distribution system leakage (DSL).

As shown in Table E-2, the average annual growth rate within the City over the last 10 years was 1.25 percent. Klickitat County expects a growth rate of 1.5 percent. The City expects the actual growth within the city limits to lie between these rates, at a growth of 1 percent. A 1 percent population growth rate was used to forecast water demands through the 6- and 20-year planning periods as required by WAC 246-290-100.

TABLE E-2

Historical Population 2004 to 2014

Year	Population	Growth Rate
2004	645	-
2005	655	1.55%
2006	680	3.82%
2007	680	0.00%
2008	694	2.06%
2009	702	1.15%
2010	712	1.42%
2011	720	1.12%
2012	730	1.39%
2013	725	-0.68%
2014	730	0.69%
Average Annual Growth Rate		1.25%

Table E-3 summarizes City water production since the year 2007.

TABLE E-3

Historical Water Production and Purchase

Year	Production (gallons)			Purchase (gallons)			Total
	Dry Creek Well	Reservoir Well	Park Well	SR 14 Intertie	Old Line Intertie	SR 141 PRV Intertie	
2007	28,556,170	14,322,000	24,237,311	2,546,000	6,591,000	70,000	76,322,481
2008	27,434,310	14,550,400	22,651,700	680,371	157,653	4,111,134	69,585,568
2009	27,867,570	13,512,500	20,237,000	12,651,546	573,420	3,498,292	78,340,328
2010	19,138,654	14,163,000	23,284,700	41,572,355	479,850	3,379,631	102,018,190
2011	21,513,570	14,131,200	10,191,300	45,483,028	14,748,070	2,921,377	108,988,545
2012	5,773,792	14,423,300	1,804,710	55,117,597	1,083,540	3,182,434	81,385,373
2013	10,933,060	14,852,600	12,888,845	48,156,422	4,825,051	3,613,965	95,269,943

Table E-4 summarizes metered water consumption over the last six years.

TABLE E-4

Metered Consumption by Customer Class

Year	Single-Family Residential (gpd)	Multi-Family Residential (gpd)	Commercial (gpd)	Industrial (gpd)	Total (gpd)
2008	-	-	-	-	130,076
2009	-	-	-	-	151,122
2010	-	-	-	-	149,664
2011	-	-	-	-	141,539
2012	40,890	8,644	24,264	70,001	143,799
2013	40,116	9,367	26,342	134,942	210,767

(1) 2008-2011 Total Consumption data came from Table 3 of the Distribution System Leakage Study performed by Gray & Osborne in July 2012. Data broken down by customer class was not available for these years.

(2) 2012-2013 totals came from Water User Efficiency Reports filed by the City.

(3) Data broken down by customer class comes from Top Utilities Users spreadsheets provided by the City.

A critical parameter for analyzing water system capacity is the Equivalent Residential Unit (ERU). Table E-5 summarizes how the ERU was calculated for the City of Bingen water system. For this Plan, data from 2012 was used to calculate the ERU and all further projections of water usage due to unusually high industrial usage in 2013.

TABLE E-5

Year 2012 Equivalent Residential Units

Customer Class	Average Consumption (gpd)	Number of Connections[1]	ERUs[2]	Number of ERUs per Unit
Single Family Residential	40,890	245	245	1.00
Multi-Family Residential	8,644	16	52	3.24
Commercial	24,264	67	145	2.17
Industrial	70,001	25	419	16.78
Total	**143,799**	**353**	**862**	

(1) The City serves 245 single-family residences and 16 multi-family connections which serve 76 units.

(2) ERU defined as 167 gpd, the average year 2012 metered consumption by a single-family residential household.

The difference between metered production and metered consumption is considered distribution system leakage, or DSL. Table E-6 summarizes DSL for the City of Bingen water utility. Under the Water Use Efficiency requirements, DOH has set a distribution system leakage standard of 10 percent calculated as a 3-year rolling average. The City's 3-year rolling average DSL in 2013 was 36 percent and has generally decreased over the last 6 years aside from a spike in 2011.

The City has identified two areas in its distribution system that appear to have contributed to a significant amount of the City's total DSL. One area is the Old Line that comes directly from White Salmon (SR 141 intertie); the other is the metering system for Underwood Fruit.

The Old Line contributed to roughly 16 percent of the total DSL for water in the year 2013. This line is under very high pressures, estimated to be in excess of 130 pounds per square inch (psi) in some locations, and is believed to be a major source of DSL.

Underwood Fruit has two meters that are read monthly and combined into a single billing. In 2012, these meters combined to measure 15,423,170 gallons of water usage out of a total City-wide metered consumption of 52,486,766 gallons. This represented almost 30 percent of the City's metered consumption in that year. The City anticipates that the meter replacement at Underwood Fruit could reduce their distribution system leakage significantly.

TABLE E-6

Water System Distribution System Leakage

Year	Metered Production[1] (gallons)	Metered Consumption (gallons)	DSL (gallons)	Percent DSL	3-Year Rolling Average
2007	73,876,097	40,876,627	32,999,470	44.67%	-
2008[2]	69,585,568	47,477,820	22,107,748	31.77%	-
2009[2]	78,340,328	55,159,518	23,180,810	29.59%	35.34%
2010[2]	102,018,190	54,627,205	47,390,985	46.45%	35.94%
2011[2]	108,988,545	51,661,582	57,326,963	52.60%	42.88%
2012[3]	81,385,373	52,486,766	28,898,607	35.51%	44.85%
2013[3]	95,269,943	76,930,034	18,339,909	19.25%	35.79%

(1) Production includes all water from the City's three active wells and the three interties with the City of White Salmon.

(2) Totals for 2008-20011 were taken from Table 3 of the Distribution System Leakage Report prepared by Gray & Osborne in 2012.

(3) Totals for 2012 and 2013 were taken from Top Utility User data provided by the City.

DOH requires that water utilities forecast water demands based on average day, maximum day, and peak hour demands. Average day consumption and production forecasts are presented in Table E-7 assuming that the distribution system leakage remains unchanged from 79,800 gallons (35.8 percent of 2012 total production).

TABLE E-7

Projected Average Day Production through the Year 2034 Assuming DSL is Unchanged

Year	Consumption (gpd)	Production (gpd)
2014	146,700	226,500
2020	155,800	235,600
2034	179,000	258,800

The City has limited data necessary to forecast maximum day and peak hour demands. Water production data for the year 2012 was used to develop a peaking factor to predict maximum day demand. A peaking factor of 1.63 was determined based on the ratio of metered maximum day demand to average day demand. This is close to the DOH recommended peaking factor of 2.0. A DOH formula was used to calculate the peaking factor for peak hour demand as 1.75.

Table E-8 summarizes each of these projected demands (average, maximum day and peak day) assuming the City's distribution system leakage remains unchanged from 2012 levels.

TABLE E-8

Projected Average Day, Maximum Day, and Peak Hour Production through 2034 Assuming DSL is Unchanged

Year	Projected Average Day Production		Projected Maximum Day Production		Projected Peak Hour Production
	gpd	acre-ft/yr	gpd	gpm	gpm
2014	226,500	254	368,900	256	449
2020	235,600	264	383,700	266	467
2034	258,800	290	421,500	293	513

(1) Maximum day demand was projected by applying a peaking factor of 1.63.
(2) Peak hour demand was projected by applying a peaking factor of 1.75.

WATER SYSTEM ANALYSIS

SOURCE ANALYSIS

The capacity of the City's three active sources was analyzed with respect to water rights and historical operating capacity. As shown in Table E-1, the three active sources have water rights totaling 450 gallons per minute (gpm) based on instantaneous withdrawal. However, historically only the Reservoir Well and Dry Creek Well have had withdrawals matching their instantaneous water rights. The Park Well has not been pumped to its instantaneous water right of 260 gpm; recommendations from Golder Associates following the rehabilitation of this well recommended significantly lower pumping rates. Well capacity for the three wells was evaluated based on 2013 pumping records as well as instantaneous and annual water rights, and was assumed to total 323 gpm between the three active sources.

Table E-9 shows the projected average annual withdrawal for the 6-year and 20-year planning periods. As shown in Table E-9, the City has adequate water rights for average daily demand projections through the 6-year and 20-year planning periods.

TABLE E-9

Projected Average Annual Withdrawal Water Rights Analysis

Year	Projected Annual Withdrawal (acre-ft/yr)	Maximum Annual Withdrawal Rate (acre-ft/yr)	Water Rights Surplus (acre-ft/yr)
2014	254	450	196
2020	264	450	186
2034	290	450	160

Table E-10 shows source production capacity analysis assuming no reduction in DSL. As shown in Table E-10, the City has adequate water rights for projected maximum day demands if distribution system leakage remains unchanged.

TABLE E-10

Source Production Capacity Analysis
No Reduction in Distribution System Leakage

Year	Maximum Day Production Capacity(1) (gpd)	Projected Maximum Day Production(2) (gpd)	Production Surplus/(Deficit) (gpd)
2014	433,200	368,900	64,300
2020	433,200	383,700	49,500
2034	433,200	421,500	11,700

(1) The sum of maximum day production values from Table 3-14.
(2) From Table 2-15- assumes no reduction in distribution system leakage.

Table E-11 shows the City's source production capacity assuming DSL can be reduced to 10 percent. As indicated in Table E-11, if the City meets the DOH standard for distribution system leakage, maximum day demands can be served with the City's existing water rights.

As part of the water system analysis, an evaluation of the potential to develop a new well to improve water system reliability was performed. This evaluation included a cost analysis comparing developing a new well for the City of Bingen versus purchasing water from the City of White Salmon to meet future water needs. The cost of treatment for taste/odor control in the City of Bingen wells was incorporated into the cost analysis to help the City determine if hydrogen sulfide removal for taste and odor control is cost effective; this analysis used information from taste/odor control pilot study report completed by Gray & Osborne in August 2013.

The present worth cost analysis for continued use of City of White Salmon water, assuming levels of use consistent with recent patterns (63 percent White Salmon water) was $3,500,000 compared to an estimated cost of $2,000,000 to develop a new well.

Based on this preliminary analysis, the recommended approach for the City of Bingen is to continue to purchase water from the City of White Salmon. The City of White Salmon has identified improvements to its water system that it believes are needed to serve the City of Bingen (see Appendix J). The City of Bingen has not agreed to these costs and requires further study of the proposed improvements for any cost sharing arrangement. Although the alternative to have White Salmon provide water service to Bingen is more expensive than the development of an additional well along with odor and taste removal treatment, it is the least risk alternative and considered the more reliable approach because it lacks the technical and regulatory uncertainties associated with developing a new groundwater source.

TABLE E-11

Source Production Capacity Analysis
Meeting Distribution Leakage Standard

Year	Maximum Day Production Capacity[1] (gpd)	Projected Maximum Day Production[2] (gpd)	Target Annual DSL Met (percent)	Production Surplus/(Deficit) (gpd)
2014	433,200	278,900	20%	154,300
2020	433,200	271,200	10%	162,000
2034	433,200	290,600	10%	142,600

(1) Sum of maximum day production values from Table 3-14.
(2) Assumes reduction in distribution system leakage per the target shown.

The City's three active wells have telemetry that allows the water system operator to remotely view pump operating status at the City Shop facility. The City desires more information through its telemetry system including pump flow rates and cumulative flow. Additionally, it would benefit the City to have the ability to monitor water levels in each of the three active pumps, a capability the wells currently do not have.

None of the three wells has emergency power capability. At a minimum, providing such a capability would require installing manual transfer switches at each well and procuring a portable generator to service the wells.

STORAGE ANALYSIS

The City has two reservoirs: the Old Reservoir, which has a nominal volume of 250,000 gallons, and the Sand Pit Reservoir, which has a nominal volume of

183,000 gallons. The reservoirs are in the same pressure zone and their available capacity is controlled by the water level in the Old Reservoir.

Actual usable storage volume in the two reservoirs is based on the following storage volume components, which were analyzed for the City's two reservoirs in accordance with the DOH Water System Design Manual:

- Operational Storage (Vos)
- Equalizing Storage (Ves)
- Standby Storage (Vsb)
- Fire Suppression Storage (Vff)
- Dead Storage

Operational storage is based on the reservoir level set points in the Old Reservoir selected by the City for operating the wells. Since the overflow elevation of the Sand Pit Reservoir is nearly 3 feet higher than the overflow in the Old Reservoir, this results in 16,300 gallons of lost storage in the Sand Pit Reservoir. Equalizing storage is the amount of water needed to meet peak system demand for a period of time that the system demand exceeds the system source capacity. Standby storage is water held in reserve for emergency situations, such as temporary loss of a water source, and is based on a DOH formula that takes into account the number of connections served by the water system. Fire flow storage is based on providing 1,500 gpm for 1 hour. DOH allows nesting of standby and fire flow storage if the local fire authority allows this. Dead storage is based on the volume in the reservoir that is not usable if a minimum system-wide pressure of 30 psi cannot be maintained under normal conditions, or 20 psi under fire flow conditions.

The analysis indicates that as long as all service connections are below 221 feet, there is no dead storage. There is one service connection above 221 feet. If this connection is not factored into the analysis, the City has adequate storage for the 6-year and 20-year planning periods with the two existing reservoirs. Table E-12 summarizes the reservoir storage analysis.

Based on a dive inspection in June 2006, the visible interior and exterior surfaces of the Old Reservoir have experienced significant rusting and are in poor condition. Photographs taken of the reservoir interior in June 2006 show significant rusting (between 50 and 100 percent of the surface), and in some cases, flaking of several structural elements was apparent. Because of the age and condition of the Old Reservoir, the City needs to consider how the loss of that reservoir would impact water system operations. As the analysis summarized in Table E-12 indicates, the storage surplus with nesting in year is currently much smaller than size of the Old Reservoir. The Old Reservoir is also required to meet the disinfection contact time (CT) provisions that are discussed in the treatment section.

TABLE E-12

City of Bingen Water System Summary of Storage Analysis

Year	Vos	Ves	Vsb	Vff	Total w/Nesting	Surplus w/Nesting
2014	47,655	18,926	189,480	90,000	256,061	167,984
2020	47,655	21,629	207,680	90,000	276,964	147,081
2034	47,655	28,533	254,080	90,000	330,268	93,777

(1) Assumes a total available storage of 424,045 gallons for both reservoirs.

TREATMENT ANALYSIS

The water quality from the City's three active sources is generally good and complies with primary drinking water standards established by EPA and DOH. The only treatment that the City currently provides is disinfection to provide a CT of 6 and maintain a chlorine residual in the water distribution system.

In its letter to the City dated February 11, 2010, DOH designated the City's Reservoir Well as a groundwater in hydraulic connection to the surface, and at a minimum the City will need to provide a CT of 6 mg-min/L (the product of chlorine dose and contact time) to achieve adequate disinfection. Based on an analysis of the available CT volume in the Old Reservoir and the waterline between the reservoir and the first connection, the City has adequate facilities to provide the CT required.

In 2013 the City converted from chlorine gas to liquid sodium hypochlorite to mitigate safety and health issues associated with the continued use of chlorine gas. The new disinfection system includes six 53-gallon hypochlorite storage containers, a feed pump for the chlorinated side stream, and a backup feed pump.

DISTRIBUTION SYSTEM HYDRAULIC ANALYSIS

A computer-based hydraulic model was used to analyze the City's water distribution system to meet the following demands:

- 2014 Average Daily Demands: These demands were used while calibrating the model.
- 2020 Peak Hour Demands: These demands were used to verify the system is able to meet the DOH standards to supply domestic water at a minimum system-wide pressure of 30 psi within the 6-year planning period.
- 2020 Maximum Day Demands: These demands were used to evaluate the system's ability to meet the maximum day demands plus required fire flows at DOH's requirement of 20 psi within the 6-year planning period.

Fire flow standards are defined as 1,000 gpm within the city limits and 1,500 gpm at the Port.

- 2034 Peak Hour Demands: These demands were used to verify the system is able to meet the DOH standards to supply domestic water at a minimum system-wide pressure of 30 psi within the 20-year planning period.

- 2034 Maximum Day Demands: These demands were used to evaluate the system's ability to meet the maximum day demands plus required fire flows at DOH's requirement of 20 psi within the 20-year planning period.

Under 2034 peak hour demand conditions, the system is capable of meeting the minimum pressure requirements aside from the first connection near the Old Reservoir which is located above 221 feet.

As shown in Table E-13, under 2014, 2020, and 2034 maximum day demands plus fire flow, hydraulic modeling indicates that there are several hydrants in the distribution system which may be unable to supply the minimum fire flow. The modeling shows that three hydrants at the Port may be below the fire flow standard of 1,500 gpm by 50 to 100 gpm. These deficiencies are relatively minor, and the hydraulic model has a slight margin of error. There is also one hydrant within the City limits that the model indicates cannot meet the fire flow standard of 1,000 gpm. This hydrant is located just south of Bridgeview Court off of Oak Street and is connected directly to the Dry Creek and park Wells. Its operation will depend on the operation of the wells to provide the required fire flow. To provide reliable fire flow from this hydrant, it will be connected to the water main on SR 141 when it is replaced in 2015.

TABLE E-13

City of Bingen Water System Deficient Fire Flow Locations

Hydrant ID	Required Fire Flow (gpm)	Available Flow at Hydrant (gpm) 2014	2020	2034
City of Bingen				
JF-49	1,000	524	519	504
Port of Klickitat at Bingen Point				
JF-65	1,500	1,440	1,438	1,432
JF-66	1,500	1,478	1,476	1,470
JF-67	1,500	1,436	1,434	1,428

CAPITAL IMPROVEMENT PROGRAM

The following section summarizes water system deficiencies, provides preliminary cost estimates, and proposes a schedule for correcting each deficiency.

Table E-14 provides a summary of system capacity by ERU. Capacity is expressed as ERUs without any system losses and ERUs assuming the 2012 level of distribution system leakage.

TABLE E-14

Water System Component Capacities

Water System Component (Facility)	Calculated Capacity in ERUs for Each Component
Source(s)[2]	**1,591**
Treatment	-
Equalizing Storage[4]	1,497
Standby Storage[5]	1,521
Distribution[6]	-
Transmission[6]	-
Instantaneous Water Rights[7]	**3,068**
Annual Water Rights[8]	**2,404**
Water System Physical Capacity (ERUs) = (based on the limiting water system component shown above)	**1,497**

(1) From Table 2-7.
(2) Calculated Capacity from Eq. 6-4, WSDM, based on operating the two smaller production wells for 24 hours.
(3) Sum of equalizing storage and standby storage.
(4) Calculated from Eq. 6-6, WSDM.
(5) Calculated from Eq. 6-7, WDSM.
(6) Transmission and distribution system physical capacity varies within the distribution system.
(7) Instantaneous Water Rights of 580 gpm.
(8) Annual Water Rights of 450 acre-ft/yr.

As indicated in Table E-5, *when no DSL is included in the ERU calculation* year 2012 ERUs are estimated as 862, but DSL equates to 474 ERUs alone, bringing the ERU total to 1,336.

As Table E-14 shows, the limiting factor is equalizing storage.

The City has implemented a water use efficiency program with the goal of reducing DSL to 10 percent or less by the year 2018. The City has already begun efforts to reduce DSL by converting to fully automated meter reading, replacing malfunctioning meters at Underwood Fruit, and having the City of White Salmon install a pressure reducing valve on the Old Line. The City is also starting construction in 2015 on a project to replace a large section of aging pipe known as the Old Line located on SR 141, along with a 570-foot segment of the water main on Steuben Street starting at Walnut Street and extending 200 feet west of Willow Street, which is expected to greatly reduce DSL in the system.

Table E-15 shows a summary of the City's planned Capital Improvement Program for the 6-year and 20-year planning periods.

TABLE E-15

Summary of Capital Improvement Projects City of Bingen Water System

No.	Title	Year	Project Cost[(1)]
M-1	SDS Meter Replacement	2015	$13,000
D-1	Oak Street and Steuben Street Water Main Replacement	2015	$575,000
M-2	Underwood Fruit Vault and Meter Replacement	2016	$200,000
6-Year Capital Improvement Total			**$807,000**
P-1	Update Water System Plan	2020	$45,000
ST-1	CT Piping & Old Reservoir Isolation	2021	$69,000
SO-1	Emergency Power System & Telemetry Upgrades	2021	$449,000
D-2	Franklin Street Water Main Replacement	2024	$326,000
D-3	Cedar Street Water Main Replacement	2025	$88,000
D-4	Jefferson & Maple Street Water Main Replacement	2026	$228,000
SO-2	Additional Well Development & Taste/Odor Treatment	2028	$2,000,000
ST-2	Replace Old Reservoir	2030	$625,000
20-Year Capital Improvement Total			**$3,825,000**
Complete Capital Improvement Total			**$4,632,000**

(1) Costs are in 2014 dollars.