NEWPORT

OREGON

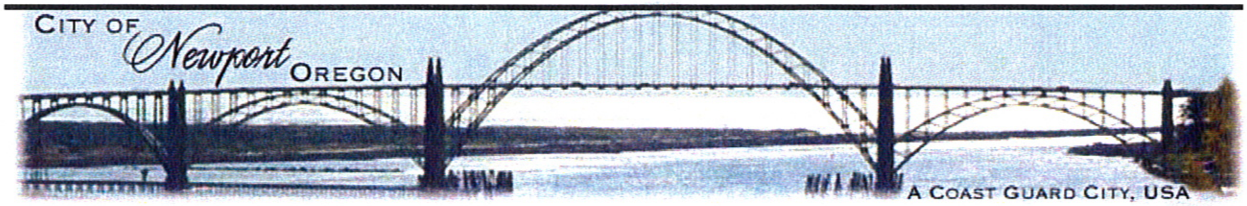
125 YEARS 1882 - 2007

# WATER SYSTEM MASTER PLAN

**November 2008**

Financial assistance was provided in part for development of this Water System Master Plan by the Coastal Zone Management Act of 1972, as amended, administered by the Office of Ocean and Coastal Resource Management, National Oceanic and Atmospheric Administration, through a grant to the Department of Land Conservation and Development.

Civil West Engineering Services, Inc.




# *CITY OF NEWPORT*

**LINCOLN COUNTY, OREGON**

# WATER SYSTEM MASTER PLAN

***November 2008***

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JULY 9, 2001
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# Executive Summary

Section ES

The purpose of this section is to provide a summary of the basic information contained in the body of this master planning effort. The Executive Summary section briefs readers who want to quickly obtain the main points without having to research the entire document and is helpful for readers who are seeking a quick reference for planning information.

Each subsection within the Executive Summary provides an overview of each section within the master plan itself. Therefore, subsection ES-1 provides a summary of Section 1, subsection ES-2 provides a summary of Section 2, and so on.

For more detailed information on any subject discussed within the Executive Summary, the reader should turn to the section in the master plan that is being summarized.

## ES-1 Summary of Section 1 - Introduction

The City of Newport is located in Lincoln County Oregon approximately in the center of the County coastline (44°37'57"N, 124°03'23"W) at the mouth of the Yaquina River.

The City owns and operates a water system that includes raw water supplies and intakes, water treatment facilities, water distribution facilities, and treated water storage facilities. The City has operated a water system for over 60 years and works hard to maintain and manage the system.

The Oregon Department of Human Services, Drinking Water Program (DWP), regulates the need for water master planning in the State of Oregon. The laws governing public water systems require that all water providers maintain a current water master plan. Master plans are to be updated on intervals no longer than 20 years and are often updated every ten years. The City's previous master plan was completed in 1988 and by completing this current update the City is complying with the Department's planning requirements. Additionally, raw water supply concerns and water treatment capacity limitations have come to the point where solution planning needed to commence immediately.

Planning was authorized to begin in September of 2007. Planning was undertaken and managed with the aid of a Water System Task Force comprised of community members with specific insights or backgrounds pertinent to water planning in Newport. The Task Force reviewed the planning progress, provided insight and feedback, and directed and sustained much of the actions of the consultants in preparing this planning effort.

## ES-2 Summary of Section 2 – Study Area

Section 2 summarizes many of the physical, environmental, socio-economic, and population issues related to the city of Newport and the surrounding area. The Section includes detailed mapping defining the City Limits, Urban Growth Boundary, wetland issues, flood plain issues, and other relevant information.

Section 2 includes an analysis of historic population and growth trends and develops projections for future population growth.

Table 1 below summarizes the population analysis developed in this plan and utilized for all planning and sizing criteria for proposed facilities. An average annual growth rate of 1.25% was selected to estimate future populations. The selected 1.25% growth rate matches actual average growth over the last 100 years in Newport.

**Table 1 – Population Analysis and Summary – City of Newport**

| | 1.25% Growth Inside City Limits | | | 1.25% Growth Outside City Limits, Inside UGB | | | OCCC Central Campus | Total | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Year | Population | Housing Units | EDU | Population | Housing Units | EDU | EDU | Population | Housing Units | EDU |
| 2007 | 10,455 | 5,501 | 11,270 | | | | | 10,455 | 5,501 | 11,270 |
| 2008 | 10,586 | 5,601 | 11,411 | | | | | 10,586 | 5,601 | 11,411 |
| 2009 | 10,718 | 5,671 | 11,554 | | | | | 10,718 | 5,671 | 11,554 |
| 2010 | 10,852 | 5,742 | 11,698 | 140 | 74 | 119 | | 10,992 | 5,816 | 11,817 |
| 2011 | 10,988 | 5,814 | 11,845 | 142 | 75 | 120 | 410 | 11,129 | 5,889 | 12,375 |
| 2012 | 11,125 | 5,886 | 11,993 | 144 | 76 | 122 | 410 | 11,269 | 5,962 | 12,525 |
| 2013 | 11,264 | 5,960 | 12,143 | 145 | 77 | 124 | 410 | 11,409 | 6,037 | 12,676 |
| 2014 | 11,405 | 6,034 | 12,294 | 147 | 78 | 125 | 410 | 11,552 | 6,112 | 12,829 |
| 2015 | 11,547 | 6,110 | 12,448 | 149 | 79 | 127 | 410 | 11,696 | 6,189 | 12,985 |
| 2016 | 11,692 | 6,186 | 12,604 | 151 | 80 | 128 | 410 | 11,843 | 6,266 | 13,142 |
| 2017 | 11,838 | 6,263 | 12,761 | 153 | 81 | 130 | 410 | 11,991 | 6,344 | 13,301 |
| 2018 | 11,986 | 6,342 | 12,921 | 155 | 82 | 131 | 410 | 12,140 | 6,424 | 13,462 |
| 2019 | 12,136 | 6,421 | 13,082 | 157 | 83 | 133 | 410 | 12,292 | 6,504 | 13,625 |
| 2020 | 12,287 | 6,501 | 13,246 | 159 | 84 | 135 | 820 | 12,446 | 6,585 | 14,201 |
| 2021 | 12,441 | 6,583 | 13,411 | 160 | 85 | 136 | 820 | 12,601 | 6,667 | 14,368 |
| 2022 | 12,596 | 6,665 | 13,579 | 163 | 86 | 138 | 820 | 12,759 | 6,751 | 14,537 |
| 2023 | 12,754 | 6,748 | 13,749 | 165 | 87 | 140 | 820 | 12,918 | 6,835 | 14,709 |
| 2024 | 12,913 | 6,832 | 13,921 | 167 | 88 | 142 | 820 | 13,080 | 6,921 | 14,882 |
| 2025 | 13,075 | 6,918 | 14,095 | 169 | 89 | 143 | 820 | 13,243 | 7,007 | 15,058 |
| 2026 | 13,238 | 7,004 | 14,271 | 171 | 90 | 145 | 820 | 13,409 | 7,095 | 15,236 |
| 2027 | 13,404 | 7,092 | 14,449 | 173 | 91 | 147 | 820 | 13,577 | 7,183 | 15,416 |
| 2028 | 13,571 | 7,181 | 14,630 | 175 | 93 | 149 | 820 | 13,746 | 7,273 | 15,599 |
| 2029 | 13,741 | 7,270 | 14,813 | 177 | 94 | 151 | 820 | 13,918 | 7,364 | 15,783 |
| 2030 | 13,913 | 7,361 | 14,998 | 179 | 95 | 153 | 820 | 14,092 | 7,456 | 15,970 |
| Change | 3,458 | 1,860 | 3,728 | 39 | 21 | 34 | 820 | 3,637 | 1,955 | 4,700 |

UGB = Urban Growth Boundary
EDU = Equivalent Dwelling Unit (water use equal to that of one typical single-family dwelling)
OCCC = Oregon Coast Community College

Based on this analysis, it is anticipated that approximately 3,458 persons will be added to the system over the 20-year planning period or around 4,700 new equivalent dwelling units including all growth sectors (residential, commercial, industrial, institutional, etc.). For more information on this analysis, see Section 2.

## ES-3 Summary of Section 3- Regulatory Environment

Section 3 provides a summary of the current rules governing the management and operation of a public water system, and basic water quality requirement rules at the time of this planning effort. As federal and state water quality requirements continue to become more stringent over time, water providers must upgrade their systems and improve operations to ensure that water quality standards are met. The City complies with current rules however continuing to meet the current and anticipated future rules with aging facilities and increasing population is unlikely without system improvements.

## ES-4 Summary of Section 4 – Design Criteria and Service Goals

The purpose of Section 4 is to establish the criteria used to size facilities, identify deficiencies, and plan for improvements. In general, Section 4 defines the standards used to measure the effectiveness of the existing water system and to determine improvements needed to ensure future health of the system. The selected planning goals include:

- Raw water supply – 20-year maximum day demand (MDD) of 10.83 cfs
- Water treatment capacity – 20-year MDD with 20-hour plant runtime, 7.0 mgd
- Treated water storage capacity – 1.25xMDD plus fire storage, 8.2 million gallons
- Fire protection requirements – 1000 gpm residential minimum, 4000 gpm for major structures and schools

The basis used for establishing cost estimates in the master plan is also presented in this section. Construction costs are tied to a national construction index known as the Engineering News Record (ENR) Construction Cost Index. The index is published monthly and can be used to update project costs in the master plan over time. Costs in this Plan are based on an ENR index of 7967.

## ES-5 Summary of Section 5 – Existing Water System

Section 5 provides a detailed description of all of the water system components in the City's existing water system. A summary of these components is provided below.

### Water Rights

The City of Newport holds several water rights in the area. The only rights that are of practicable use are the rights on Big Creek and the Siletz River. Table 2 below summarizes the existing water rights held by Newport.

**Table 2 – Newport Water Rights**

| Source Name | Application | Permit | Certificate | Priority Date | POD Rate (cfs) |
|---|---|---|---|---|---|
| Blattner Creek | S72 | S20 | 1012 | 5/10/1909 | 0.54 |
| Nye Creek | S8970 | S5882 | 8603 | 5/14/1923 | 1.5 |
| Nye Creek | S9224 | S6197 | 9113 | 10/15/1923 | 0.7 |
| Hurbert Creek | S9221 | S6194 | 9112 | 10/15/1923 | 0.1 |
| Big Creek | S11156 | S7722 | 9127 | 10/27/1926 | 10.0 |
| Siletz River | S39121 | S29213 | ~ | 9/24/1963 | 6.0 |
| Jeffries Creek | S44381 | S33151 | 57650 | 1/9/1968 | 0.4 |
| | | | | | 19.24 |
| | | | | | |
| **Storage** | **Application** | **Permit** | **Certificate** | **Priority Date** | **Storage (acre-feet)** |
| Big Creek Res. #1 | S26388 | S20703 | 21357 | 8/31/1951 | 200 |
| Big Creek Res. #2 | S43413 | S33127 | 48628 | 3/24/1967 | 310 |
| Big Creek Res. #2 | S43413 | S33127 | 48628 | 6/5/1968 | 35 |
| Big Creek Res. #2 | S52204 | S38220 | ~ | 7/19/1974 | 625 |

### Raw Water Facilities

The Big Creek intake facility, located near the treatment plant, pumps raw water to the treatment facility from the Lower Big Creek Reservoir (Reservoir #1). The City also diverts water from the Siletz River near the City of Siletz and pumps raw water through five miles of 16-inch and 18-inch piping. The Siletz water is deposited into the Upper Big Creek Reservoir (Reservoir #2) where it is held until it flows into the Lower Big Creek Reservoir.

### Treatment Facilities

The existing treatment plant is classified as a conventional type facility utilizing two circular solids-contact clarifiers (clariflocculators), four mixed-media gravity filters, chlorine disinfection, and other related facilities. The existing plant is capable of treating between 3.5 and 4 million gallons per day (mgd) of water though it struggles with water quality during the peak demand season mostly due to high levels of manganese in the raw water. The plant is in excess of 50 years of age and has several deficiencies causing operational difficulties and vulnerabilities. During peak demand seasons, the plant often operates for 24 hours a day but is still unable to maintain storage tank levels in the system. The storage tank drop with plant operating at full capacity indicates community peak water demands now exceed the capacity of the plant. The plant has been well operated and maintained but has reached the end of its useful life. A detailed discussion of all treatment components is provided in Section 5.

### Treated Water Storage

The Newport water system includes 7 treated water storage tanks providing a total combined maximum storage volume of 8.2-million gallons. All tanks are constructed with steel with the exception of two concrete tanks referred to as the City Shop Tanks. The existing storage volume is adequate for the planning period when the tanks are all full however the lack of significant storage at the north end of town results in fire flow deficiencies in that area.

**Table 3 – Treated Water Reserve Summary**

| Name | Nominal Volume | Year Installed | Base Elevation | Overflow Elevation | Diameter (ft) | Height (ft) | Max. Working Volume (gal) | Service Elev. (40-80 psi) | Max. Serv. El. (25 psi static) |
|---|---|---|---|---|---|---|---|---|---|
| Main Tank #1 | 2.0 MG | 1972 | 241.0 | 275.0 | 100 | 34.75 | 1,968,187 | 90' to 183' | 217' |
| Main Tank #2 | 2.0 MG | 1978 | 241.0 | 275.0 | 100 | 34.75 | 1,968,187 | 90' to 183' | 217' |
| Smith Tank | 0.25 MG | 1958 | 271.5 | 302.5 | 38 | 31.5 | 258,755 | 118' to 210' | 245' |
| Yaquina Hts. Tank | 1.6 MG | 1993 | 360.25 | 410.0 | 75 | 51.5 | 1,627,610 | 225' to 318' | 352' |
| South Beach Tank | 1.3 MG | 1998 | 160.25 | 200.0 | 75 | 41.5 | 1,297,131 | 15' to 108' | 142' |
| City Shops Tanks | 1.1 MG | 1910 | | 219.0 | | | 1,100,000 | 34' to 127' | 161' |
| | | | | Total Maximum Existing Storage | | | 8,219,871 | | |

### Distribution System

The City of Newport's distribution system consists of over 90 miles of piping and 6 booster pump stations. The City operates over nine separate pressure levels due to the variety of elevations in the system. Fire protection is provided throughout the system through over 500 fire hydrants. Hydrant coverage is good with only limited areas that have deficient spacing between hydrants.

**Table 4 – Pipeline Summary**

| Diameter (inches) | Length (feet) | % Total |
|---|---|---|
| 2 | 35,000 | 7.4% |
| 3 | 800 | 0.2% |
| 4 | 27,500 | 5.8% |
| 6 | 154,000 | 32.4% |
| 8 | 130,200 | 27.4% |
| 10 | 23,900 | 5.0% |
| 12 | 85,600 | 18.0% |
| 14 | 3,300 | 0.7% |
| 16 | 15,600 | 3.3% |
| Total | 475,900 | feet |
| | 90.1 | miles |

Computerized hydraulic modeling shows that fire flows in the system are very good in most locations with isolated pockets of deficiencies. Deficiencies are generally due to undersized piping and dead end pipe runs that do not allow adequate flows to fight a typical fire. The largest area of concern is at the north end of the system.

Section 5 includes drawings of the piping network, hydrant locations and coverage, and other information on the existing system.

## ES-6 Section 6 Summary – Water Demand Analysis

Section 6 describes the analysis that was completed to determine the existing water demand requirements for the system as well as projected future demands to the end of the 20-year planning period. The analysis includes a comprehensive review of water production and sales data to determine the amount of water that is produced versus the amount that is sold. The difference between the two amounts is defined as unaccounted water. Unaccounted water may include leakage, meter inaccuracies, fire fighting water, and other unmetered use. The City works hard to reduce the levels of unaccounted water.

The analysis seeks to define average and peak level water demands. Figure 1 illustrates water plant production and plant run times for 2006. The figure illustrates the plant capacity limitations now being experienced with 24 hour per day run times. Current average daily demand is 2.15 mgd. Current peak days require over 4 million gallons be delivered to the system.

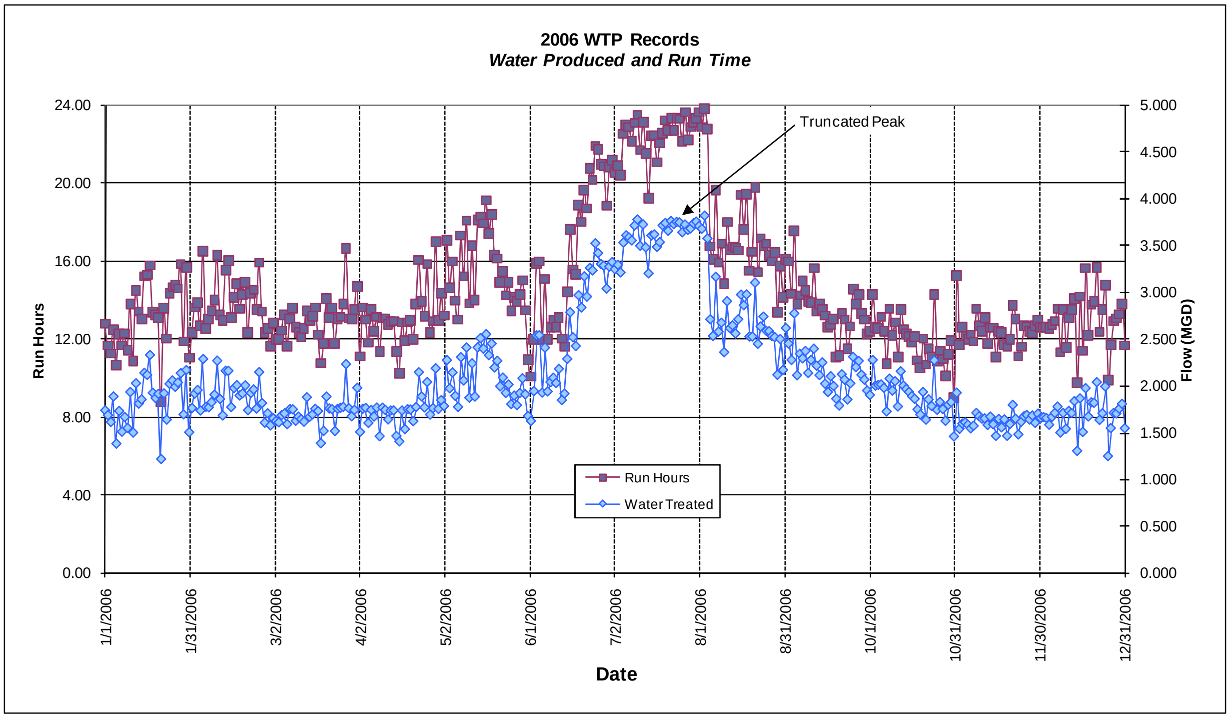



**Figure 1 – Water Production and Plant Run Times**

Water sales data was reviewed and compared against production data. It was determined that the City experiences unaccounted water levels on the order of 16%. This is relatively good though the current State requirement is to reduce water losses to under 15%. Those successful in meeting this goal are encouraged to reduce unaccounted levels to less than 10%.

The City sells water to a variety of customer sectors including residential, commercial, industrial, and others. The billing department keeps data on each sector's water use. Figure 2 below shows the distribution of water use in Newport.

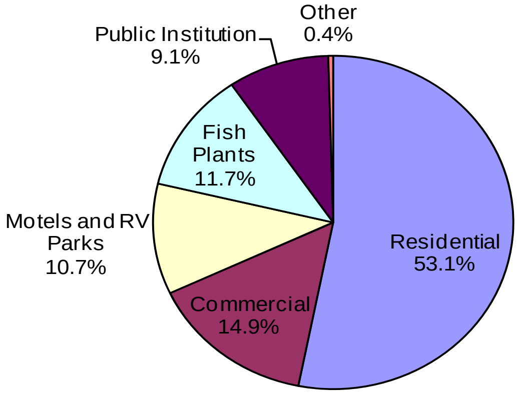



**Figure 2 – Water Sales Distribution Summary by Sector**

Table 5 below summarizes the water demand projections utilized in the Plan. The table illustrates the projected population and equivalent dwelling units along with the average daily demand (ADD), maximum monthly demand (MMD), maximum daily demand (MDD), and peak hourly demand (PHD) in millions of gallons per day (mgd).

**Table 5 – Water Demand Projections**

| Year | Population | EDU | ADD (mgd) | MMD (mgd) | MDD (mgd) | PHD (mgd) |
|---|---|---|---|---|---|---|
| 2007 | 10,455 | 11,270 | 2.15 | 3.80 | 4.10 | 8.60 |
| 2008 | 10,586 | 11,411 | 2.18 | 3.85 | 4.15 | 8.71 |
| 2009 | 10,718 | 11,554 | 2.20 | 3.90 | 4.20 | 8.82 |
| 2010 | 10,992 | 11,817 | 2.25 | 3.98 | 4.30 | 9.02 |
| 2011 | 11,129 | 12,375 | 2.36 | 4.17 | 4.50 | 9.44 |
| 2012 | 11,269 | 12,525 | 2.39 | 4.22 | 4.56 | 9.56 |
| 2013 | 11,409 | 12,676 | 2.42 | 4.27 | 4.61 | 9.67 |
| 2014 | 11,552 | 12,829 | 2.45 | 4.33 | 4.67 | 9.79 |
| 2015 | 11,696 | 12,985 | 2.48 | 4.38 | 4.72 | 9.91 |
| 2016 | 11,843 | 13,142 | 2.51 | 4.43 | 4.78 | 10.03 |
| 2017 | 11,991 | 13,301 | 2.54 | 4.48 | 4.84 | 10.15 |
| 2018 | 12,140 | 13,462 | 2.57 | 4.54 | 4.90 | 10.27 |
| 2019 | 12,292 | 13,625 | 2.60 | 4.59 | 4.96 | 10.40 |
| 2020 | 12,446 | 14,201 | 2.71 | 4.79 | 5.17 | 10.84 |
| 2021 | 12,601 | 14,368 | 2.74 | 4.84 | 5.23 | 10.96 |
| 2022 | 12,759 | 14,537 | 2.77 | 4.90 | 5.29 | 11.09 |
| 2023 | 12,918 | 14,709 | 2.81 | 4.96 | 5.35 | 11.22 |
| 2024 | 13,080 | 14,882 | 2.84 | 5.02 | 5.41 | 11.36 |
| 2025 | 13,243 | 15,058 | 2.87 | 5.08 | 5.48 | 11.49 |
| 2026 | 13,409 | 15,236 | 2.91 | 5.14 | 5.54 | 11.63 |
| 2027 | 13,577 | 15,416 | 2.94 | 5.20 | 5.61 | 11.76 |
| 2028 | 13,746 | 15,599 | 2.98 | 5.26 | 5.67 | 11.90 |
| 2029 | 13,918 | 15,783 | 3.01 | 5.32 | 5.74 | 12.04 |
| 2030 | 14,092 | 15,970 | 3.05 | 5.38 | 5.81 | 12.19 |

More detailed information about the planning criteria and water demand analysis can be found in Sections 4 and 6 of the master plan.

# ES-7 Section 7 Summary – Alternatives and Recommendations

Section 7 describes the analysis that was undertaken for each system component to determine if a deficiency exists and, if so, what alternatives are available to remedy the deficiency. Recommendations and cost estimates are also provided in this section for all system components.

A brief summary of the alternatives considered and the recommendations made is provided below for the major system components.

**Raw Water System**

It was found that the existing raw water supply is adequate for the planning period with slightly longer periods of pumping water from the Siletz River than is now required. In summer months when available water flow in Big Creek drops below that required by the system, Siletz River water must be pumped into the reservoirs to maintain adequate supply. Figure 3 below illustrates the water balance and relationship between monthly system demand, drought year flows in Big Creek, and the supplemental water available from the Siletz River. By pumping the maximum water right from the Siletz River (6 cfs) in June through November, the Big Creek Reservoir water levels can be maintained. The City can also choose to pump less and allow a drop in reservoir levels in later summer months when sufficient storage until rainfall is assured.

Even though current raw water supplies are adequate for the next 20 years, periods of supply problems can be expected after that time. Due to the critical nature of raw water supplies and the difficulty and expense of obtaining new water rights, the City must continue to move planning forward to solve their long-term raw water supply needs. Long-term options include the long discussed Rocky Creek Dam project, raising the height of the dam at Big Creek, constructing a dam at Valsetz, and other potential projects that would result in increased water supplies for Newport. At this time, it appears that heading toward the Rocky Creek Dam option and coordinating with other stakeholders is the most viable long-term solution.

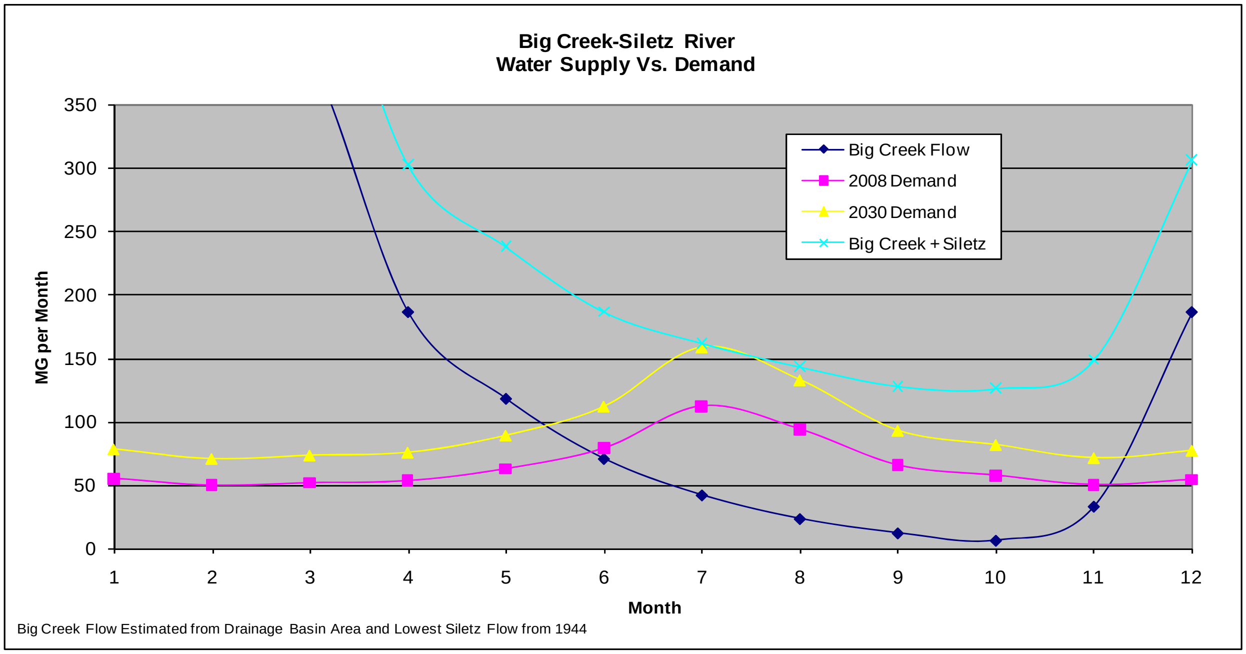



**Figure 3 – Big Creek and Siletz Water Supply Balance Summary**

### Water Treatment System

The existing treatment plant is inadequate for current demand levels and any growth in the system will exacerbate the problems. Due to the age and condition of the facility, it was determined that expanding the plant utilizing the existing process technology is not the most prudent or financially wise option. A number of alternatives were considered including desalination, membrane treatment, and various locations for a new plant. In the end, it was recommended that the City construct a new facility at the existing site, taking advantage of some of the existing structures and components, but expanding the facility to accommodate a new membrane treatment process capable of producing 7 MGD now with the ability to expand to 10 MGD in the future.

### Treated Water Storage and Distribution

The City has adequate treated water storage volume for the planning period however the distribution of that stored water throughout the system, under fire protection flows, is inadequate. Fire flows in the north part of the system are widely deficient and a new storage tank in that area is a more economical solution than attempting to sufficiently upsize large lengths of piping. Therefore, it is recommended that a new tank be constructed in the Agate Beach area to solve fire flow issues.

Computer modeling was utilized to develop several other projects to correct distribution problems and deficiencies related to the low fire flows, dead end piping runs, and other deficiencies.

Detailed project descriptions and cost estimates can be found in Section 7.

## ES-8 Section 8 Summary – Capital Improvement Plan

The purpose of Section 8 is to summarize the recommendations developed in Section 7 into a Capital Improvement Plan (CIP). The CIP lists all the projects that are planned to improve the system over the planning period. The CIP for the City of Newport water system is summarized below in Table 6.

### Table 6 – CIP Summary

| Project | Description | Project Budget |
|---|---|---|
| T1 | Big Creek Water Treatment Plant Improvements | $12,125,340 |
| T2 | Siletz River Pump Station - Pump Replacement | $642,060 |
| T3 | Upper Lake Siphon Intake | $612,540 |
| T4 | Raw Water Transmission Pipe, Dam to Plant | $1,239,840 |
| | | |
| S1 | Agate Beach Lower Storage Tank - 1.0 MG GFS | $2,009,575 |
| S2 | Agate Beach Upper Storage Tank - 1.0 MG GFS | $1,740,470 |
| S3 | City Shops Tank Replacement - 1.0 MG GFS | $1,657,090 |
| S4 | King Ridge Storage Tank - 1.0 MG GFS | $2,533,740 |
| | | |
| D1 | Highway 101 SE 40th to 50th Waterline, Hwy. Bore Crossing | $528,260 |
| D2 | 12" Redundant Bay Crossing, Idaho Point Option | $2,333,560 |
| D3 | Highway 101 NE 36th to NE 40th Waterline | $228,780 |
| D4 | Highway 101 NE 40th to Circle Way Waterline Replacement | $509,220 |
| D5 | NE 40th and Golf Course Drive Waterline Replacement | $389,670 |
| D6 | NE Crestview Pl. to 17th Ct. Waterline Loop | $132,840 |
| D7 | NE Avery Street Loop Closure | $112,770 |
| D8 | NW 19th (Nye St. to Hwy 101) and Nye St. (18th to 20th) Waterline | $153,510 |
| D9 | Ocean View (12th to 14th) Waterline Replacement, Loop 13th to 12th | $196,160 |
| D10 | | |
| D11 | SW Coho Street (27th to 29th) Waterline Replacement | $106,270 |
| D12 | Idaho Point Waterline Replacement and Looping | $574,315 |
| D13 | East Newport Waterline Extensions | $2,096,510 |
| D14 | Water Meter Replacement - Conversion to Touch Read Meters | $1,461,240 |
| D15 | NE 5th St., Benton to Eads | $107,600 |
| | | |
| P1 | Candletree Pump Station Rehabilitation | $206,640 |
| P2 | Lakewood Pump Station Rehabilitation | $187,450 |
| | Total CIP Budget Estimate | $31,885,451 |

The projects listed on the CIP summary are divided into project sectors: (T) treatment, (S) storage, (D) distribution, and (P) for pump stations. The projects were organized into three priority categories to aid the City in undertaking the projects in an orderly and prioritized manner.

Tables 7, 8, and 9 summarize the priority 1, 2, and 3 project groups. Priority 1 projects should be undertaken immediately. Priority 2 projects should be undertaken over the next 5 to 10 years. Priority 3 projects should be undertaken as development patterns, deficiencies, or other project needs dictate. All projects are considered important to maintain an effective and viable water system in Newport throughout the planning period.

### Table 7 – Priority 1 Projects

| Project No. | Description | Project Cost |
|---|---|---|
| T1 | Big Creek Water Treatment Plant Improvements | $12,125,340 |
| T3 | Upper Lake Syphon Intake | $612,540 |
| T4 | Raw Water Transmission Pipe, Dam to Plant | $1,239,840 |
| S1 | Agate Beach Lower Storage Tank - 1.0 MG GFS | $2,009,575 |
| D1 | Highway 101 SE 40th to 50th Waterline, Hwy. Bore Crossing | $528,260 |
| | **Total** | **$16,515,555** |

### Table 8 – Priority 2 Projects

| Project No. | Description | Project Cost |
|---|---|---|
| T2 | Siletz River Pump Station - Pump Replacement | $642,060 |
| D2 | 12" Redundant Bay Crossing, Idaho Point Option | $2,333,560 |
| D3 | Highway 101 NE 36th to NE 40th Waterline | $228,780 |
| D5 | NE 40th and Golf Course Drive Waterline Replacement | $389,670 |
| D6 | NE Crestview Pl. to 17th Ct. Waterline Loop | $132,840 |
| D7 | NE Avery Street Loop Closure | $112,770 |
| D8 | NW 19th (Nye St. to Hwy 101) and Nye St. (18th to 20th) Waterline | $153,510 |
| D9 | Ocean View (12th to 14th) Waterline Replacement, Loop 13th to 12th | $196,160 |
| D10 | 0 | $0 |
| D11 | SW Coho Street (27th to 29th) Waterline Replacement | $106,270 |
| D12 | Idaho Point Waterline Replacement and Looping | $574,315 |
| P1 | Candletree Pump Station Rehabilitation | $206,640 |
| P2 | Lakewood Pump Station Rehabilitation | $187,450 |
| D15 | NE 5th St., Benton to Eads | $107,600 |
| | **Total** | **$5,371,626** |

### Table 9 – Priority 3 Projects

| Project No. | Description | Project Cost |
|---|---|---|
| D13 | East Newport Waterline Extensions | $2,096,510 |
| D4 | Highway 101 NE 40th to Circle Way Waterline Replacement | $509,220 |
| S2 | Agate Beach Upper Storage Tank - 1.0 MG GFS | $1,740,470 |
| S3 | City Shops Tank Replacement - 1.0 MG GFS | $1,657,090 |
| S4 | King Ridge Storage Tank - 1.0 MG GFS | $2,533,740 |
| D14 | Water Meter Replacement - Conversion to Touch Read Meters | $1,461,240 |
| | **Total** | **$9,998,270** |

Section 8 also includes an update of the City's Water System SDC Methodology to reflect changes resulting from the updated CIP. Based on the methodology update in Section 8, the City should set the new SDC for the water system to around $1,632 per equivalent dwelling unit. This is a reduction from the previous SDC assessment. The change is due to an increase in anticipated growth in the water system coupled with a funding plan for the priority 1 projects that includes utilizing GO bond funds to fund the improvement projects which renders the projects to be SDC ineligible.

## ES-9 Section 9 Summary – Conservation Planning

Section 9 is provided as information and recommendations for conservation planning in Newport. The Oregon Department of Water Resources (WRD) has rules in place requiring systems to develop a conservation and management plan that is designed to reduce overall water consumption in the community and aid communities in resourceful and effective management of their water supplies.

Section 9 provides information and recommendations to the City on potential efforts and measures that they may take. However, completing a true conservation and management plan requires that the City actually make efforts, measure results, and report their effectiveness to WRD over time. A true conservation and management plan is a living and active effort that will be undertaken over many years and throughout the entire planning period.

Section 9 includes information on the management of the existing system, description of conservation measures, mandatory conservation measures, curtailment planning, and long-range water supply planning.

# ES-10 Section 10 Summary – Financing and Rate Analysis

Section 10 includes an analysis of financial issues related to the Newport water system. A summary of the existing rate structures is presented along with a budget summary for the past 3 budget cycles. A brief description of potential funding sources is provided along with contact information for each program. Finally, a discussion of the funding plan for the CIP is presented. Specifically, the plan to fund priority 1 projects is to pass a GO bond measure in November of 2008. The City's finance department developed a plan that would allow funding the priority 1 projects through a GO bond that would not result in an increase in property taxes due to other bonds that are about to be retired. Figure 4 below illustrates the GO bond plan for the planning period.

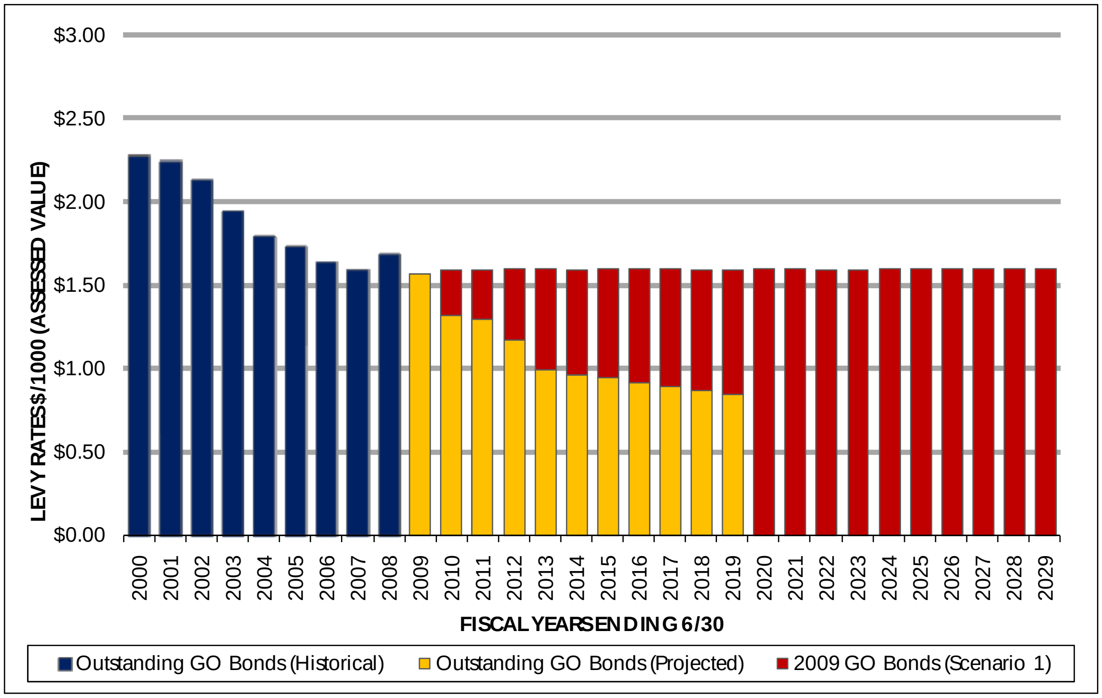



**Figure 4 – GO Bond Summary**

## 1.1 Background and Need

### 1.1.1 Town History

The City of Newport is located in Lincoln County, Oregon approximately in the center of the county coastline (44˚37’57”N, 123˚03’23”W) at the mouth of the Yaquina River. The City was incorporated in 1882 and quickly became a tourist destination in the summer for residents of the Willamette Valley. White settlement in the area began 20 years prior to the city incorporation, shortly after sailing vessels discovered oyster beds in Yaquina Bay and realized the profit to be made by shipping oysters to San Francisco and other areas. The town was named after Newport, Rhode Island.

Historically, the Bayfront was the economic hub of Newport, housing wood product industries and a commercial fishing port. Electricity later provided the means for refrigeration and the large scale development of the seafood industry. The Yaquina Head Lighthouse, dredging, and the jetty construction made Yaquina Bay an attractive shipping port. Today, the Bayfront is still home to one of the state’s largest commercial fishing fleets. It also includes shops, art galleries, restaurants, fish processing plants, and other family attractions.[1]

Nye Beach was once separate from the Bayfront. In the 1890s, Newport began to outgrow the Bayfront and a wood plank road was built to connect the two areas. By the early 1900s, Nye Beach, with its sea baths, taffy shops, and agate shops, became the number one visitor attraction on the coast. It was known for its rooming houses, resorts, and a large “sanatorium” built by Herbert Hoover’s stepfather, Dr. Henry J. Minthorn. Nye Beach and other areas of Newport are now a haven for artists with numerous galleries and the Newport Performing Arts and Visual Arts Center.

The construction of Highway 101 occurred between 1919 and 1936. The completion of the Yaquina Bay Bridge not only increased the speed of travel along the coast, it also changed the face of Newport. Without the need for the ferry from Yaquina City, the Bayfront lost its role as the center of travel. Businesses moved from Nye Beach and Bayfront to along the highway. The result was the end to a dividing line between the two areas, and the development of a new, connected Newport.

In the early 1980s, a group of local businesses and government leaders joined forces to develop a community revitalization plan. The strategic plan was created to reduce the community’s dependence on natural resource-based fishing and tourism industries and to develop Newport as a destination resort and research center. These developments included expanding the research facilities of the Oregon State University Hatfield Marine Science Center and the Oregon Coast Aquarium. The contemporary Marine Science Center houses a number of federal agencies, including the National Oceanic and Atmospheric Administration (NOAA), the Oregon Department of Fish and Wildlife (ODFW), U.S. Fish and Wildlife Service (USFWS), and the Environmental Protection Agency (EPA).

Tourists to Newport enjoy yearly festivals that include the Seafood and Wine Festival, the Microbrew Festival (originally called the Fishermen’s Harvest), the Tuna Canning Festival, and the Newport Loyalty Days and Seafair Festival. Other events include Oregon Lighthouse Week, Stories by the Sea, Oyster

[1] History information from Northwest Fisheries Science Center, Newport Community Profile http://www.nwfsc.noaa.gov/research/divisions/sd/communityprofiles/Oregon/Newport_OR.pdf

Cloyster on the Oregon Coast, the Newport Clambake and Seafood BBQ, the Blessing of the Fleet, and the Lighted Boat Parade.

### 1.1.2 Water System Background

The earliest water right listed for Newport is on Blattner Creek, the north branch of Big Creek. The 1909 permit for Blattner Creek water describes a dam 8 feet wide by 40 feet long being anticipated for completion in 1910 and having a masonry and concrete spillway. Water from the dam was then conveyed to the "city waterworks" via a pipeline with 8 or 10-inch "gate valves of iron." Storage capacity behind the dam was said to be 500,000 gallons. The application for this water right permit states that winter population was 1,100 persons and summer population grew to 6,000 persons. The application also states that this water is "badly needed." The permit was issued and by 1915 the city had constructed the necessary waterworks and received a certificate of water right for .54 cfs (242 gpm).

In May 1923, a second water use permit was issued for Nye Creek, to provide the "Nye Creek water supply." The application describes a small timber-sided well on Nye Creek. A population of 2,000 persons is listed on the permit application. The map accompanying the original permit shows the well pumping directly into the piping and a storage tank adding supply to the "City's principal water system." Later that year, in October of 1923, a second permit was requested on the north branch of Nye Creek, with the population corrected to 1,200 persons. By 1931, the city could prove beneficial use of the entire requested amounts and two certificates were issued totaling 2.2 cfs (987 gpm) from Nye Creek.

Another permit was requested in October of 1923 for water in Hurbert Street Creek (Section Line Creek) with pumping directly into the piping system, when needed. A certificate for this water right was issued in 1931 for 0.1 cfs (45 gpm).

As population and business continued to grow and the piping network expanded, the city continued to look for additional water supplies. In 1926, Newport turned to Big Creek and its tributaries for more supply. A permit was requested for 30 cfs from Big Creek, with plans for a timber dam 3 feet tall and 20 feet long, a pumphouse, and a 1.5-mile long 8-inch pipe to connect to the existing storage tank. The facilities were constructed, but in 1931 the State issued the certificate allowing 10 cfs (4488 gpm) rather than the 30 cfs requested.

In the late 1940s, plans for a bigger dam on Big Creek and a filtration plant began. In 1951, a permit to construct a dam on Big Creek and store water behind it was submitted to the State and construction began on the water treatment facility. The population listed on the permit at that time was 3,200 persons. The dam was to be 25 feet high and 315 feet long, constructed of compacted clay with a concrete spillway. It was realized that flows in Big Creek during summer months were less than the 10 cfs permitted and storage of winter flow for later summer use was desired. The reservoir would supply flow to the existing pump intake pond, where a 300 gpm pump and a 500 gpm pump were located. Presumably, this dam replaced the smaller timber dam built in the late 1920s. Two 8-inch pipes connected the pump station to the storage tanks located near the "road to Corvallis" (Highway 20). The dam was completed shortly after and a certificate allowing 200 acre-feet (65 million gallons) of storage was issued. Newport's water treatment facility was located just below the dam.

In 1963, with population approaching 5,500 persons (and much greater in the summer), and ongoing concerns about water supply, the city applied for 6.0 cfs (2693 gpm) from the Siletz River. The permit application described the plan for 38,000 feet of 14-inch piping to bring water from the Siletz to the Big Creek reservoirs with proposed completion by 1970 (it was actually completed in 1994).

In 1967, again citing concerns with inadequate summer flows on Big Creek, construction on a second dam (upper Big Creek Dam) began to retain flows on Big Creek. The dam was constructed of compacted clay and measured 40 feet high and 422 feet long. In 1968, a small water right for 0.4 cfs (179 gpm) was obtained for Jeffries Creek. Population at that time had risen to 5,760. In 1979 a certificate allowing 345 acre-feet (112 million gallons) of storage was issued to store winter flows behind the upper dam.

In 1975 the City applied for a permit to enlarge the upper Big Creek Dam. A population of 6,000 full-time residents was listed on the permit application. An increase in height of 14 feet was requested along with an increase in storage from 345 acre-feet to 970 acre-feet (316 million gallons). The permit was issued for an additional 625 acre feet (204 million gallons) of storage.

The water system has continued to expand over the years with multiple storage tanks and pumping stations added, and older facilities replaced or abandoned. The Siletz River intake and pipeline was completed around 1994 and has allowed the community's water demands to be met over the last decade.

A significant and ongoing problem for the City is the water quality degradation in the 55+ year-old lower Big Creek Reservoir. In recent years, the reservoir has become shallow, warmer and choked with Brazilian Elodea (a non-native, invasive species which adversely affects water quality).

The struggle to secure adequate raw water supplies to keep up with community needs continues, and in 1998 Newport applied for withdrawal and storage rights on Rocky Creek; however, facilities to utilize this additional water supply do not yet exist.

### 1.1.3 Need for Plan

The City's water system has numerous components which have aged and may be undersized and/or in need of replacement. As growth continues the City must ensure that reliable water service and fire protection are available to residents, businesses, industry and institutions. The last comprehensive system analysis and master planning effort occurred 20 years ago. Since that time, over 2,000 new full-time residents have moved to Newport, as well as many other businesses. The community is expected to continue to grow over the next 20 years at approximately the same rate it has over the previous 20 years. In addition, growth in the South Beach area is expected to increase with potential additions, including the Oregon Coast Community College, and other mixed uses.

Of primary concern is the supply of raw water for the community and treatment capacity. The existing treatment plant is over 55 years old and no longer meets the community's summer water needs. During peak summer water demand, the plant frequently must run 24 hours per day for many consecutive days. Often, even with the plant running at full capacity, water demand in the community exceeds plant output, resulting in a drop in treated water storage levels. Plans for treatment capacity increase options are now required.

Ongoing struggles with water supply quantities in the Big Creek drainage led to the construction of two dams in the past to allow storage of winter flows for summer use. As demands increased, it became apparent that quantity of raw water available on Big Creek was no longer adequate and the Siletz River intake was constructed in 1994 to pump water from the Siletz River into the Big Creek reservoirs in the summer to supplement supply and prevent excessive water level drops in the reservoirs. As demands continue to increase, further pumping from the Siletz is required for longer and longer periods during the summer, at considerable expense. It is uncertain if this practice will suffice to meet community needs over the next 20 years. Additionally, as silt accumulation over the years has decreased the depth of the reservoirs, water quality has degraded and the lower reservoir has become choked with elodea. An update for water supply options is needed to ensure that a reliable supply of water is available for the planning period and to ensure that any required plant improvements are constructed in the proper location to allow the most economical supply options to be utilized.

### 1.1.4 Plan Authorization

The City of Newport solicited engineering proposals for this Water System Master Plan in June of 2007. After a review of proposals and interviews with several engineering firms in July 2007, the City selected HBH Consulting Engineers to conduct the planning effort. The Engineering Services Agreement was signed by the City on September 27, 2007, authorizing HBH to complete the desired Water System Master Plan. A kick-off meeting was conducted on October 18, 2007 with HBH, City Staff, and the Water System Task Force to initiate the planning work and begin the necessary data collection. In the summer of 2008, the City hired Civil West Engineering Services, Inc. to complete the Master Plan. Former HBH engineers, now owners of Civil West, completed the Plan.

### 1.1.5 Past Studies

- Water System Master Plan Update, 1988 – CH2M Hill
- Long-Range Water Supply Plan, 1997 – Fuller & Morris Engineering, Inc.
- Rocky Creek Regional Water Supply Project – CH2M Hill, Fuller & Morris, David Evans and Assoc.
- South Beach Neighborhood Plan, Rev. 2006 Draft – Lancaster Engineering and others.

## 1.2 Study Objective

The purpose of the Water System Master Plan is to furnish the City of Newport with a comprehensive planning document that provides engineering assessment of system components and guidance for future planning and management of the water system over the next 20 years. This document satisfies the Oregon Drinking Water Program (DWP) requirements for water master plans. Additionally, plan elements sufficient to satisfy Oregon Water Resource Department (WRD) requirements for a Water Management and Conservation Plan are included.

Principal plan objectives include:

- Description and mapping of existing water system
- Evaluation of existing water system components
- Prediction of future water demands
- Evaluation of the capability of the existing system to meet future needs and regulations
- Recommendations for improvements needed to meet future needs and/or address deficiencies
- Discussion of financing options and impacts on water rates
- Description of water management and conservation measures to comply with OAR 690-86
- Background provisions to support updated water system SDCs

This Plan details infrastructure improvements required to maintain compliance with State and Federal standards as well as provide for anticipated growth. Capital improvements are presented as projects with estimated costs to allow the City to plan and budget as needed. Supporting technical documentation is included to aid in grant and loan funding applications and meet the requirements of the Oregon Economic and Community Development Department (OECDD), the Oregon Water Resource Department, the Rural Utilities Service (RUS), as well as the DWP.

## 1.3 Scope of Study

### 1.3.1 Planning Period

The planning period for this Water System Master Plan is 20 years, in accordance with OAR 333-061-0060 (5)(b). The period must be short enough for current users to benefit from system improvements, yet long enough to provide reserve capacity for future growth and increased demand. Existing residents should not pay an unfair portion for improvements sized for future growth, yet it is not economical to build improvements that will be undersized in a relatively short period of time. OAR 690-086-0170 suggests that demands be projected over 20 years, which is a typical planning period for water master plans. The end of the planning period is the year 2030, based on the assumption that immediately needed infrastructure improvements would not be implemented until around 2010.

### 1.3.2 Planning Area

The Master Plan planning area is that contained within the Newport Urban Growth Boundary (UGB), as well as the immediate area surrounding water system components outside the UGB, such as Siletz River intake and pipeline and the Big Creek reservoirs. A map showing Newport's location is shown in Figure 1 "*Location Map*." Additional information and maps for the planning area are presented in Section 2.

### 1.3.3 Work Tasks

In compliance with Drinking Water program and Water Resource Department plan elements and standards, this plan provides descriptions, analyses, projections, and recommendations for the water system over the planning period. The following elements are included:

- Study area characteristics, including land use and population trends and projections
- Description of the existing water system including supply, treatment, storage and distribution
- Existing regulatory environment including regulations, rules and plan requirements
- Current water usage quantities and allocations
- Projected water demands
- Existing system capacity analysis and evaluation
- Improvement alternatives and recommendations with associated costs
- Recommendations for water management planning and water usage curtailment
- A summary of recommendations with a Capital Improvement Plan
- Funding options
- Maps of the existing system and recommended improvements

## 1.4 Acknowledgments

Members of the City staff and council have contributed efforts to ensure complete information and proper planning of the community's water system needs. In addition, a Water System Task Force was assembled from community residents to provide a forum for ideas and better establish a working relationship between the engineering firm and the City of Newport.

### 1.4.1 City Council and Staff

Many City of Newport staff members contributed greatly and facilitated in the preparation of this planning document. The City Council also took great interest and had enthusiasm and support for the subject.

We wish to recognize and express gratitude to the following people for their support during this planning effort:

| City Council | City Staff |
| --- | --- |
| Mayor Bill Bain | Allen O'Neal – City Manager |
| Councilor Jeff Bertuleit | Lee Ritzman – City Engineer, Public Works Director |
| Councilor Larry Henson | James Bassingthwaite – City Planner |
| Councilor Patricia Patrick-Joling | Steve Stewart – Water Plant Supervisor |
| Councilor Neal Henning | Greg Schaecher – Assistant City Engineer |
| Councilor Terry Obteshka | Jim Salisbury – GIS |
| Councilor Peggy Sabanskas | Lanny Schulze – Water Distribution Supervisor |
| | Sharon Seabrook – Public Works Secretary |
| | Gary Firestone – City Attorney |

### 1.4.2 Water System Task Force

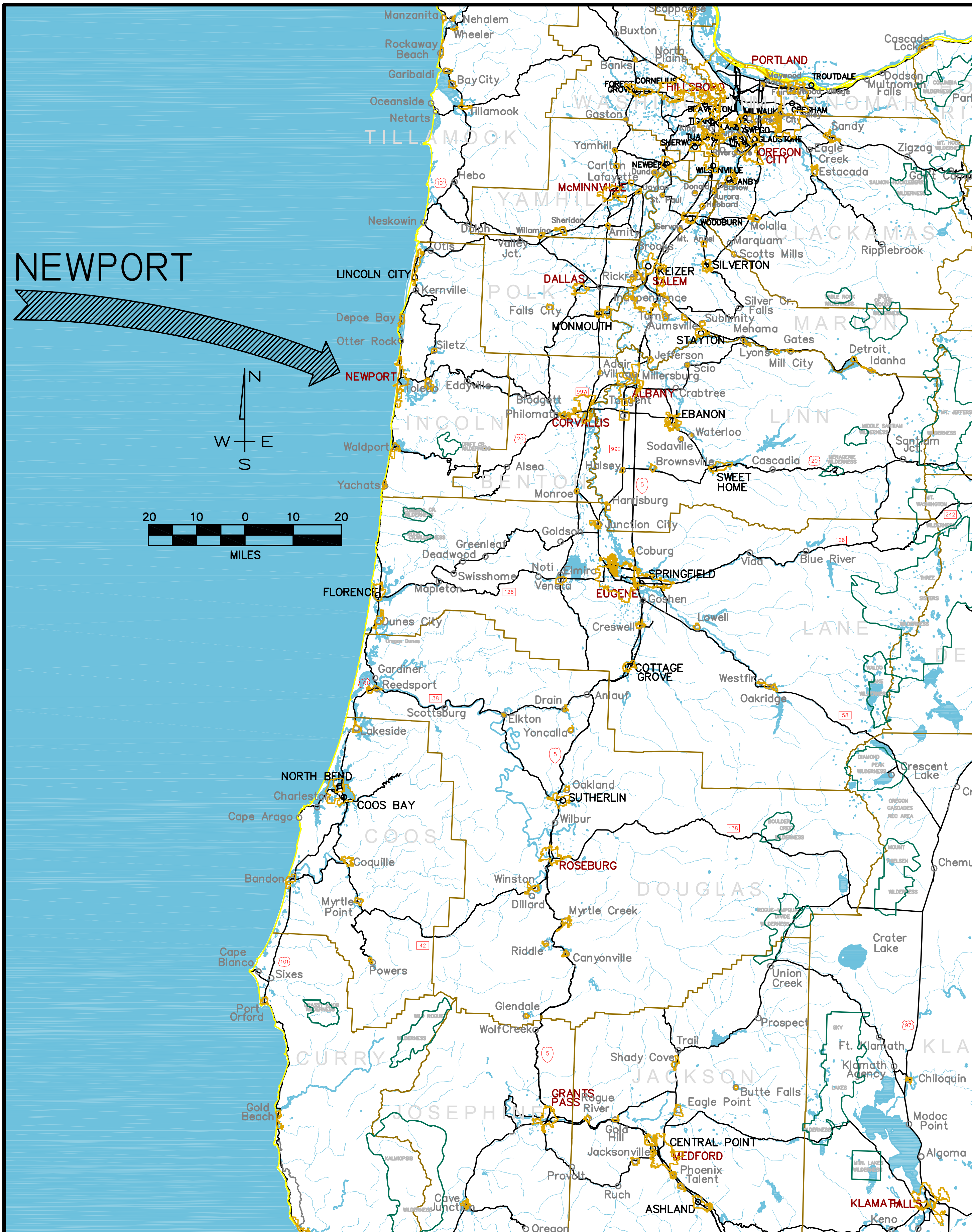
The City elected to undertake this important planning effort and utilize a community committee or task force to aid in the planning process. Task Force members were appointed based on their backgrounds, professional knowledge, personal interests, and other factors. The Task Force members played a key and important role throughout this project.

Task Force members included:

Paul Amundson
Richard Beemer
Don Davis
Jim Fuller
Reuben Johnsen
Jay Peterson
Steve Salisbury
Deborah Trusty
Janet Webster

Council Liaison:
Patricia Patrick-Joling
Peggy Sabanskas


| | | | | |
|---|---|---|---|---|
| **CIVIL WEST** Engineering Services, Inc. | DWG BY: REB<br>DATE: OCT 8, 2008 | 0 1" | LOCATION MAP | FIG |
| | *44° 37' 57" N, 124° 03' 24" W* | | CITY OF NEWPORT<br>LINCOLN COUNTY, OREGON | 1-1 |




**Civil West**
Engineering Services, Inc.

Dwg By: REB
Date: Oct 8, 2008

0 1"

*44° 37' 57" N, 124° 03' 24" W*

# LOCATION MAP

## City of Newport
Lincoln County, Oregon

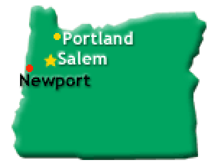
FIG
1-1

# Study Area

# Section 2

## 2.1 Physical Environment

### 2.1.1 Planning Area Location



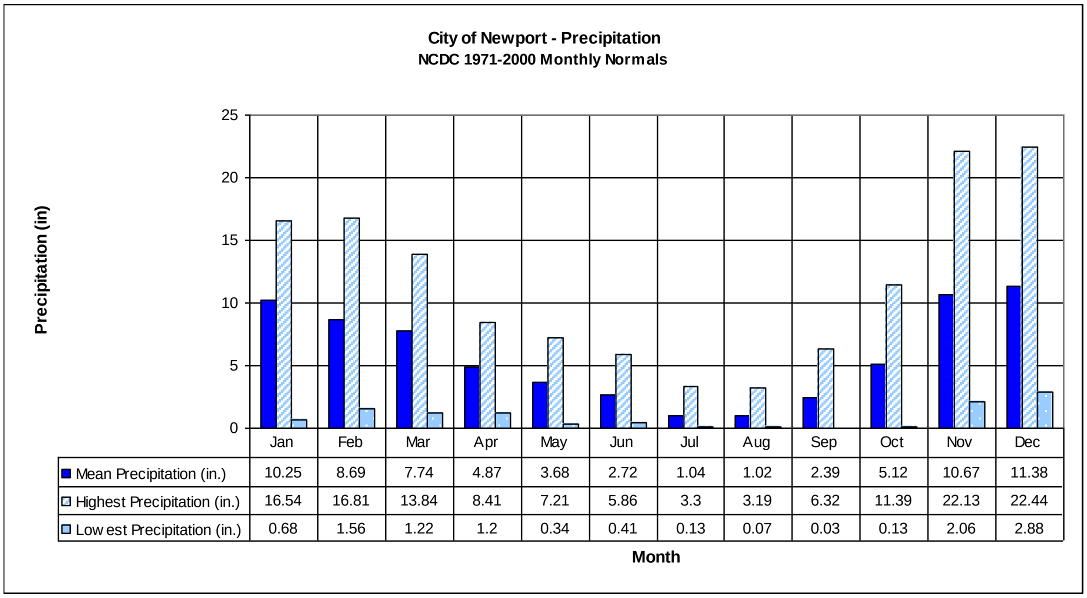

The City of Newport is located in Lincoln County Oregon approximately in the center of the County coastline (44°37’57”N, 124°03’23”W) at the mouth of the Yaquina River. The city limits extend to both the north and south sides of Yaquina Bay in Townships 10S, 11S, and 12S, Range 11W. The city extends north from the bayfront along the beach to include Agate Beach, Yaquina Head, and Schooner Point, stopping just south of Moolack Creek. South of the bay the city extends along the beach to include South Beach, the Newport Municipal Airport, and the lower drainage of Thiel Creek. The 2007 City Limits encompasses 6,619 acres or 10.3 square miles.

The Master Plan planning area is that contained within the Newport Urban Growth Boundary (UGB) as well as the immediate area surrounding water system components outside the UGB such as the Siletz River intake and pipeline and the Big Creek Reservoirs. The Siletz Intake is located approximately 7 miles northeast of the water treatment plant near the City of Siletz. The Big Creek Reservoirs, created by dam construction on Big Creek, are located just east of the water treatment plant. The area can be seen in Figure 2.1.1-1 *“Planning Area Map”.*

### 2.1.2 Climate

Climate data was obtained using long-term records collected at the Newport Station (Station 356032) as reported by the Western Regional Climate Center.

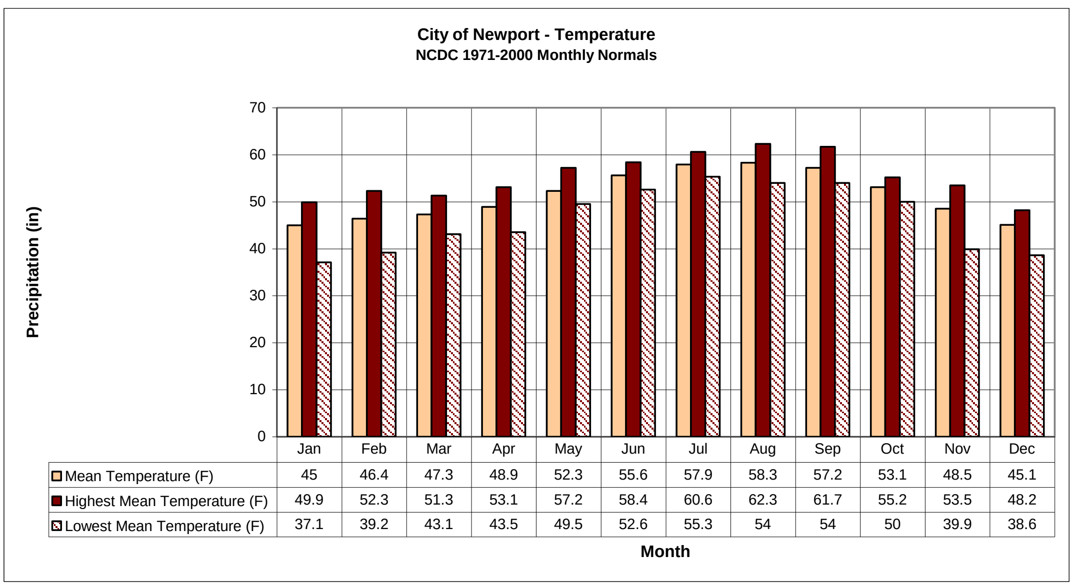
Average annual precipitation is approximately 70-inches in Newport. Record low and high precipitation years recorded were 43-inches in 1944 and 111-inches in 1968. The maximum recorded 24-hour rainfall was 4.99-inches on November 19, 1996. On average, 46% of the annual precipitation occurs in November, December, and January. Snowfall is rare with most years recording little or no snowfall; however, record snowfall of 11-inches was reported in 1942-43 and again in 1972-73. The mean annual snowfall during the period from 1930 to 2007 is 1.02-inches. No statistically significant increasing or decreasing trend in annual rainfall is evident. Based on the NOAA Atlas 2, Volume X Isopluvial maps, the 5-year storm 24-hour rainfall is 4.5 inches.




| | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Mean Precipitation (in.) | 10.25 | 8.69 | 7.74 | 4.87 | 3.68 | 2.72 | 1.04 | 1.02 | 2.39 | 5.12 | 10.67 | 11.38 |
| Highest Precipitation (in.) | 16.54 | 16.81 | 13.84 | 8.41 | 7.21 | 5.86 | 3.3 | 3.19 | 6.32 | 11.39 | 22.13 | 22.44 |
| Lowest Precipitation (in.) | 0.68 | 1.56 | 1.22 | 1.2 | 0.34 | 0.41 | 0.13 | 0.07 | 0.03 | 0.13 | 2.06 | 2.88 |

**Figure 2.1.2-1 – Precipitation Normals, NCDC 1971-2000**

The average annual temperature in Newport ranges from 45 to 58°F with an annual mean of 51°F. A record high temperature of 100°F was recorded on July 11, 1961. A record low temperature of 1°F was recorded on December 8, 1972. August is statistically the warmest month with a mean of 58°F while December and January are the coldest with a mean of 45°F.




| | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Mean Temperature (F) | 45 | 46.4 | 47.3 | 48.9 | 52.3 | 55.6 | 57.9 | 58.3 | 57.2 | 53.1 | 48.5 | 45.1 |
| Highest Mean Temperature (F) | 49.9 | 52.3 | 51.3 | 53.1 | 57.2 | 58.4 | 60.6 | 62.3 | 61.7 | 55.2 | 53.5 | 48.2 |
| Lowest Mean Temperature (F) | 37.1 | 39.2 | 43.1 | 43.5 | 49.5 | 52.6 | 55.3 | 54 | 54 | 50 | 39.9 | 38.6 |

**Figure 2.1.2-2 – Temperature Normals, NCDC 1971-2000**

### 2.1.3 Land Use

Land use within the City Limits of Newport is a typical mixture of residential, commercial, and industrial zoning. The City is bounded on the west by the Pacific Ocean. Land to the east of the UGB is primarily zoned Timber-Conservation (T-C) including land inside the UGB east of the airport and some of the land inside the UGB northeast of Yaquina Head. Portions of land outside the City Limits but inside the UGB in the South Beach area are zoned for Public Facilities (P-F) and Planned Industrial (I-P) and the remaining land outside the City Limits but inside the UGB is zoned for residential use. The Big Creek reservoirs and the raw water transmission piping from the Siletz River Intake are located in Timber-Conservation zoned land. Formally classified lands within the area include the South Beach State Park, Yaquina Bay State Park, Agate Beach State Recreation Site, and the Yaquina Head Outstanding Natural Area. No Wild and Scenic Rivers are located in the planning area.

### 2.1.4 Floodplains

Areas of the City are within the 100-year floodplain. Floodplain areas occur along the beach and several creeks. FEMA FIRM maps for Newport are included at the end of this Section.

### 2.1.5 Wetlands

Several wetland designations occur in Newport according to the National Wetlands Inventory (NWI). Estuarian and Marine Wetland areas occur along the beach and tidal flats of the Yaquina River. Freshwater Forested-Shrub Wetlands occur in low areas east of South Beach State Park and near Thiel Creek, Moore Creek, Grant Creek, and Henderson Creek south of the Bay. Pockets of Freshwater Emergent Wetlands also occur along creeks and in the low areas near South Beach State Park. A Wetlands Map produced from the digital NWI data is shown as Figure 2.1.5-1.

### 2.1.6 Cultural Resources

According to the Oregon National Register List, five historic properties are located in the planning area. All listed properties lie inside the current Newport City Limits.

**Table 2.1.6-1 – Listed National Register Historic Properties, Newport**

| Historic Property Name | Street Address | Construction Date | Listed Date | NR Number |
|---|---|---|---|---|
| New Cliff House | 267 NW Cliff St. | 1911 | 11/6/1986 | 86002962 |
| Old Yaquina Bay Lighthouse | | 1871 | 5/1/1974 | 74001692 |
| Roper, Charles & Theresa, House (Hilan Castle) | 620 SW Alder St. | 1913 | 12/9/1981 | 81000500 |
| Yaquina Bay Bridge #01820 | Hwy. 101 | 1936 | 8/5/2005 | 05000821 |
| Yaquina Head Lighthouse | Yaquina Head | 1872 | 5/13/1993 | 73002340 |

Lincoln County is part of the Siletz Service Area of the Confederated Tribes of Siletz Indians. Areas around Yaquina Bay and River were once home to the Yaquina Tribe (now included in the Siletz Tribe). Several remnants of tribal settlements in the area have been discovered including fishing-weirs at Yaquina Bay at the Ahnkuti site[1], skeletal remains at Yaquina Head[2], and shell middens at north Yaquina Head[3].

[1] R. Scott Byram. Oregon Historical Quarterly, Vol. 108, No. 2
[2] Minor, Rick, Kathryn Ann Toepel, and Ruth L. Greenspan. Arch. Investigations at Yaquina Head. 1987
[3] Minor, Rick. Archaeology of the North Yaquina Head Shell Middens. U.S.Dept. of Interior. 1989

### 2.1.7 Biological Resources

Biological resources in the area include numerous fish, shellfish, birds and mammals. Fish species include white sturgeon, pacific herring, steelhead, flatfishes, perch, coho, chinook salmon, chum salmon, surf smelt, longfin smelt, lingcod, English sole, and starry flounder. Shellfish include Pacific oysters, blue mussels, various clams, bay shrimp, and dungeness crab. A variety of bird species are present including the threatened brown pelican and threatened western snowy plover. Marine mammals in the area include California sea lions, harbor seals, and the threatened northern sea lion. Biological habitat in the area includes tidal, marine, and forest habitat.

### 2.1.8 Coastal Resources

The Oregon Coastal Zone roughly includes all land west of the crest of the Coast Range. The entire planning area is therefore within the Coastal Zone. Coastal resources in Newport include coastal and marine habitat, tidal wetlands, commercial and sport fisheries, the Yaquina Bay deep draft estuary, and tourism related to the beach and Oregon Coast Aquarium.

## 2.2 Population

### 2.2.1 Historic and Existing Population

Records for the first municipal water right for Newport lists the 1910 population at 1,100 persons. Subsequent water right applications indicate the population had risen to 3,200 by 1951. US Census data records a population increase from 5,344 in 1960 to 9,532 in 2000. The Portland State University Population Research Center (PSU PRC) has published certified estimates for 2001 to 2006 and a preliminary estimate for 2007. PSU certified estimates show a population increase from 9,660 in 2001 to 10,240 in 2006. The PSU certified estimate for the July 1, 2007 population of Newport is 10,455 persons.

Based on the 2000 Census data, there are 1.89 persons per housing unit in Newport on average when vacant and seasonal housing units are included. The 2000 Census identified 437 housing units out of the total 5,034 housing units (8.68%) that were seasonally occupied, recreational, or occasional use homes. 922 housing units were identified as vacant. When seasonal and vacant housing units are not included, the persons per full-time occupied housing unit is 2.59.

**Table 2.2.1-1 – Historic Population Summary, 1910-2007**

| Year | Population | Housing Units | Source |
|---|---|---|---|
| 1910 | 1,100 | | 1910 water use permit application |
| 1923 | 1,200 | | 1923 water use permit application |
| 1951 | 3,200 | | 1951 reservoir storage permit application |
| 1960 | 5,344 | | US Census |
| 1970 | 5,188 | 2,106 | US Census |
| 1980 | 7,519 | 3,862 | US Census |
| 1990 | 8,437 | 4,105 | US Census |
| 2000 | 9,532 | 5,034 | US Census |
| 2001 | 9,660 | | Portland State University PRC |
| 2002 | 9,650 | | Portland State University PRC |
| 2003 | 9,740 | | Portland State University PRC |
| 2004 | 9,760 | | Portland State University PRC |
| 2005 | 9,925 | | Portland State University PRC |
| 2006 | 10,240 | | Portland State University PRC |
| 2007 | 10,455 | | Portland State University PRC |

Through tracking the number of building permits issued each year for residential construction in Newport, the City Community Development Director identified that an average of 66.7 new housing units per year were added between 2000 and 2006. Starting with the Census count in 2000 of 5,034 housing units and adding the number of new units added each year, the current number of housing units is estimated at 5,501 as shown in Table 2.2.1-2.

Combining the PSU population estimates for 2001 to 2007 with the housing unit counts provided by the City results in values of 1.88 to 1.90 persons per housing unit with an average of 1.89. This matches the 1.89 persons per housing unit identified in the 2000 Census data.

**Table 2.2.1-2 – Population and Housing Units, 2000-2007**

| Year | Population | Housing Units | Residential Units Added | People per Unit |
|---|---|---|---|---|
| 2000 | 9,532 | 5,034 | 94 | 1.89 |
| 2001 | 9,660 | 5,128 | 26 | 1.88 |
| 2002 | 9,650 | 5,154 | 12 | 1.87 |
| 2003 | 9,740 | 5,166 | 22 | 1.89 |
| 2004 | 9,760 | 5,188 | 93 | 1.88 |
| 2005 | 9,925 | 5,281 | 95 | 1.88 |
| 2006 | 10,240 | 5,376 | 125 | 1.90 |
| 2007 | 10,455 | 5,501 | | 1.90 |
| | | *average* | *66.7* | *1.89* |

2000 population per Census. 2001-2007 population per PSU Estimates
Residential units added per City records

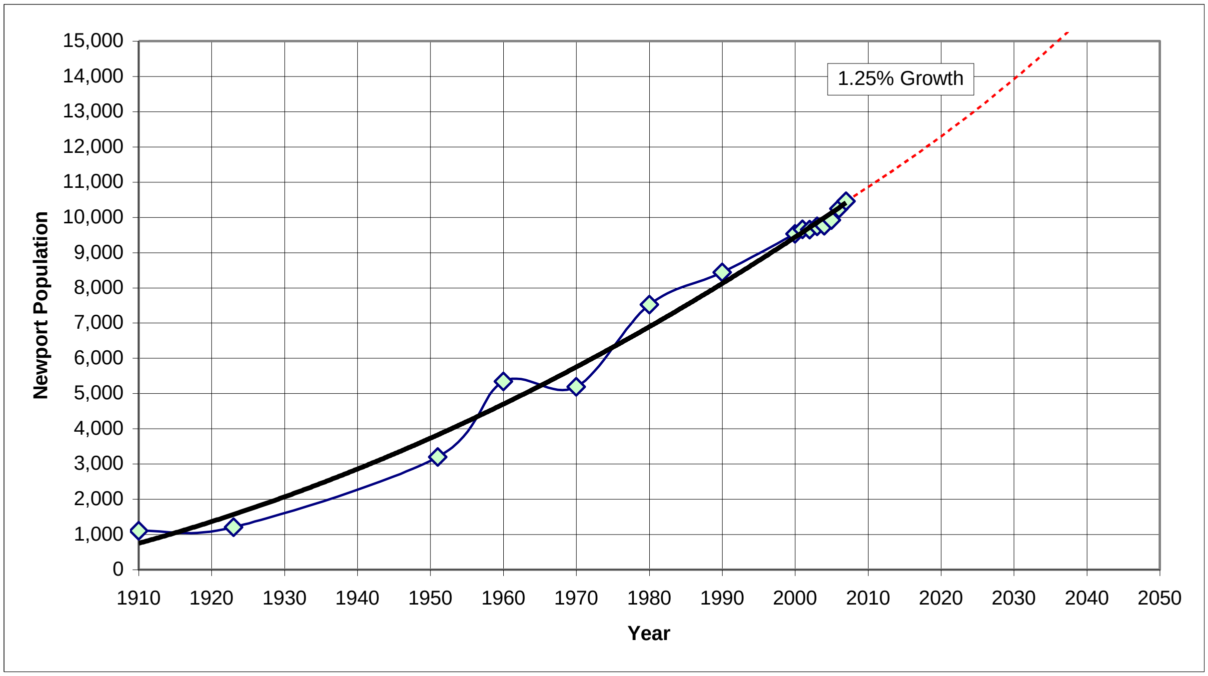



**Figure 2.2.1-1 – Newport Historic Population, 1910-2007**

### 2.2.2 Projected Population

The City of Newport experienced an average annual growth rate of 1.22% between 1980 and 1990 based on Census counts. Annual growth from 1990 to 2000 averaged 1.30%. Based on PSU population estimates for 2000 to 2007, the average annual growth rate for this period was 1.33%. Based on the historic growth patterns in Newport, an average growth rate of 1.2 to 1.3% is expected over the 20-year planning period. A best-fit polynomial trend line from 1910 to 2007 is shown in Figure 2.2.2-1 indicating a good fit to a projected average growth of approximately 1.25% per year. A value of 1.89 persons per dwelling unit will be used for future projections within the City. Growth projections will be taken to the year 2030 based on the assumption that improvements needed for the 20-year planning period will not be initiated until 2010. An annual growth rate of 1.25% will be used.

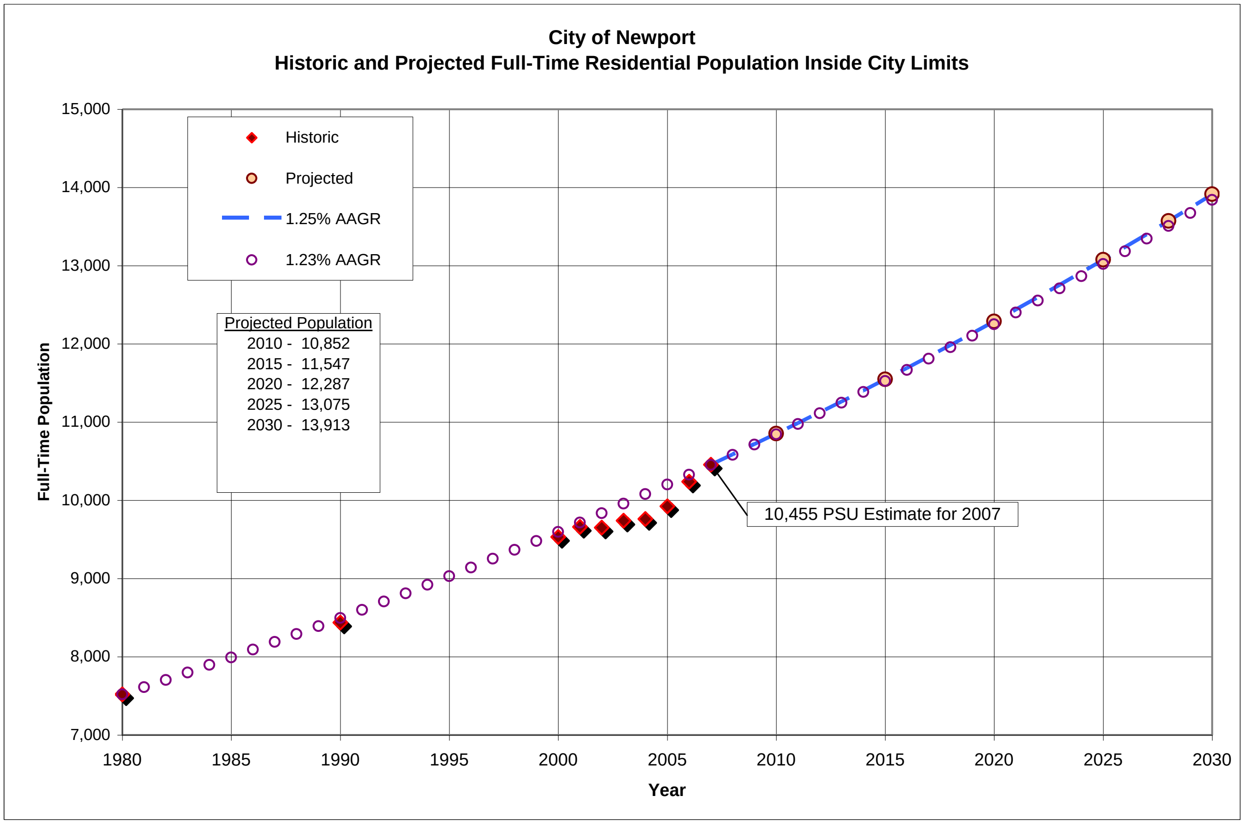



**Figure 2.2.2-1 – Newport Population Growth, 1980-2030**

The current service population of 10,455 persons is equivalent to 11,270 Equivalent Dwelling Units (EDU) as calculated in Section 6. For current conditions an average of 1.078 EDU per person occurs in Newport.

In addition to the projected residential growth inside the city, plans for future water needs must include any additional major non-residential additions as well as any future plans for water service outside the current service area. Current per capita water demands include the needs of existing commercial, industrial, and other users. However, any future non-residential development anticipated which may be beyond the demands wrapped into current per capita water demand values must be accounted for. Such development may increase the number of equivalent dwelling units (EDUs) the water system must serve without increasing the actual population of the city.

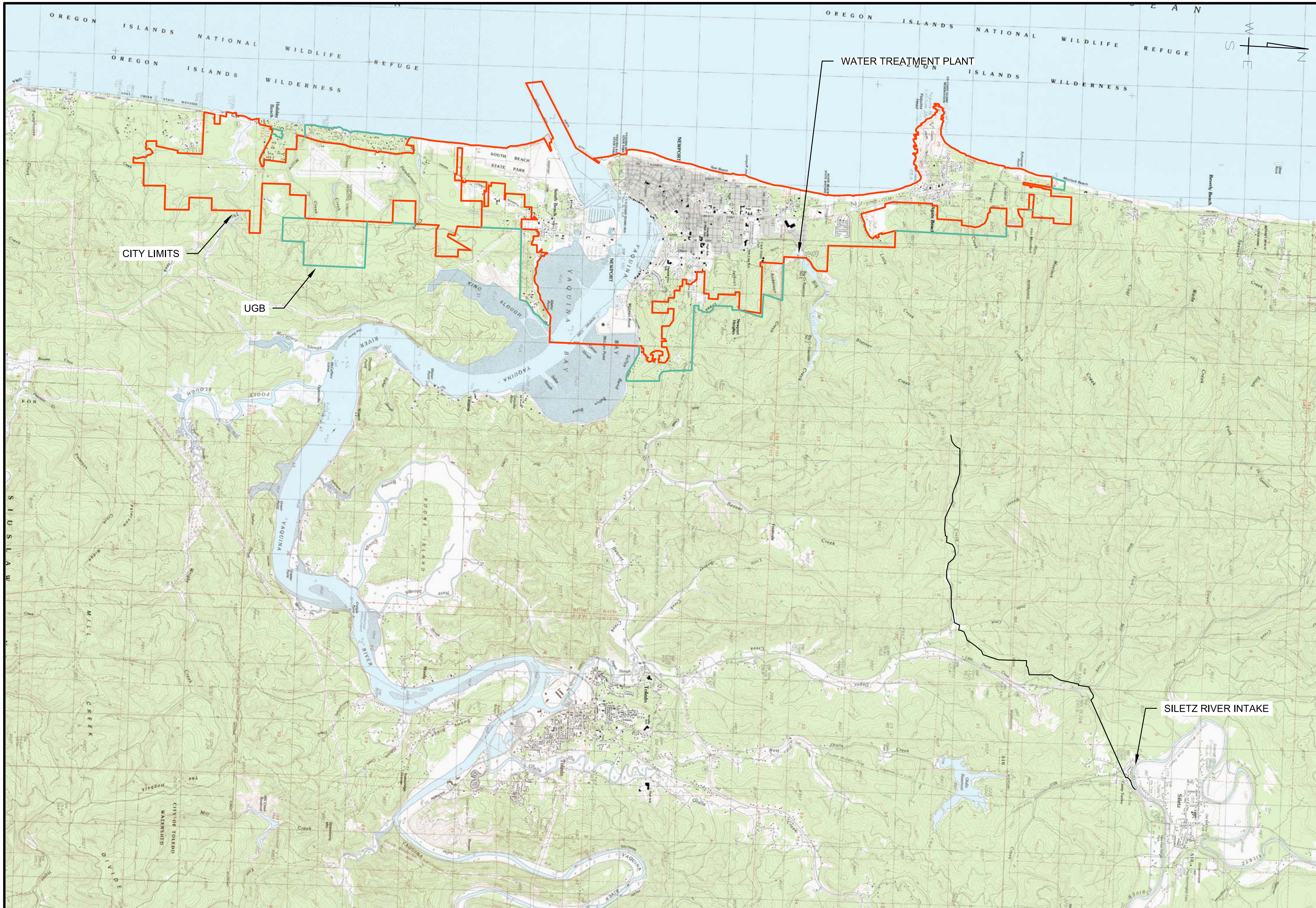
In the near future, Newport will provide water service to an additional 74 domestic and 25 commercial connections now served by the Seal Rock Water District. An analysis of water use over a 12 month period shows that the 25 commercial connections are equivalent to 45 EDUs in terms of water use. These 119 additional EDUs must be added to the City projections to properly account for future water demand. Using 1.89 people per housing unit indicates an additional service population from these connections of 140 persons. It is assumed that these customers will be added to the system in 2010 and that additional similar connections will occur at a growth rate of 1.25% per year, matching the projected City growth.

South of Yaquina Bay, specific development including the Oregon Coast Community College Central Campus currently under construction, the proposed Village Commercial Center, and a proposed industrial park – all part of the South Beach Plan – may impact water demand and population beyond what the city growth rate might indicate. Since current per capita water demand numbers for Newport include a mixture of residential, commercial, and industrial uses, the per capita demands are assumed to account for future commercial and industrial growth in the City, including that in South Beach. Water demand for the new college however will be added to that predicted only through population growth.

The OCCC Central Campus plans include two 72,000 s.f. buildings (144,000 s.f.) with the first building to be completed around 2011 and the second completed near the end of the planning period with a total design capacity of 6,000 part-time students. Newport's SDC methodology estimates 1.4 EDU per 250 s.f. for institutions such as a college campus resulting in 806 EDU. A typical value for school water use is 21 gpd/student for an institution with a cafeteria, gymnasium and showers [Water Quality, Tchobanoglous & Schroeder, 1987] resulting in 820 EDU. To account for the campus, a total of 820 EDU will be assumed with half (410 EDU) anticipated in 2011, and the remaining 410 EDUs assumed to occur around 2020.

**Table 2.2.2-1 – Population, Housing Unit and EDU Growth Projections**

| | 1.25% Growth Inside City Limits | | | 1.25% Growth Outside City Limits, Inside UGB | | | OCCC Central Campus | Total | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Year | Population | Housing Units | EDU | Population | Housing Units | EDU | EDU | Population | Housing Units | EDU |
| 2007 | 10,455 | 5,501 | 11,270 | | | | | 10,455 | 5,501 | 11,270 |
| 2008 | 10,586 | 5,601 | 11,411 | | | | | 10,586 | 5,601 | 11,411 |
| 2009 | 10,718 | 5,671 | 11,554 | | | | | 10,718 | 5,671 | 11,554 |
| 2010 | 10,852 | 5,742 | 11,698 | 140 | 74 | 119 | | 10,992 | 5,816 | 11,817 |
| 2011 | 10,988 | 5,814 | 11,845 | 142 | 75 | 120 | 410 | 11,129 | 5,889 | 12,375 |
| 2012 | 11,125 | 5,886 | 11,993 | 144 | 76 | 122 | 410 | 11,269 | 5,962 | 12,525 |
| 2013 | 11,264 | 5,960 | 12,143 | 145 | 77 | 124 | 410 | 11,409 | 6,037 | 12,676 |
| 2014 | 11,405 | 6,034 | 12,294 | 147 | 78 | 125 | 410 | 11,552 | 6,112 | 12,829 |
| 2015 | 11,547 | 6,110 | 12,448 | 149 | 79 | 127 | 410 | 11,696 | 6,189 | 12,985 |
| 2016 | 11,692 | 6,186 | 12,604 | 151 | 80 | 128 | 410 | 11,843 | 6,266 | 13,142 |
| 2017 | 11,838 | 6,263 | 12,761 | 153 | 81 | 130 | 410 | 11,991 | 6,344 | 13,301 |
| 2018 | 11,986 | 6,342 | 12,921 | 155 | 82 | 131 | 410 | 12,140 | 6,424 | 13,462 |
| 2019 | 12,136 | 6,421 | 13,082 | 157 | 83 | 133 | 410 | 12,292 | 6,504 | 13,625 |
| 2020 | 12,287 | 6,501 | 13,246 | 159 | 84 | 135 | 820 | 12,446 | 6,585 | 14,201 |
| 2021 | 12,441 | 6,583 | 13,411 | 160 | 85 | 136 | 820 | 12,601 | 6,667 | 14,368 |
| 2022 | 12,596 | 6,665 | 13,579 | 163 | 86 | 138 | 820 | 12,759 | 6,751 | 14,537 |
| 2023 | 12,754 | 6,748 | 13,749 | 165 | 87 | 140 | 820 | 12,918 | 6,835 | 14,709 |
| 2024 | 12,913 | 6,832 | 13,921 | 167 | 88 | 142 | 820 | 13,080 | 6,921 | 14,882 |
| 2025 | 13,075 | 6,918 | 14,095 | 169 | 89 | 143 | 820 | 13,243 | 7,007 | 15,058 |
| 2026 | 13,238 | 7,004 | 14,271 | 171 | 90 | 145 | 820 | 13,409 | 7,095 | 15,236 |
| 2027 | 13,404 | 7,092 | 14,449 | 173 | 91 | 147 | 820 | 13,577 | 7,183 | 15,416 |
| 2028 | 13,571 | 7,181 | 14,630 | 175 | 93 | 149 | 820 | 13,746 | 7,273 | 15,599 |
| 2029 | 13,741 | 7,270 | 14,813 | 177 | 94 | 151 | 820 | 13,918 | 7,364 | 15,783 |
| 2030 | 13,913 | 7,361 | 14,998 | 179 | 95 | 153 | 820 | 14,092 | 7,456 | 15,970 |
| Change | 3,458 | 1,860 | 3,728 | 39 | 21 | 34 | 820 | 3,637 | 1,955 | 4,700 |




CIVIL WEST Engineering Services, Inc.

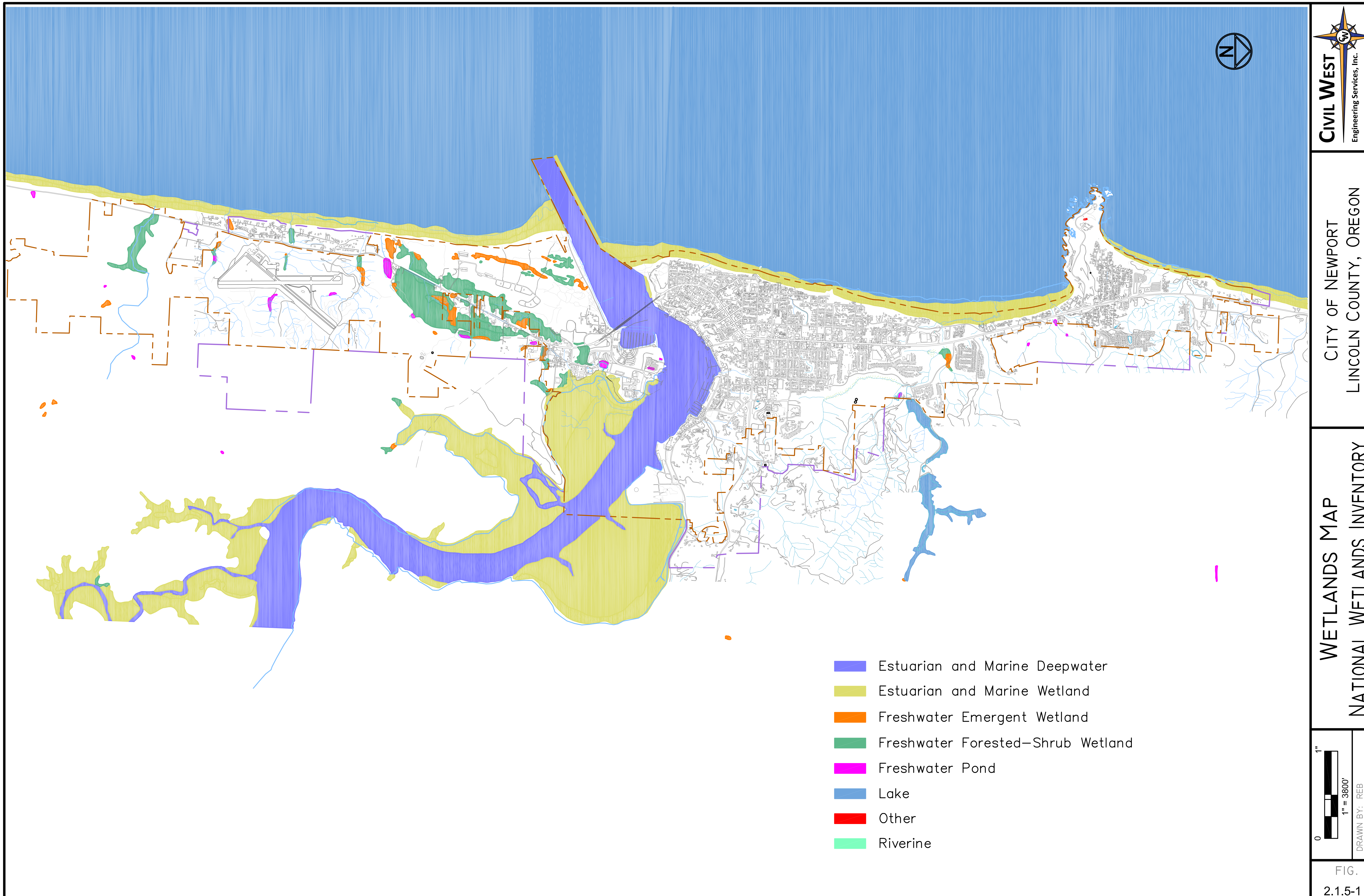
CITY OF NEWPORT
LINCOLN COUNTY, OREGON

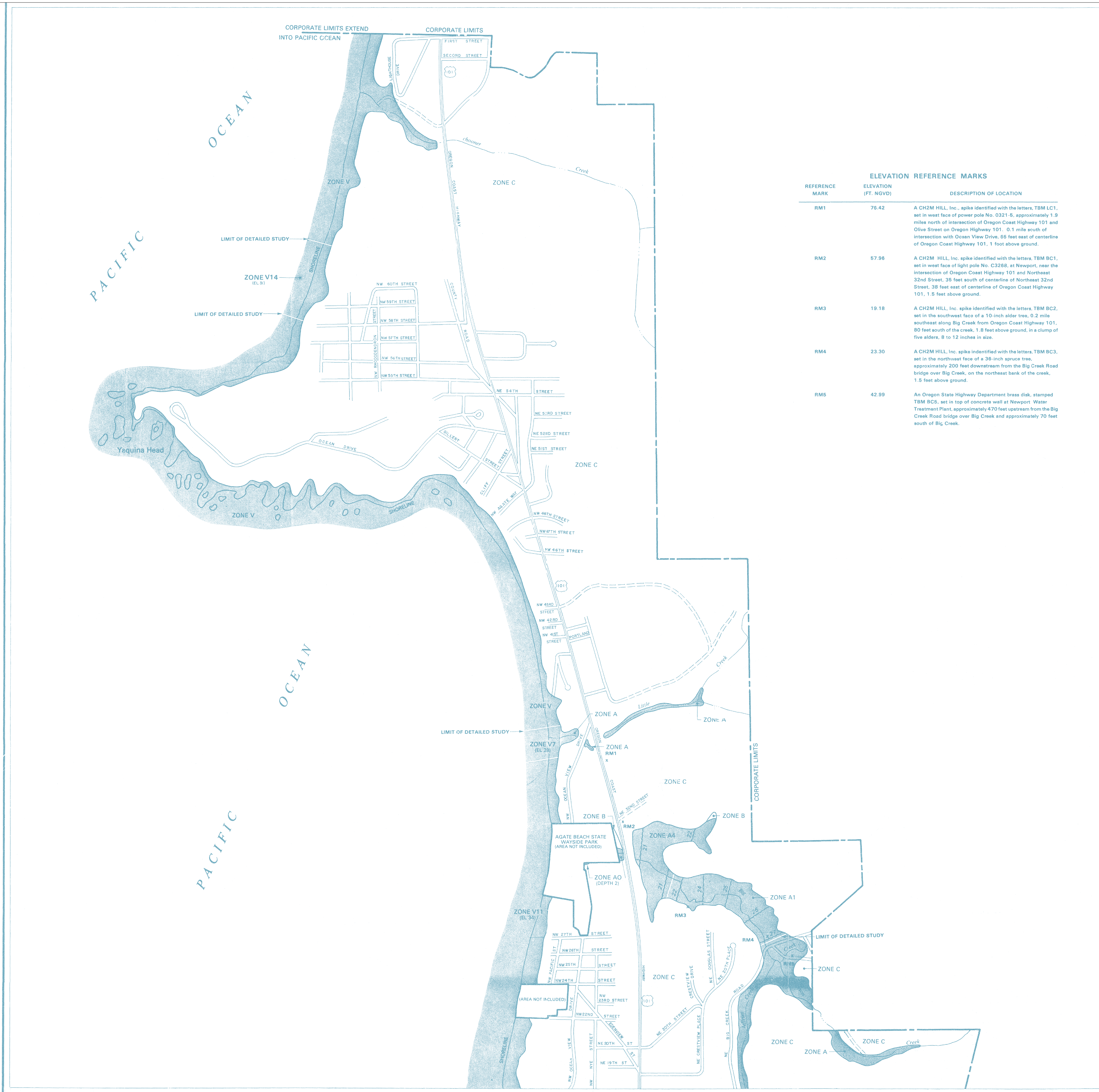
PLANNING AREA MAP

0 1"
1" = 1 MILE

DRAWN BY: REB
DATE: OCT. 9, 2008

FIG.
2.1.1-1


Estuarian and Marine Deepwater
Estuarian and Marine Wetland
Freshwater Emergent Wetland
Freshwater Forested-Shrub Wetland
Freshwater Pond
Lake
Other
Riverine
N
CIVIL WEST
Engineering Services, Inc.
CITY OF NEWPORT
LINCOLN COUNTY, OREGON
WETLANDS MAP
NATIONAL WETLANDS INVENTORY
0
1"
1" = 3800'
DRAWN BY: REB
DATE: OCT. 9, 2008
FIG.
2.1.5-1




## ELEVATION REFERENCE MARKS

| REFERENCE MARK | ELEVATION (FT. NGVD) | DESCRIPTION OF LOCATION |
|---|---|---|
| RM1 | 76.42 | A CH2M HILL, Inc., spike identified with the letters, TBM LC1, set in west face of power pole No. 0321-5, approximately 1.9 miles north of intersection of Oregon Coast Highway 101 and Olive Street on Oregon Highway 101. 0.1 mile south of intersection with Ocean View Drive, 65 feet east of centerline of Oregon Coast Highway 101, 1 foot above ground. |
| RM2 | 57.96 | A CH2M HILL, Inc. spike identified with the letters, TBM BC1, set in west face of light pole No. C3268, at Newport, near the intersection of Oregon Coast Highway 101 and Northeast 32nd Street, 35 feet south of centerline of Northeast 32nd Street, 38 feet east of centerline of Oregon Coast Highway 101, 1.5 feet above ground. |
| RM3 | 19.18 | A CH2M HILL, Inc. spike identified with the letters, TBM BC2, set in the southwest face of a 10-inch alder tree, 0.2 mile southeast along Big Creek from Oregon Coast Highway 101, 80 feet south of the creek, 1.8 feet above ground, in a clump of five alders, 8 to 12 inches in size. |
| RM4 | 23.30 | A CH2M HILL, Inc. spike indentified with the letters, TBM BC3, set in the northwest face of a 36-inch spruce tree, approximately 200 feet downstream from the Big Creek Road bridge over Big Creek, on the northeast bank of the creek, 1.5 feet above ground. |
| RM5 | 42.99 | An Oregon State Highway Department brass disk, stamped TBM BC5, set in top of concrete wall at Newport Water Treatment Plant, approximately 470 feet upstream from the Big Creek Road bridge over Big Creek and approximately 70 feet south of Big Creek. |

## KEY TO MAP

| | |
|---|---|
| 500-Year Flood Boundary | ZONE B |
| 100-Year Flood Boundary | |
| Zone Designations* | |
| 100-Year Flood Boundary | ZONE B |
| 500-Year Flood Boundary | |
| Base Flood Elevation Line With Elevation In Feet** | 513 |
| Base Flood Elevation in Feet Where Uniform Within Zone** | (EL 987) |
| Elevation Reference Mark | RM7 x |
| River Mile | • M1.5 |

**Referenced to the National Geodetic Vertical Datum of 1929

### *EXPLANATION OF ZONE DESIGNATIONS

| ZONE | EXPLANATION |
|---|---|
| A | Areas of 100-year flood; base flood elevations and flood hazard factors not determined. |
| A0 | Areas of 100-year shallow flooding where depths are between one (1) and three (3) feet; average depths of inundation are shown, but no flood hazard factors are determined. |
| AH | Areas of 100-year shallow flooding where depths are between one (1) and three (3) feet; base flood elevations are shown, but no flood hazard factors are determined. |
| A1-A30 | Areas of 100-year flood; base flood elevations and flood hazard factors determined. |
| A99 | Areas of 100-year flood to be protected by flood protection system under construction; base flood elevations and flood hazard factors not determined. |
| B | Areas between limits of the 100-year flood and 500-year flood; or certain areas subject to 100-year flooding with average depths less than one (1) foot or where the contributing drainage area is less than one square mile; or areas protected by levees from the base flood. (Medium shading) |
| C | Areas of minimal flooding. (No shading) |
| D | Areas of undetermined, but possible, flood hazards. |
| V | Areas of 100-year coastal flood with velocity (wave action); base flood elevations and flood hazard factors not determined. |
| V1-V30 | Areas of 100-year coastal flood with velocity (wave action); base flood elevations and flood hazard factors determined. |

### NOTES TO USER

Certain areas not in the special flood hazard areas (zones A and V) may be protected by flood control structures.

This map is for flood insurance purposes only; it does not necessarily show all areas subject to flooding in the community or all planimetric features outside special flood hazard areas.

For adjoining map panels, see separately printed Index To Map Panels.

INITIAL IDENTIFICATION:
MAY 24, 1974

FLOOD HAZARD BOUNDARY MAP REVISIONS.
JULY 2, 1976

FLOOD INSURANCE RATE MAP EFFECTIVE
APRIL 15, 1980

FLOOD INSURANCE RATE MAP REVISIONS:
JUNE 15, 1982 to change Corporate Limits, to add new Special Flood Hazard Areas, to reduce Special Flood Hazard Areas, to change Zone Designations, to add Base Flood Elevations, to change Zone Boundary Line Designations, to add Street Names, and to add Streets.

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APPROXIMATE SCALE
600 0 600 FEET

NATIONAL FLOOD INSURANCE PROGRAM

# FIRM
## FLOOD INSURANCE RATE MAP

## CITY OF NEWPORT, OREGON
LINCOLN COUNTY

PANEL 1 OF 3
(SEE MAP INDEX FOR PANELS NOT PRINTED)

COMMUNITY-PANEL NUMBER
410131 0001 C

MAP REVISED:
JUNE 15, 1982

federal emergency management agency


## ELEVATION REFERENCE MARKS

| REFERENCE MARK | ELEVATION (FT. NGVD) | DESCRIPTION OF LOCATION |
|---|---|---|
| RM6 | 177.05 | An Oregon State Highway Department disk, stamped S 156 1941, set vertically in south face of foundation wall, approximately 0.5 mile east of Oregon Coast Highway 101 on Northeast 3rd Street, approximately 160 feet north of the intersection of Northeast 3rd Street and Northeast Grant Street at the fairgrounds, at the southeast corner of the western of two exhibit buildings, approximately 1 foot above ground. |
| RM7 | 140.47 | An Oregon State Highway Department standard disk, stamped Z 40 Reset, set in the curb on the west side of Oregon Coast Highway 101, near the junction with U.S. Highway 20, approximately 82 feet south of the centerline of a catch basin near the southwest corner of the intersection of West Olive Street and Oregon Coast Highway 101. |
| RM8 | 135.06 | A U.S. Coastal and Geodetic Survey standard disk, stamped T 52 1930, set in the top of the concrete wall at City Hall, at the intersection of Oregon Coast Highway 101 and Southwest Alder Street, on the southeast side of the highway, at the southwest end of the northeast (main) entrance, in line with the base of the building. |
| RM9 | 15.42 | An Oregon State Highway Department standard disk, stamped F 80 1933, set in the top of the concrete curb on the northwest side of Southwest Bay Boulevard, approximately 310 feet southwest of the intersection of Southwest Bay Boulevard and Fall Street, 3 feet northeast of the northeast property line of Southwest Abbey Street, just west of a catch basin. |
| *RM10 | 117.98 | An Oregon State Highway Department disk, stamped Y 1 1936, set in the top of a concrete walk, at the northeast corner of the Oregon Coast Highway 101 bridge over Yaquina Bay. |
| *RM11 | 17.35 | A CH2M HILL, Inc. 6-inch spike, identified with the letters TBM SB 101, set in the south face of power pole No. F 17-G, at south end of the Oregon Coast Highway 101 bridge over Yaquina Bay, 100 feet east of bridge and 500 feet north of the south end, 50 feet south of the bay. |
| RM12 | 16.07 | Disk stamped "16 5A 1929", in a concrete post, on U.S. Highway 101 (Oregon Coast Highway), 0.55 mile south of the south end of the U.S. Highway 101 bridge across Yaquina Bay, 100 feet north of an old railroad crossing, just south of the junction with the old highway to the northeast, 40 feet east of the centerline of the highway. Established by U.S. Bureau of Public Roads. |

*Located In Area Not Included

## KEY TO MAP

500-Year Flood Boundary — ZONE B
100-Year Flood Boundary
Zone Designations*
100-Year Flood Boundary
500-Year Flood Boundary — ZONE B

Base Flood Elevation Line With Elevation In Feet** — 513

Base Flood Elevation in Feet Where Uniform Within Zone** — (EL 987)

Elevation Reference Mark — RM7 x

River Mile — • M1.5

**Referenced to the National Geodetic Vertical Datum of 1929

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| A1-A30 | Areas of 100-year flood; base flood elevations and flood hazard factors determined. |
| A99 | Areas of 100-year flood to be protected by flood protection system under construction; base flood elevations and flood hazard factors not determined. |
| B | Areas between limits of the 100-year flood and 500-year flood; or certain areas subject to 100-year flooding with average depths less than one (1) foot or where the contributing drainage area is less than one square mile; or areas protected by levees from the base flood. (Medium shading) |
| C | Areas of minimal flooding. (No shading) |
| D | Areas of undetermined, but possible, flood hazards. |
| V | Areas of 100-year coastal flood with velocity (wave action); base flood elevations and flood hazard factors not determined. |
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JULY 2, 1976

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APRIL 15, 1980

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APPROXIMATE SCALE
600 0 600 FEET

NATIONAL FLOOD INSURANCE PROGRAM

# FIRM
## FLOOD INSURANCE RATE MAP

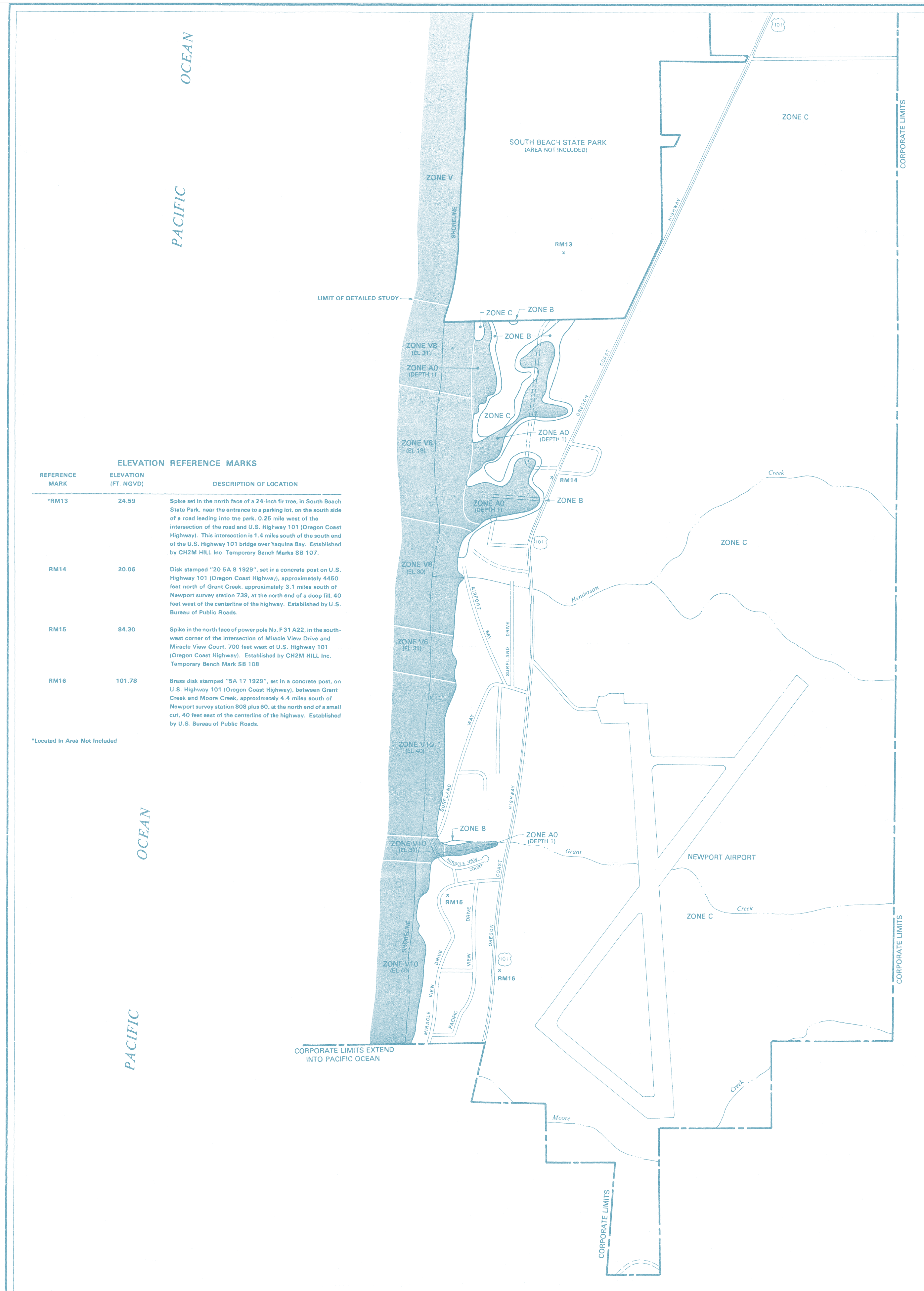
CITY OF
# NEWPORT, OREGON
LINCOLN COUNTY

PANEL 2 OF 3
(SEE MAP INDEX FOR PANELS NOT PRINTED)

COMMUNITY-PANEL NUMBER
410131 0002 C

MAP REVISED:
JUNE 15, 1982

federal emergency management agency




## ELEVATION REFERENCE MARKS

| REFERENCE MARK | ELEVATION (FT. NGVD) | DESCRIPTION OF LOCATION |
|---|---|---|
| *RM13 | 24.59 | Spike set in the north face of a 24-inch fir tree, in South Beach State Park, near the entrance to a parking lot, on the south side of a road leading into tne park, 0.25 mile west of the intersection of the road and U.S. Highway 101 (Oregon Coast Highway). This intersection is 1.4 miles south of the south end of the U.S. Highway 101 bridge over Yaquina Bay. Established by CH2M HILL Inc. Temporary Bench Marks SB 107. |
| RM14 | 20.06 | Disk stamped "20 5A 8 1929", set in a concrete post on U.S. Highway 101 (Oregon Coast Highway), approximately 4450 feet north of Grant Creek, approximately 3.1 miles south of Newport survey station 739, at the north end of a deep fill, 40 feet west of the centerline of the highway. Established by U.S. Bureau of Public Roads. |
| RM15 | 84.30 | Spike in the north face of power pole No. F 31 A22, in the south-west corner of the intersection of Miracle View Drive and Miracle View Court, 700 feet west of U.S. Highway 101 (Oregon Coast Highway). Established by CH2M HILL Inc. Temporary Bench Mark SB 108 |
| RM16 | 101.78 | Brass disk stamped "5A 17 1929", set in a concrete post, on U.S. Highway 101 (Oregon Coast Highway), between Grant Creek and Moore Creek, approximately 4.4 miles south of Newport survey station 808 plus 60, at the north end of a small cut, 40 feet east of the centerline of the highway. Established by U.S. Bureau of Public Roads. |

*Located In Area Not Included

## KEY TO MAP

| | |
|---|---|
| 500-Year Flood Boundary | ZONE B |
| 100-Year Flood Boundary | |
| Zone Designations* | |
| 100-Year Flood Boundary | ZONE B |
| 500-Year Flood Boundary | |
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| Base Flood Elevation in Feet Where Uniform Within Zone** | (EL 987) |
| Elevation Reference Mark | RM7 x |
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**Referenced to the National Geodetic Vertical Datum of 1929

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| C | Areas of minimal flooding. (No shading) |
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| V | Areas of 100-year coastal flood with velocity (wave action); base flood elevations and flood hazard factors not determined. |
| V1-V30 | Areas of 100-year coastal flood with velocity (wave action); base flood elevations and flood hazard factors determined. |

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JULY 2, 1976

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APRIL 15, 1980

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APPROXIMATE SCALE
600 0 600 FEET

NATIONAL FLOOD INSURANCE PROGRAM

# FIRM
## FLOOD INSURANCE RATE MAP

CITY OF
# NEWPORT, OREGON
LINCOLN COUNTY

PANEL 3 OF 3
(SEE MAP INDEX FOR PANELS NOT PRINTED)

COMMUNITY-PANEL NUMBER
410131 0003 C

MAP REVISED:
JUNE 15, 1982

federal emergency management agency

# Regulatory Environment

## 3.1 Responsibilities as a Water Supplier

Per OAR 333-061-0025, water suppliers are responsible for taking all reasonable precautions to assure that the water delivered to water users does not exceed maximum contaminant levels, to assure that water system facilities are free of public health hazards, and to assure that water system operation and maintenance are performed as required by these rules. This includes, but is not limited to, the following:

- Routinely collect and submit water samples for laboratory analyses at the frequencies and sampling points prescribed by OAR 333-061-0036 "Sampling and Analytical Requirements";
- Take immediate corrective action when the results of analyses or measurements indicate that maximum contaminant levels have been exceeded and report the results of these analyses as prescribed by OAR 333-061-0040 "Reporting and Record Keeping";
- Continue to report as prescribed by OAR 333-061-0040, the results of analyses or measurements which indicate that maximum contaminant levels (MCLs) have not been exceeded;
- Notify all customers of the system, as well as the general public in the service area, when the maximum contaminant levels have been exceeded;
- Notify all customers served by the system when the reporting requirements are not being met, or when public health hazards are found to exist in the system, or when the operation of the system is subject to a permit or a variance;
- Maintain monitoring and operating records and make these records available for review when the system is inspected;
- Maintain a pressure of at least 20 pounds per square inch (psi) at all service connections at all times (at the property line);
- Follow-up on complaints relating to water quality from users and maintain records and reports on actions undertaken;
- Conduct an active program for systematically identifying and controlling cross connections;
- Submit, to the DWP, plans prepared by a professional engineer registered in Oregon for review and approval before undertaking the construction of new water systems or major modifications to existing water systems, unless exempted from this requirement;
- Assure that the water system is in compliance with OAR 333-061-0205 "Water Personnel Certification Rules - Purpose" relating to certification of water system operators.
- Assure that Transient Non-Community water systems utilizing surface water sources or sources under the influence of surface water are in compliance with OAR 333-061-0065 "Operation and Maintenance" (2)(c) relating to required special training.

## 3.2 Public Water System Regulations

Water providers should always be informed of current standards, which can change over time, and should also be aware of pending future regulations. As of this writing, OAR Chapter 333, Division 61 covering Public Water Systems is over 300 pages in length. This Section is not meant to be a comprehensive list of all requirements but a general overview of the requirements.

Specific information on the regulations concerning public water systems may be found in the Oregon Administrative Rules (OAR), Chapter 333, Division 61. The rules can be found on the Internet at http://oregon.gov/DHS/ph/dwp/rules.shtml where copies of all the rules and regulations can be printed out or downloaded for reference. A summary of Oregon drinking water quality standards is published in "*Pipeline*" (Volume 21, Issue 4, Fall 2006) by the State Drinking Water Program.

Drinking water regulations were established in 1974 with the signing of the Safe Drinking Water Act (SDWA). This act and subsequent regulations were the first to apply to all public water systems in the United States. The Environmental Protection Agency (EPA) was authorized to set standards and implement the Act. With the enactment of the Oregon Drinking Water Quality Act in 1981, the State of Oregon accepted primary enforcement responsibility for all drinking water regulations within the State. Requirements are detailed in OAR Chapter 333, Division 61. The SDWA and associated regulations have been amended several times since inception with the goal of further protection of public health.

SDWA requires the EPA to regulate contaminants which present health risks and are known, or are likely, to occur in public drinking water supplies. For each contaminant requiring federal regulation, EPA sets a non-enforceable health goal, or maximum contaminant level goal (MCLG). This is the level of a contaminant in drinking water below which there is no known or expected health risk. The EPA is then required to establish an enforceable limit, or maximum contaminant level (MCL), which is as close to the MCLG as is technologically feasible, taking cost into consideration. Where analytical methods are not sufficiently developed to measure the concentrations of certain contaminants in drinking water, the EPA specifies a treatment technique instead of an MCL to protect against these contaminants.

Water systems are required to collect water samples at designated intervals and locations. The samples must be tested in State approved laboratories. The test results are then reported to the State, which determines whether the water system is in compliance or violation of the regulations. There are three main types of violations:

(1) MCL violation — occurs when tests indicate that the level of a contaminant in treated water is above the EPA or State's legal limit (states may set standards equal to, or more protective than, EPA's). These violations indicate a potential health risk, which may be immediate or long-term.

(2) Treatment technique (TT) violation — occurs when a water system fails to treat its water in the way prescribed by EPA (for example, by not disinfecting). Similar to MCL violations, treatment technique violations indicate a potential health risk to consumers.

(3) Monitoring and reporting violation — occurs when a system fails to test its water for certain contaminants or fails to report test results in a timely fashion. If a water system does not monitor its water properly, no one can know whether or not its water poses a health risk to consumers.

If a water system violates EPA/State rules, it is required to notify the State and the public. States are primarily responsible for taking appropriate enforcement actions if systems with violations do not return to compliance. States are also responsible for reporting violation and enforcement information to the EPA quarterly.

To comply with the regulations, water systems must provide adequate treatment techniques, operate treatment processes to meet performance standards, and properly protect treated water to prevent subsequent contamination after treatment.

## 3.3 Current Standards

There are now EPA-established drinking water quality standards for 91 contaminants, including 7 microbials and turbidity, 7 disinfectants and disinfection byproducts, 16 inorganic chemicals (including lead and copper), 56 organic chemicals (including pesticides and herbicides), and 5 radiologic contaminants. These standards either have established MCLs or treatment techniques. In addition, there are secondary contaminant levels for 16 contaminants that represent desired goals, and in the case of fluoride, may require special public notice.

**Total Coliform Rule**

The total coliform rule was established by the EPA in 1989 to reduce the risk of waterborne illness resulting from disease-causing organisms associated with animal or human waste. Routine samples collected by Oregon public water suppliers are analyzed for total coliform bacteria. The number of monthly samples required varies based on population served. For Newport, a minimum of 10 samples per month is required.

Compliance is based on the presence or absence of total coliforms in any calendar month. Sample results are reported as "coliform-absent" or "coliform-present". If any routine sample is coliform-present, a set of at least three repeat samples must be collected within 24 hours. If any repeat sample is total coliform-present, the system must analyze that culture for fecal coliforms or *E. coli*, and must then collect another set of repeat samples, unless the MCL has been violated and the system has notified the State. Following a positive routine or repeat total coliform result, the system must collect a minimum of five routine samples the following month.

Systems which collect fewer than 40 samples per month are allowed no more than one coliform-present sample per month including any repeat sample results. Larger systems (40 or more samples per month) are allowed no more than five percent coliform-present samples in any month including any repeat sample results. Confirmed presence of fecal coliform or *E. coli* presents a potential acute health risk and requires immediate notification of the public to take protective actions such as boiling or using bottled water. Any fecal coliform-positive repeat sample or *E. coli*-positive repeat sample, or any total coliform-positive repeat sample following a fecal or *E. coli*-positive routine sample is a violation of the MCL.

**Surface Water Treatment Rules**

All water systems using surface water must provide a total level of filtration and disinfection treatment to remove/inactivate 99.9 percent (3-log) of *Giardia lamblia*, and to remove/inactivate 99.99 percent (4-log) of viruses. In addition, filtered water systems must physically remove 99 percent (2-log) of *Cryptosporidium.* Systems with source water *Cryptosporidium* levels exceeding specified limits must install and operate additional treatment processes.

Filtered water systems must meet specified performance standards for combined filter effluent turbidity levels, and water systems using conventional and direct filtration must also record individual filter effluent turbidity and take action if specified action levels are exceeded. When more than 1 filter exists, each filter's effluent turbidity must be monitored continuously and recorded at least every 15 minutes. The combined flow from all filters must have a turbidity measurement at least every four hours by grab sampling or continuous monitoring. Turbidity monitoring must occur prior to any storage such as a clearwell or contact tank. Turbidity monitoring equipment must be calibrated using an approved method at least once per quarter. General requirements for systems utilizing conventional or direct filtration are:

- Individual filter turbidity monitored continuously and recorded every 15 minutes or less
- Combined filter turbidity monitored continuously or grab sample taken at least every 4 hours
- Combined filter turbidity less than 1 NTU in 100% of measurements
- Combined filter turbidity less than or equal to 0.3 NTU in 95% of measurements in a month
- Specific follow-up actions if individual filter turbidity exceeds 1.0 NTU twice

General requirements for systems utilizing slow sand, and alternative filtration (membrane filtration and cartridge filtration) are:

- Combined filter turbidity monitored continuously or grab sample taken at least every 4 hours Department may reduce to once per day if determined to be sufficient
- Combined filter turbidity less than 5 NTU in 100% of measurements
- Combined filter turbidity less than or equal to 1 NTU in 95% of measurements in a month
- Department may require lower turbidity values if the above levels cannot provide the required level of treatment

All water systems must meet specified CxT [concentration x time] requirements for disinfection, and meet required removal/inactivation levels. In addition, a disinfectant residual must be maintained in the distribution system.

- Continuous recording of disinfectant residual at entry point to the distribution system. Small system may be allowed to substitute 1-4 daily grab samples.
- Daily calculation of CxT at highest flow (peak hourly flow)
- Provide adequate CxT to meet needed removal/inactivation levels
- Maintain a continuous minimum 0.2 mg/L disinfectant residual at entry point to the distribution system
- Maintain a minimum detectable disinfectant residual in 95% of the distribution system samples (collected at coliform bacteria monitoring points)

Filtered water systems that recycle spent filter backwash water or other waste flows must return those flows through all treatment processes in the filtration plant. Systems wishing to recycle filter backwash water must provide notice to the State including a plant schematic showing the origin, conveyance, and return location of recycled flows. Design flows, observed flows, and typical recycle flows are also required along with a state-approved plant operating capacity.

**Disinfectants and Disinfection Byproducts**

Disinfection treatment chemicals used to kill microorganisms in drinking water can react with naturally occurring organic and inorganic matter in source water, called DBP precursors, to form disinfection byproducts (DBPs). Some disinfection byproducts have been shown to cause cancer and reproductive effects in lab animals and suggested bladder cancer and reproductive effects in humans. The challenge is to apply levels of disinfection treatment needed to kill disease-causing microorganisms while limiting the levels of disinfection byproducts produced. The primary disinfection byproducts of concern in Oregon are the total trihalomethanes (TTHM) and the haloacetic acids (HAA5).

Disinfection byproducts must be monitored throughout the distribution system at frequencies of daily, monthly, quarterly, or annually, depending on the population served, type of water source, and the specific disinfectant applied, and in accordance with an approved monitoring plan. Disinfectant residuals must be monitored at the same locations and frequency as coliform bacteria.

Total organic carbon (TOC) is an indicator of the levels of DBP precursor compounds in the source water. Systems using surface water sources and conventional filtration treatment must monitor source water for TOC and alkalinity monthly and practice enhanced coagulation to remove TOC if it exceeds 2.0 mg/L as a running annual average.

Compliance is determined based on meeting maximum contaminant levels (MCLs) for disinfection byproducts and maximum levels for disinfectant residual (MRDLs) over a running annual average of the sample results, computed quarterly.

- TTHM/HAA5 monitoring required in distribution system. One sample per quarter for systems serving 500-9,999 persons. One sample per year in warmest month required for systems serving less than 500.
- MCL for TTHM is 0.080 mg/L. MCL for HAA5 is 0.060 mg/L.
- Any system having TTHM > 0.064 mg/L or HAA5 > 0.048 based on a running annual average must conduct disinfection profiling.
- TOC and alkalinity monitoring in source water monthly. Enhanced coagulation if TOC greater than 2.0 mg/L
- Comply with MRDLs. Limit for chlorine (free $Cl_2$ residual) is 4.0 mg/L. Limit for chloramines is 4.0 mg/L (as total $Cl_2$ residual). Limit for chlorine dioxide is 0.8 mg/L (as $ClO_2$)
- Bromate MCL of 0.010 mg/L
- Chlorite MCL of 1.0 mg/L

**Long Term 2 Enhanced Surface Water Treatment Rule**

LT2ESWTR was published by the U.S. EPA on January 5, 2006. The Oregon rule is due by January 5, 2010. The rule requires source water monitoring for public water systems that use surface water or ground water under the influence of surface water. Based on the system size and filtration type, systems must monitor for *Cryptosporidium*, *E. coli*, and turbidity. Source water monitoring data will be used to categorize the source water *Crypto* concentration into four "bin" classifications that have associated treatment requirements. Systems serving 10,000 or more people are required to conduct 24 months of *Crypto* monitoring. Systems serving fewer than 10,000 people are required to conduct 12 months of *E. coli* monitoring and 12-24 months of *Crypto* monitoring if E. coli trigger levels are exceeded. The rule provides other options to comply with the initial source water monitoring that include either submitting previous *Crypto* data meeting (grandfathered data) the requirements or committing to provide a total of at least 5.5-log treatment for *Cryptosporidium*. A second round of source water monitoring will follow 6 years after the system makes its initial bin determination.

<u>Critical Deadlines for LT2ESWTR for systems serving less than 10,000 persons include:</u>

| | |
|---|---|
| Submit sample schedule and sample location description: | July 1, 2008<br>July 1, 2010* |
| Begin first round of source water monitoring: | October 2008<br>April 2010* |
| Submit Grandfathered Data (if applicable): | December 1, 2008<br>June 1, 2010* |
| Submit Bin Classification: | September 2012 |
| Comply with Rule: | October 1, 2014 |
| Begin second round of source water monitoring: | October 1, 2017<br>April 1, 2019* |

** Cryptosporidium monitoring - applies to filtered systems that exceed E. coli trigger*

Critical Deadlines for LT2ESWTR for systems serving 10,000 to 49,999 persons include:

Submit sample schedule and sample location description:_______January 1, 2008
Begin first round of source water monitoring:________________April 2008
Submit Grandfathered Data (if applicable):__________________June 1, 2008
Submit Bin Classification:_______________________________September 2010
Comply with Rule:_____________________________________October 1, 2013
Begin second round of source water monitoring: _____________October 2016

**Stage 2 Disinfectants and Disinfection Byproducts Rule**

The Stage 2 DBPR was published by the U.S. EPA on January 4, 2006. The Oregon rule is expected to be finalized on January 4, 2010. The rule builds on existing regulations by requiring water systems to meet disinfection byproduct (DBP) MCLs at each monitoring site in the distribution system. Whereas the Stage 1 Rule controls average DBP levels across distribution systems, the Stage 2 Rule controls the occurrence of peak DBP levels within distribution systems.

The rule requires all community water systems to conduct an Initial Distribution System Evaluation (IDSE). The goal of the IDSE is to characterize the distribution system and identify monitoring sites where customers may be exposed to high levels of TTHM and HAA5. There are four ways to comply with the IDSE requirements: Standard Monitoring, System Specific Study, 40/30 Certification, and Very Small System (VSS) Waiver.

Standard monitoring (SM) is one year of increased monitoring for TTHM and HAA5 in addition to the data being collected under Stage 1 DBPR. These data will be used with the Stage 1 data to select Stage 2 DBPR TTHM and HAA5 compliance monitoring locations. Any system may conduct standard monitoring to meet the Initial Distribution System Evaluation (IDSE) requirements of the Stage 2 DBPR. The number of monitoring sites, the monitoring periods, and monitoring frequency vary depending on population served.

Systems that have extensive TTHM and HAA5 data (including Stage 1 DBPR compliance data) or technical expertise to prepare a hydraulic model may choose to conduct a system specific study (SSS) to select the Stage 2 DBPR compliance monitoring locations.

The term “40/30” refers to a system that during a specific time period has all individual Stage 1 DBPR compliance samples less than or equal to 0.040 mg/L for TTHM and 0.030 mg/L for HAA5 and no monitoring violations during the same period. These systems have no IDSE monitoring requirements, but will still need to conduct Stage 2 DBPR compliance monitoring.

The Very Small System (VSS) Waiver applies to systems that serve fewer than 500 people and have eligible TTHM and HAA5 data. The VSS eligibility does not depend on the actual TTHM and HAA5 sample results. These systems also have no IDSE monitoring requirements, but will still need to conduct Stage 2 DBPR compliance monitoring. 40/30 certifications were previously due for systems larger than 10,000 persons. For systems less than 10,000 persons, the 40/30 due date is April 1, 2008.

Critical Deadlines for Stage 2 DBPR for systems serving less than 10,000 persons include:

Submit SM Plan or SSS Plan:_____________________________April 1, 2008
Complete SM:_________________________________________March 31, 2010
Submit IDSE Report:____________________________________July 1, 2010
Begin Compliance Monitoring:____________________________October 1, 2013

Critical Deadlines for Stage 2 DBPR for systems serving 10,000 to 49,999 persons include:

Submit SM Plan or SSS Plan:______________________________October 1, 2007 (should be done)
Complete SM:__________________________________________September 30, 2009
Submit IDSE Report:_____________________________________January 1, 2010
Begin Compliance Monitoring:_____________________________October 1, 2013

**Lead and Copper**

Excessive levels of lead and copper are harmful and rules exist to limit exposure through drinking water. Lead and copper enter drinking water mainly from corrosion of plumbing materials containing lead and copper. Lead comes from solder and brass fixtures. Copper comes from copper tubing and brass fixtures. Protection is provided by limiting the corrosivity of water sent to the distribution system. Treatment alternatives include pH adjustment, alkalinity adjustment, or both, or adding passivating agents such as orthophosphates.

Samples from community systems are collected from homes built prior to the 1985 prohibition of lead solder in Oregon. One-liter samples of standing water (first drawn after 6 hours of non-use) are collected at homes identified in the water system sampling plan. Two rounds of initial sampling are required, collected at 6-month intervals. Subsequent annual sampling from a reduced number of sites is required after demonstration that lead and copper action levels are met. After three rounds of annual sampling, samples are required every 3 years. The number of initial and reduced samples required is dependant on the population served by the water system.

In each sampling round, 90% of samples from homes must have lead levels less than or equal to the Action Level of 0.015 mg/L and copper levels less than or equal to 1.3 mg/L. Water systems with lead above the Action Level must conduct periodic public education, and either install corrosion control treatment, change water sources, or replace plumbing.

- Have Sampling Plan for applicable homes
- Collect required samples
- Meet Action Levels for Lead and Copper (0.015 mg/L for Lead and 1.3 mg/L for Copper)
- Rule out source water as a source of significant lead levels
- If Action Levels not met, provide corrosion control treatment and other steps

On October 10, 2007 EPA published the 2007 Final Revisions to the Lead and Copper Rule. The Oregon rule is projected for 2009 to 2011. The rule addresses confusion about sample collection by clarifying language that speaks to the number of samples required and the number of sites from which samples should be collected. The rule also modifies definitions for monitoring and compliance periods to make it clear that all samples must be taken within the same calendar year. Finally, the rule adds a new reduced monitoring requirement, which prevents water systems above the lead action level to remain on a reduced monitoring schedule.

**Inorganic Contaminants**

The level of many inorganic contaminants is regulated for public health protection. These contaminants are both naturally occurring and can result from agriculture or industrial operations. Inorganic contaminants most often come from the source of water supply, but can also enter water from contact with materials used for pipes and storage tanks. Regulated inorganic contaminants include arsenic, asbestos, fluoride, mercury, nitrate, nitrite, and others. A possible future MCL for Nickel is currently being evaluated by EPA.

Compliance is achieved by meeting the established MCLs for each contaminant. Systems that cannot meet one or more MCL must either install treatment systems (such as ion exchange or reverse osmosis) or develop alternate sources of water.

- Sample quarterly for Nitrate (reduction to annual may be available)
- Communities with Asbestos Cement (AC) pipe must sample every 9 years for Asbestos
- Sample annually for Arsenic. New MCL of 0.010 mg/L effective January 2006
- Sample annually for all other inorganics. Waivers are available based on monitoring records showing three samples below MCLs. MCLs vary based on contaminant

**Organic Chemicals**

Organic contaminants are regulated to reduce exposure to harmful chemicals through drinking water. Examples include acrylamide, benzene, 2,4-D, styrene, toluene, and vinyl chloride. Major types of organic contaminants are Volatile Organic Chemicals (VOCs) and Synthetic Organic Chemicals (SOCs). Organic contaminants are usually associated with industrial or agricultural activities that affect sources of drinking water supply, including industrial and commercial solvents and chemicals, and pesticides. These contaminants can also enter from materials in contact with the water such as pipes, valves and paints and coatings used inside water storage tanks.

At least one test for each contaminant from each water source is required during every 3-year compliance period. Public water systems serving more than 3,300 people must test twice during each 3-year compliance period for SOCs. Public water systems using surface water sources must test for VOCs annually.

Compliance is achieved by meeting the established MCL for each contaminant. Quarterly follow up testing is required for any contaminants that are detected above the specified MCL. Only those systems determined by the State to be at risk must monitor for dioxin. Water systems using polymers containing acrylamide or epichlorohydrin in their water treatment process must keep their dosages below specified levels. Systems that cannot meet one or more MCL must either install or modify water treatment systems (such as activated carbon and aeration) or develop alternate sources of water.

- At least one test for each contaminant (for each water source) every 3-year compliance period
- Sample twice each compliance period for each SOCs when system over 3,300 people
- Test VOCs annually
- Quarterly follow up testing required for any detects above MCL
- Maintain polymer dosages in treatment process below specified levels
- MCLs vary based on contaminant

**Radiologic Contaminants**

Radioactive contaminants, both natural and man-made, can result in an increased risk of cancer from long-term exposure and are regulated to reduce exposure through drinking water. Rules were recently revised to include a new MCL for uranium (30 μg/L), and to clarify and modify monitoring requirements. Initial monitoring tests, quarterly for one year at the entry point from each source, were to be completed by December 31, 2007 for gross alpha, radium-226, radium-228 and uranium. A single analysis for all four contaminants collected between June 2000 and December 2003 will substitute for the four initial samples. Gross alpha may substitute for radium-226 if the gross alpha result does not exceed 5 pCi/L and may substitute for uranium monitoring if the gross alpha result does not exceed 15 pCi/L. Subsequent monitoring is required every three, six, or nine years depending on the initial results, with a return to quarterly monitoring if the MCL is exceeded. Compliance with MCLs is based on the average of the four initial test results, or subsequent quarterly tests. Community water systems than cannot meet MCLs must install treatment (such as ion exchange or reverse osmosis) or develop alternate water sources.

## 3.4 Future Water System Regulations

The 1996 Safe Drinking Water Act (SDWA) requires EPA to review and revise as appropriate each current standard at least every six years. Data is continually collected on contaminants currently unregulated in order to support development of future drinking water standards. Drinking water contaminant candidate lists (CCL) are prepared and revised every five years. The first DWCCL was published on March 2, 1998 which included 51 chemicals and 9 microbials. In 2003, EPA decided not to regulate any of the 9 microbials from the initial list. In 2005 EPA published the second CCL consisting of the remaining 51 contaminants from the first list. The Agency published the preliminary regulatory determinations for 11 of the 51 contaminants listed on the second CCL in April of 2007. EPA has started the process to develop the third Contaminant Candidate List (CCL3) to help identify unregulated contaminants that may require a national drinking water regulation in the future. The EPA must publish a decision on whether to regulate at least five contaminants from the CCL every 5 years. As a result, additional contaminants can become regulated in the future.

In addition, rule revisions and new rules will occur to further address health risks from disinfection byproducts and pathogenic organisms. Rules such as the Long-Term Stage 2 Enhanced Surface Water Treatment Rule (LT2ESWTR) and the Stage 2 Disinfectants/Disinfection Byproducts Rule (State 2 DBPR) have recently gone into effect at the federal level and require systems to begin planning for compliance. New and revised drinking water quality standards are mandated under the 1996 federal SDWA. Known future standards (and their likely EPA promulgation date) include:

- Radon Rule (2009)
- Distribution Rule, including revised coliform bacteria requirements (2010)

Water suppliers should be aware of and familiar with these mandates and deadlines, and plan strategically to meet them. DHS, under the Primacy Agreement with the EPA, has up to two years to adopt each federal rule after it is finalized. Water suppliers generally have at least three years to comply with each federal rule after it is finalized; however, some of these rules will likely establish a significant number of compliance dates for water suppliers that will occur prior to state adoption of the rules. These “early implementation” dates will likely have to be implemented in Oregon directly by the EPA, because the state program will not yet have the rules in place or the resources to carry them out.

These anticipated rules are described generally below. Additional details will be found in the final EPA rules once they are promulgated.

**Radon Rule**

All community water systems using groundwater sources will conduct quarterly initial sampling at distribution system entry points for one year. Subsequent sampling will occur once every 3 years. The Radon MCL is expected to be 300 pCi/L. An alternative MCL (AMCL) of 4,000 pCi/L is proposed if the State develops and adopts an EPA-approved statewide Multi-Media Mitigation (MMM) program. Local communities may have the option of developing an EPA-approved local MMM program in the absence of a statewide MMM program, and meeting the AMCL.

**Distribution Rule**

Under this rule, current requirements for coliform bacteria will be revised, emphasizing fecal coliforms and *E. coli*, and focusing on protection of water within the distribution system. The rule will apply to all public water systems and will involve identifying and correcting sanitary defects and hazards in water systems and using best management practices for disinfection to control coliform bacteria in the system.

## 3.5 Water Management and Conservation Plans

The Municipal Water Management and Conservation Planning (WMCP) program provides a process for municipal water suppliers to develop plans to meet future water needs. Municipal water suppliers are encouraged to prepare water management and conservation plans, but are not required to do so unless a plan is prescribed by a condition of a water use permit; a permit extension; or another order or rule of the Commission. These plans will be used to demonstrate the communities' needs for increased diversions of water under the permits as their demands grow. A master plan prepared under the requirements of the Department of Human Resources Drinking Water Program or the water supply element of a public facilities plan prepared under the requirements of the Department of Land Conservation and Development which substantially meets the requirements of OAR 690-086-0125 to 690-086-0170 may be submitted to meet the requirements for WMCPs. Rules for WMCPs are detailed in OAR 690, Division 86.

A WMCP provides a description of the water system, identifies the sources of water used by the community, and explains how the water supplier will manage and conserve supplies to meet future needs. Preparation of a plan is intended to represent a pro-active evaluation of the management and conservation measures that suppliers can undertake. The planning program requires municipal water suppliers to consider water that can be saved through conservation practices as a source of supply to meet growing demands if the saved water is less expensive that developing new supplies. As such, a plan represents an integrated resource management approach to securing a community's long-term water supply.

Many of the elements required in a plan are also required under similar plans by the Drinking Water Section of the state Department of Human Services (water system master plans) and Department of Land Conservation and Development (public facilities plans). Water providers can consolidate overlapping plan elements and create a single master plan that meets the requirements of all three programs.

Every municipal water supplier required to submit a WMCP shall exercise diligence in implementing the approved plan and shall update and resubmit a plan consistent with the requirements of the rules as prescribed during plan approval. Progress reports are required showing 5-year benchmarks, water use details, and a description of the progress made in implementing the associated conservation or other measures.

The WMCP shall include the following elements:

1) Water System Description including infrastructure details, supply sources, service area and population, details of water use permits and certificates, water use details, customer details, system schematic, and leakage information.

2) Water Conservation Element including description of conservation measures implemented and planned, water use and reporting program details, progress on conservation measures, and conservation benchmarks.

3) Water Curtailment Element including current capacity limitations and supply deficiencies, three or more stages of alert for potential water shortages or service difficulties, levels of water shortage severity and curtailment action triggers, and specific curtailment actions to be taken for each stage of alert.

4) Water Supply Element detailing current and future service areas, estimates of when water rights and permits will be fully exercised, demand projections for 10 and 20 years, evaluation of supply versus demand, and additional details should an expansion of water rights be anticipated.

Failure to comply with rules for WMCPs can result in enforcement actions by the Water Resources Department Director. Enforcement actions can include requirements for additional information and planning, water use regulation, cancellation of water use permits, or civil penalties under OAR 690-260-0005 to 690-260-0110.

# Design Criteria & Service Goals

Section 4

## 4.1 Design Life of Improvements

The design life of a water system component is sometimes referred to as its useful life or service life. The selection of a design life is a matter of judgment based on such factors as the type and intensity of use, type and quality of materials used in construction, and the quality of workmanship during installation. The estimated and actual design life for any particular component may vary depending on the above factors. The establishment of a design life provides a realistic projection of service upon which to base an economic analysis of new capital improvements.

As discussed in Section 1, the planning period for this Water System Master Plan is 20 years ending in the year 2030. The planning period is the time frame during which the recommended water system is expected to provide sufficient capacity to meet the needs of all anticipated users. The required system capacity is based on projections of population, EDUs, water demand, and land use considerations.

The planning period for a water system and the design life for its components may not be identical. For example, a properly maintained steel storage tank may have a design life of 60 years, but the projected fire flow and consumptive water demand for a planning period of 20 years determine its size. At the end of the initial 20-year planning period, water demand may be such that an additional storage tank is required; however, the existing tank with a design life of 60 years would still be useful and remain in service for another 40 years. The typical design life for system components are discussed below.

### 4.1.1 Pumping Equipment and Structures

Major structures and buildings should have a design life of approximately 50 years. Pumps and equipment usually have a useful life of about 15 to 20 years. The useful life of some equipment can be extended, when properly maintained, if additional capacity is not required. Flowmeters typically have a design life of 10 to 15 years. Valves usually need to be replaced after 15 to 20 years of use.

### 4.1.2 Treated Water Transmission and Distribution Piping

Water transmission and distribution piping should easily have a useful life of 50 to 60 years if quality materials and workmanship are incorporated into the construction and the pipes are adequately sized. Steel piping used in the 1950’s and 60’s that has been buried, commonly exhibits significant corrosion and leakage within 30 years. Cement mortar lined ductile iron piping can last up to 100 years when properly designed and installed. PVC and HDPE pipe manufacturers claim a 100-year service life for pipe as well.

### 4.1.3 Treated Water Storage

Distribution storage tanks should have a design life of 60 years (painted steel construction) to 80 years (concrete construction). Steel tanks with a glass-fused coating can have a design life similar to concrete construction. Actual service life will depend on the quality of materials, the workmanship during installation, and the timely administration of maintenance activities. Several practices, such as the use of cathodic protection, regular cleaning and frequent painting can extend or assure the service life of steel reservoirs. Painting intervals for steel tanks is 15 to 25 years. The life of steel tanks is greatly reduced if not repainted periodically as needed.

## 4.2 Sizing and Capacity Criteria and Goals

The 20-year projected water demands presented in Section 6 are used to size improvements. Various components of the system demand are used for sizing different improvements. Methods and demands used are discussed below.

### 4.2.1 Water Supply

Water supply must at minimum be sufficient to meet the projected 20-year maximum daily demand (MDD). If possible, raw water availability should meet a longer-term need considering the difficulty in obtaining new water rights. Currently the MDD is 4.1 million gallons per day (mgd) or 6.34 cubic feet per second (cfs). At the end of the 20-year planning period, the projected MDD is 5.8 mgd or 8.97 cfs. In order for the treatment plant to meet system needs without requiring 24 hour per day operation, allowing for modest downtime for maintenance and cleaning, a 20-year supply goal of 10.83 cfs is recommended. In order to plan for long-term water supply options, projections beyond the planning period were made using the same growth rate as the planning period and similar 20 hour per day plant operation time.

*Supply Capacity Goal – 20-year MDD of 7.0 mgd (10.83 cfs)*
*Supply Capacity Goal – 40-year MDD of 9.0 mgd (13.93 cfs)*
*Supply Capacity Goal – 60-year MDD of 11.5 mgd (17.79 cfs)*

### 4.2.2 Water Treatment

Water treatment plant equipment and components such as intake pumps, discharge pumps, clearwells, and filtration capacity are typically sized to provide for the 20-year MDD. The actual plant capacity should be increased slightly to allow for the maximum daily demand to be met without requiring the plant to run 24 hours per day. This is suggested since the plant cannot typically run 24 hours per day as filter backwashing and other down-times are needed to produce safe drinking water. The goal is to produce the projected MDD with no more than 20 hours of plant run time per day allowing for 4 hours per day of down time. As indicated above, the projected MDD is 5.8 mgd. The water treatment facility should be sized to treat up to 7.0 mgd which will result in 5.8 mgd available to the system during 20 hours of plant operation. The instantaneous flow rate through the plant will be 4,860 gallons per minute (gpm).

*Treatment Capacity Goal – 20-year MDD with 20 hrs. Runtime, 7.0 mgd*

### 4.2.3 Treated Water Storage

Total storage capacity must include reserve storage for fire suppression, equalization storage, and emergency storage. In larger communities it is common to provide storage capacity equal to the sum of equalization storage plus the larger of fire storage or emergency storage. In small communities it is recommended that total storage be the sum of fire plus equalization plus emergency storage. This is considered prudent since it is possible for fire danger to increase during water emergencies, such as power failures when alternative sources of heating and cooking might be used.

Equalization storage is typically set at 20-25% of the MDD to balance out the difference between peak demand and supply capacity. When peak hour flows are known, equalization storage is the difference between the MDD and PHD for a duration of 8 hours [PHD-MDD x 8 hrs.].

Emergency storage is required to protect against a total loss of water supply such as would occur with a broken transmission line, an electrical outage, equipment breakdown, or source contamination. Emergency storage should be an adequate volume to supply the system's average daily demand for the duration of a possible emergency. For most systems, emergency storage should be equal to one maximum day of demand or 2.5 to 3 times the average day demand.

Fire reserve storage is needed to supply fire flow throughout the water system to fight a major fire. The fire reserve storage is based on the maximum flow and duration of flow required to confine a major fire. The guidelines published in "Fire Suppression Rating Schedule" by the Insurance Services Office (ISO) are typically used to determine the required fire flow and fire reserve storage. Generally, fire flows of 1,000 to 1,500 gpm are sufficient for one or two family dwellings not exceeding two stories in height. Commercial, industrial and institutional buildings require higher flows. Determination of these flows is unique to each building under consideration and involves detailed surveys of construction (type and area), occupancy (combustibility), exposure (construction type, distance, length/height of wall) and communications (openings).

The ISO also classifies fire protection capabilities on a numerical basis, called the Public Protection Classification (PPC) with Class 1 representing exemplary protection and Class 10 indicating less than minimum protection. This classification is used within the insurance industry for various purposes. The Public Protection Classification is determined from a complex analysis of the City's capabilities to receive and handle fire alarms, of the strength of the fire department, and of the adequacy of the water supply system. Analysis of the water supply system is further divided into equal parts of: 1) supply capabilities, 2) hydrant size, type, and installation, and 3) inspection and condition of hydrants. For a PPC Class 8 rating or better, fire storage should be adequate to support needed fire flows as follows: 2 hours when less than 3,000 gpm is needed, 3 hours when flows of 3,000 to 3,500 gpm are provided, or for 4 hours when flows greater than 3,500 gpm are needed.

For typical residential areas, the minimum recommended fire storage is 120,000 gallons to provide a flow up to 1,000 gpm for 2 hours. When significant non-residential structures exist with fire fighting requirements greater than typical residential requirements, additional fire protection storage can be justified. The 2007 Oregon Fire Code outlines fire flow and duration requirements based on building classification and size.

In Newport there are several significant structures (i.e. Schools, governmental buildings, large commercial/industrial buildings, etc.) which justify the need for additional fire storage well beyond the minimums recommended for residential areas. A fire flow of 4,000 gpm for 4 hours is required by the Oregon Fire Code (Table B105.1) for certain buildings that may occur in Newport. A fire flow of 4,000 gpm for 4 hours will consume a volume of 960,000 gallons.

Another important design parameter for treated water storage reservoirs is elevation. Efforts should be made to locate all reservoirs at the same elevation when possible within a pressure zone. As a consistent water surface is maintained in all reservoirs, the need for altitude valves, pressure reducing valves (PRVs), booster pumps, and other control devices may be minimized. Distribution reservoirs should also be located at an elevation that maintains adequate water pressure throughout the system; sufficient water pressures at high elevations and reasonable pressures at lower elevations. The ideal pressure range for a distribution system is between 40 and 80 psi.

For subdivisions at higher elevations than allowed within the main pressure zone, storage tanks should be required when possible rather than hydropneumatic tank booster pump stations. Tank size needs to be determined on a case-by-case basis as part of the design review. Fire pumps with a capacity of at least 1,000 gpm together with standby generators should be provided when a storage tank is not possible. Minimum tank size should be 120,000 gallons fire storage (1,000 gpm for 2 hours) plus 1 times the MDD per EDU. For very small developments, individual sprinkler systems may be most appropriate.

*Storage Capacity Goal – 1.25 x* $MDD_{20\text{-}year}$ *+ 960,000 fire storage = 8.2 MG*

### 4.2.4 Distribution System

Distribution mains are typically sized to convey projected maximum day flows plus simultaneous fire flows while maintaining at least 20 psi at all connections, or projected peak hourly flows while maintaining approximately 40 psi, whichever case is more stringent. Mains should be at least six inches in diameter to provide minimum fire flow capacity. The State of Oregon requires a water distribution system be designed and installed to maintain a pressure of at least 20 psi at all service connections (at the property line) at all times. OAR 333-061-0050 governs the construction standards for water systems including distribution piping. The size and layout of pipelines must be designed to deliver the flows indicated above.

The installation of permanent dead-end mains and dependence of relatively large areas on a single main should be avoided. In all cases, except for minor looping using 6-inch or larger pipe, a hydraulic analysis should be performed to ensure adequate sizing.

*Distribution Capacity Goal – Worst Case of projected MDD + fire flow with at least 20 psi residual pressure or Projected PHD with 40 psi residual pressure*

### 4.2.5 Fire Protection

According to the 2007 Oregon Fire Code, the minimum fire-flow requirements for one- and two-family dwellings not exceeding 3,600 s.f. shall be 1,000 gpm. When square footage exceeds 3,600 or for other types of buildings the minimum fire flow is 1,500 gpm. When flows of 1,750 gpm or less are required a single fire hydrant is required to be accessible within 250 feet (200 feet on dead-end streets) resulting in a maximum hydrant spacing of 500 feet (400 feet on dead-end streets).

For other types of structures, the requirements of the Oregon Fire Code require flows up to 8,000 gpm (2007 OFC Table B105.1). For fire flows less than 2,750 gpm a flow duration of 2 hours is required. For flows between 3,000 and 3,750 gpm a duration of 3 hours is required. For flows of 4,000 gpm and above a duration of 4 hours is required. The minimum number of hydrants available at a specific location, the average spacing between hydrants, and the maximum distance from any point on the street to a hydrant are dependent on the fire-flow requirement. For structures which require 4,000 gpm at least 4 hydrants must be available spaced not more than 350 feet apart.

*Fire Flow Capacity Goals – Residential Only Outlying Areas; 1,000 gpm*
*Fire Flow Capacity Goals – General Commercial Areas; 1,500 gpm*
*Fire Flow Capacity Goals – Central Town Area and Along Hwy. 101; 3,000 gpm*
*Fire Flow Capacity Goals – Major Structures and Schools; 4,000 gpm*

# 4.3 Basis for Cost Estimates

The cost estimates presented in this Plan will typically include four components: construction cost, engineering cost, contingency, and legal and administrative costs. Each of the cost components is discussed in this section. The estimates presented herein are preliminary and are based on the level and detail of planning presented in this Study. Construction costs are based on competitive bidding as public works projects. As projects proceed and as site-specific information becomes available, the estimates may require updating.

## 4.3.1 Construction Costs

The estimated construction costs in this Plan are based on actual construction bidding results from similar work, published cost guides, and other construction cost experience. Construction costs are preliminary budget level estimates prepared without design plans and details.

Future changes in the cost of labor, equipment, and materials may justify comparable changes in the cost estimates presented herein. For this reason, common engineering practices usually tie the cost estimates to a particular index that varies in proportion to long-term changes in the national economy. The Engineering News Record (ENR) construction cost index (CCI) is most commonly used. This index is based on the value of 100 for the year 1913. Average yearly values for the past 15 years are summarized in Table 5.3.1-1.

**Table 4.3.1-1 – ENR Index 1990-2007**

| YEAR | INDEX | % CHANGE/YR |
|---|---|---|
| 1990 | 4732 | 2.54 |
| 1991 | 4835 | 2.18 |
| 1992 | 4985 | 3.10 |
| 1993 | 5210 | 4.51 |
| 1994 | 5408 | 3.80 |
| 1995 | 5471 | 1.16 |
| 1996 | 5620 | 2.72 |
| 1997 | 5826 | 3.67 |
| 1998 | 5920 | 1.61 |
| 1999 | 6059 | 2.35 |
| 2000 | 6221 | 2.67 |
| 2001 | 6343 | 1.96 |
| 2002 | 6538 | 3.07 |
| 2003 | 6694 | 2.39 |
| 2004 | 7115 | 6.29 |
| 2005 | 7446 | 4.65 |
| 2006 | 7751 | 4.10 |
| 2007 | 7967 | 2.78 |
| | Average since 2000 | 3.84% |

Cost estimates presented in this Plan are based on the average of 2007 dollars with an ENR CCI of 7967. For construction performed in later years, costs should be projected based on the then current year ENR Index using the following method:

Updated Cost = Plan Cost Estimate x (current ENR CCI / 7967)

### 4.3.2 Contingencies

A contingency factor equal to approximately fifteen percent (15%) of the estimated construction cost has been added to the budgetary costs estimated in this Plan. In recognition that the cost estimates presented are based on conceptual planning, allowances must be made for variations in final quantities, bidding market conditions, adverse construction conditions, unanticipated specialized investigation and studies, and other difficulties which cannot be foreseen at this time but may tend to increase final costs. Upon final design completion of any project, the contingency can be reduced to 10%. A contingency of at least 10% should always be maintained going into a construction project to allow for variances in quantities of materials and unforeseen conditions.

### 4.3.3 Engineering

The cost of engineering services for major projects typically include special investigations, predesign reports, surveying, foundation exploration, preparation of contract drawings and specifications, bidding services, construction management, inspection, construction staking, start-up services, and the preparation of operation and maintenance manuals. Depending on the size and type of project, engineering costs may range from 18 to 25% of the contract cost when all of the above services are provided. The lower percentage applies to large projects without complicated mechanical systems. The higher percentage applies to small or complicated projects. Engineering costs for design and construction services presented in this Plan are based on 20% of the estimated total construction cost.

### 4.3.4 Legal and Administrative

An allowance of four percent (4%) of construction cost has been added for legal and administrative services. This allowance is intended to include internal project planning and budgeting, grant administration, liaison, interest on interim loan financing, legal services, review fees, legal advertising, and other related expenses associated with the project that could be incurred by the City.

### 4.3.5 Land Acquisition

Some projects may require the acquisition of additional right-of-way, property, or easements for construction of a specific improvement. The need and cost for such expenditures is difficult to predict and must be reviewed as a project is developed. Effort was made to include costs for land acquisition, where expected, within the cost estimates included in this Plan.

# Existing Water System

Section 5

## 5.1 Raw Water Supply

### 5.1.1 Water Rights

The City of Newport holds 7 water use permits allowing for a total of 19.24 cfs from various streams. Figure 5.1.1 (located at end of Section) illustrates the location of the various water rights held by Newport and the approximate location of their points of diversion.

**Table 5.1.1 – Water Rights Summary**

| | | | | | |
|---|---|---|---|---|---|
| | | | | Priority | POD Rate |
| **Source Name** | **Application** | **Permit** | **Certificate** | **Date** | **(cfs)** |
| Blattner Creek | S72 | S20 | 1012 | 5/10/1909 | 0.54 |
| Nye Creek | S8970 | S5882 | 8603 | 5/14/1923 | 1.5 |
| Nye Creek | S9224 | S6197 | 9113 | 10/15/1923 | 0.7 |
| Hurbert Creek | S9221 | S6194 | 9112 | 10/15/1923 | 0.1 |
| Big Creek | S11156 | S7722 | 9127 | 10/27/1926 | 10.0 |
| Siletz River | S39121 | S29213 | ~ | 9/24/1963 | 6.0 |
| Jeffries Creek | S44381 | S33151 | 57650 | 1/9/1968 | 0.4 |
| | | | | | 19.24 |
| | | | | | |
| | | | | Priority | Storage |
| **Storage** | **Application** | **Permit** | **Certificate** | **Date** | **(acre-feet)** |
| Big Creek Res. #1 | S26388 | S20703 | 21357 | 8/31/1951 | 200 |
| Big Creek Res. #2 | S43413 | S33127 | 48628 | 3/24/1967 | 310 |
| Big Creek Res. #2 | S43413 | S33127 | 48628 | 6/5/1968 | 35 |
| Big Creek Res. #2 | S52204 | S38220 | ~ | 7/19/1974 | 625 |

Currently, the City can only utilize the Blattner Creek, Siletz River, and Big Creek water rights. The Nye Creek and Hurbert Creek rights from 1923 are no longer in use and cannot be practically implemented due to their distance from the treatment plant and nature of development. In the past the City has set up pumping and diversion equipment to divert part or all of their Jeffries Creek water right but has not done so for several years.

Storage rights are held for two reservoirs on Big Creek upstream from the water treatment plant. The Blattner Creek water right flows into Big Creek Reservoir #2 (upper reservoir) by gravity. The Siletz right is diverted and pumped into the Big Creek Reservoir #2 through over 5 miles of piping. Water from the upper Reservoir #2 flows into the lower Reservoir #1 where the Big Creek Pump Station is located to pump all available water rights to the treatment plant.

During the heart of the summer months, the only water right that is currently capable of providing the City with a supply of raw water is the 6.0 cfs right on the Siletz River due to inadequate flows in Big Creek and Blattner Creek. System demand in excess of 6.0 cfs is met at these times through the use of water in the Reservoirs which was stored during previous wetter months.

### 5.1.2 Water Quality

Raw water data for Newport is measured at the treatment plant following withdrawal from the lower reservoir. Water from Big Creek and the Siletz is able to settle in the reservoirs prior to being diverted for treatment at the water plant. The settling that occurs in the reservoirs results in low raw water turbidity however it is possible that higher iron, manganese, and color levels also result. Natural alkalinity is low thus requiring supplemental alkalinity through lime addition when using alum for coagulation. A summary of the basic raw water quality parameters for 2004-2007 data is provided as follows:

**Table 5.1.2 – Raw Water Quality Parameters, 2004-2007**

| | Temp (°C) | pH | Turbidity (NTU) | Color (SU) | Iron (mg/L) | Mn (mg/L) | Alkalinity (mg/L) | TOC (mg/L) |
|---|---|---|---|---|---|---|---|---|
| Average | 14.5 | 7.0 | 1.5 | 34 | 0.5 | 0.04 | 11 | 1.53 |
| Max | 22.4 | 7.8 | 6.6 | 86 | 1.8 | 0.13 | 20 | 2.45 |
| Min | 4.5 | 6.5 | 0.6 | 2 | 0.1 | 0.01 | 6 | 0.96 |

During summer months, the lower Big Creek Reservoir experiences levels of iron and manganese exceeding the secondary maximum contaminant levels of 0.3 mg/L and 0.05 mg/L for iron and manganese respectively. This, combined with warmer temperatures and shallow depths where algae and other plant life thrive, results in periods of relatively poor water quality and difficult treatment.

### 5.1.3 Siletz River Intake Structure and Transmission

The City of Newport owns and operates an intake on the Siletz River. The intake is a large concrete structure located on the side of the river. The Newport intake is located adjacent to and immediately upstream of another large intake owned and operated by Georgia Pacific Lumber. A smaller intake is located just upstream and is owned and operated by the City of Toledo.

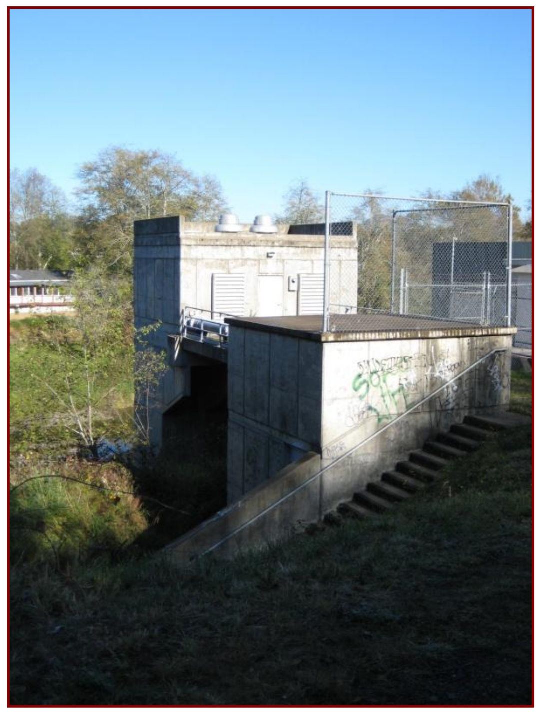
The Siletz intake was started up in 1994 in order to divert water from the Siletz River and pump it into the Big Creek drainage basin. When the intake was constructed, approximately 29,000 lineal feet of 16-inch ductile iron transmission pipe and approximately 1,000 feet of 18-inch steel pipe was installed to connect the intake to the upper Big Creek reservoir. Velocity in the 16-inch transmission piping at the full water right of 6 cfs (2693 gpm) is 4.3 feet per second.

The screening at the intake consists of two drum-type Johnson screens designed to prevent large debris and juvenile fish from entering the wetwell of the intake pump station. Each Johnson screen is 30-inches in diameter and designed to be raised and lowered to allow for maintenance of the screens.

During the winter months, the intake has generally sat idle because sufficient water is available in the Big Creek basin and the cost of pumping from the Siletz is unnecessary. The intake has a history of silt and sand buildup within the wetwell due to the highly turbid winter water conditions. This has generally required manual cleaning and removal in the spring to prepare the intake for use during the summer months.

There are three pumps located within the Siletz intake. Each pump has a 200 horsepower, 460-volt, 3-phase, 1800-rpm vertical motor manufactured by U.S. Motors. Each pump is a Fairbanks Morse 12M, 7-stage, CT head vertical turbine pump rated for 1000 gpm at 560 feet total dynamic head (TDH). With two pumps running at once the station output is approximately 2200 gpm with a discharge pressure exceeding 200 psi.

The original pumps are water lubricated meaning that a portion of the pumped water is circulated around the shaft and seals for lubrication. Due to the highly turbid water, the grit and silt in the raw water has created a maintenance problem with wear on the shafts and seals. At the time this study was being prepared, the City was in the process of investigating new pumps that will utilize a food-grade oil lubrication system for the shafts and seals. This should reduce the wear and maintenance issues related to the water lubricated systems.



A single VFD is included in the pump station to allow the City to control the rate and output of one or the other of two pumps with the third pump delivering its full capacity. This flexibility allows the City to adjust flows depending on their needs and the available water in the river.

Operating pressures are on the order of 200 psi as measured on the discharge side of the intake pumps. Consequently the risk of water hammer within the transmission main is significant at startup and shutdown. In order to protect against damage associated with water hammer, the intake facility includes a large pressure vessel housed in a separate building (shown in the foreground of the adjacent photo). The pressure vessel provides surge dampening to absorb the shock and force of water hammer so that it does not damage piping or fittings along the transmission main or within the pump station itself.

The Siletz intake is in good condition and has been well maintained. The pumps are slightly undersized for the total permitted water right but have been sufficient for past needs. Small solids handling pumps could be added to facilitate silt removal prior to summer pumping. Shut-off valves or gates to isolate the wetwell from the river cannot be added since a flooded wetwell is required to prevent uplift during high river conditions.

Drawbacks of the Siletz intake as a raw water source include the fact that water turbidity is high in the winter months and that a significant amount of energy is required to lift water from the Siletz to Big Creek. This is offset by the fact that raw water in Big Creek is relatively good even in the winter months due to the calming effect of the reservoir. Also, winter rains tend to produce enough water in the Big Creek basin to eliminate the need to pump from the Siletz River when water turbidity is high.

In order to pump the entire 2693 gpm water right from the Siletz, all three of the existing pumps must run together and the discharge pressure would be approximately 230 psi. The pumps are now 15 years old and replacement should be planned during the planning period. When new pumps are required, it is recommended that they be sized such that two pumps running together provide the full water right with a third pump in standby. This will likely require 300 Hp motors.

### 5.1.4 Big Creek Reservoirs and Dams

The water right on Big Creek dates back to 1926 with the right on Blattner Creek dating back to 1909. However, it was not until 1951 that the original Big Creek dam was constructed with the intention of impounding flows in the Big Creek basin so that the City would have more water available during the drier summer months.

The original earthen dam (1951) impounded approximately 200 acre-feet of water. This reservoir, now referred to as the lower reservoir (Reservoir #1), is the location from which the City diverts water from the Big Creek basin to be treated at the water treatment plant. The original treatment facility and raw water intake were constructed concurrently.

In 1969, the second dam was built to create the upper Big Creek reservoir (Reservoir #2). In 1976, the upper reservoir was expanded by raising the new dam to create a total storage capacity of around 970 acre-feet. Together, the upper and lower reservoirs provide about 1,200 acre-feet of storage. A simple outlet and control structure is located near the upper dam which releases water to the lower reservoir.

The upper reservoir #2 is relatively deep (as compared to the lower reservoir #1) and free from weeds and other plant growth in the water. The lower reservoir is much shallower which results in warmer summer temperatures. At some point in the past, Brazilian Elodea was introduced to the lower reservoir. The Elodea has propagated and expanded to fill much of the reservoir. This condition, along with the warmer water temperatures, has resulted in taste and odor problems as well as other water quality concerns for the City. Additionally, natural iron and manganese and annual turnover (due to thermocline) within the reservoirs has presented treatment challenges in recent years following a reduction in the prechlorination dose used at the treatment plant.

Extreme care should be taken to avoid introducing water from the lower reservoir into the upper reservoir to prevent Brazilian Elodea from contaminating the upper reservoir as well.

### 5.1.5 Big Creek Pump Station and Transmission

The City constructed a new pump station on the lower Big Creek reservoir in 1974 to serve as a raw water intake for the water treatment plant. The raw water pump station is constructed on piles and is accessed by a gang plank from the lower dam structure.

The pump station houses 3 turbine style pumps. The horsepower rating and estimated capacity of each pump is as follows:

(2) 7.5 horsepower pumps....................... ~1,000 gpm
(1) 25 horsepower pump ......................... ~2,200 gpm

The pumps are low head pumps that lift the water a short distance to the nearby Big Creek treatment plant.

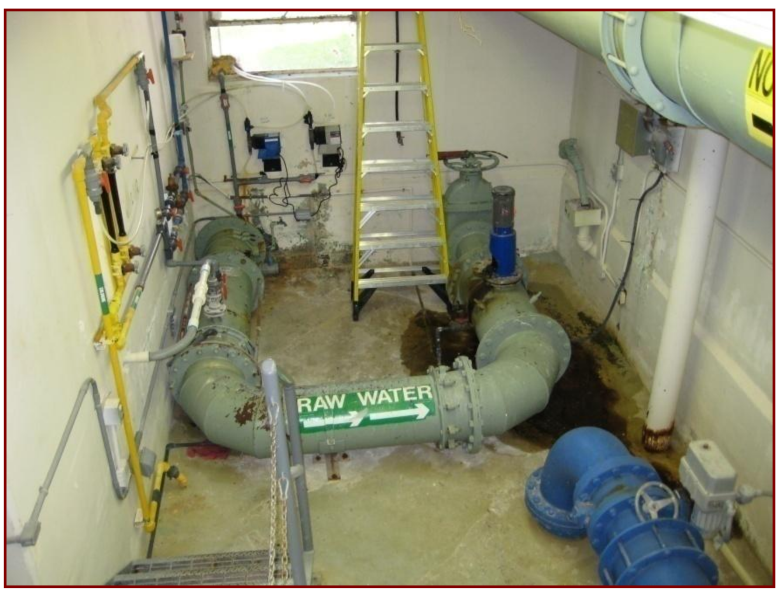
The raw water intake has been in a declining condition though some recent upgrades have been made in an effort to maintain and extend the useful life of the intake.

To improve the operational control at the plant, a VFD was recently added to the intake system so that the flow rate into the plant can be carefully controlled and tuned. This has improved the operation of the clarifiers and reduced the amount of water overflowing from the filters.

## 5.2 Water Treatment Facilities

The purpose of this section is to provide a detailed description of the existing treatment facilities at the City of Newport. Each system component will be described and an effort made to characterize the existing capacity and condition of each component. Where applicable, deficiencies with treatment components will be discussed.

### 5.2.1 Raw Water Chemical Addition




Raw water piping enters the treatment plant site between the two existing clariflocculators. The piping enters the treatment plant in the lower level where chemicals are injected into the raw water stream followed by flash mixing.

Chemicals added to the raw water stream include alum for coagulation, hydrated lime for pH and alkalinity adjustment, and chlorine for disinfection. For 2007, the average alum dose was 30.7 mg/L and the average dose of lime into the raw water was 11.8 mg/L. (A lime dose of approximately 1.6 mg/L is also added following filtration for final pH adjustment.)

As industry health concerns over disinfection byproducts (DBPs) have increased, the City has reduced the level of pre-chlorination (chlorine added prior to filtration) to reduce DBPs in the finished water. The City experimented with potassium permanganate in the past as an alternative oxidant but abandoned its use due to difficulties in controlling the dosage. As DBPs, taste and odor concerns, and manganese issues have persisted the City recently began efforts to utilize sodium permanganate as an alternative oxidant. While the use of sodium permanganate will allow oxidation without increasing DBPs, it will not alleviate the problem of inadequate chlorine contact time as discussed later.

Alum is stored in a large horizontal cylindrical tank in the lower level of the building and hydrated lime is stored upstairs in dry bags and fed in a volumetric feeder.

### 5.2.2 Flocculation and Sedimentation

After chemical addition and flash mixing, the raw water piping makes a 180-degree turn and takes the water back out of the building and into a splitter box and divided between the two clariflocculators.

The water treatment facility originally included a single clariflocculator as part of the overall treatment process. The original clariflocculator, constructed in 1952/53, has an inside diameter of 50-feet and a sidewall depth of around 12 feet. The clariflocculator contains an inner flocculation chamber surrounded by an upflow clarifier section. The flocculation chamber has a volume of approximately 31,770 gallons while the clarifier section has a surface area of approximately 1,430 $ft^2$ and a volume of about 144,500 gallons.

A second clariflocculator was added in 1978-79 as part of an upgrade to the plant and to increase the overall capacity of the water treatment facility. The second unit is of similar size and construction to the first. However, the newer clariflocculator has settled over the years and does not operate properly as the water service in the tank is no longer level with the overflow launders around the tank.

At some point, the City added tube settlers to the clariflocculators to improve the performance of the sedimentation process. Operation of the clariflocculators has historically been a struggle as the units do not function in a balanced or even rate. Water quality is not consistent from each unit nor is the rate of flow. It is only through careful operation that adequate sedimentation is accomplished.

The Recommended Standards for Water Works (10-State Standards) recommend a minimum of 30 minutes detention time within flocculators, 2 to 4 hours detention within clarifiers, and a maximum surface loading rate of 2 $gpm/ft^2$ for tube settlers. Based on these standards, the two clariflocculators have a combined maximum capacity of 3 MGD. It is estimated that suitable performance can be achieved at flows up to 4.3 MGD with ideal chemical addition however surface overflow rates on the tube settlers would be much higher than optimum for color removal. Essentially, at the current peak summer flow rates of 4 MGD, the maximum capacity of the clariflocculators has been reached.

Due to the age and condition of the structures and equipment, the poor individual performance of the units, and the lack of additional treatment capacity, the clariflocculators are considered to be at the end of their useful lives.

### 5.2.3 Filtration

Clarified water flows by gravity into the filtration portion of the treatment process consisting of four gravity rapid sand filters. Each filter measures approximately 10.75 feet wide by 21.75 feet in length for a total filter area of approximately 935 square feet.

The original plant (1952-54) was constructed with two filters and two filters were added with the plant expansion in 1978-79. The cast in place concrete filter bays include clay block underdrains (Leopold) and a mixed-media filtration media cross section. To help reduce taste and odor, the City has historically capped the media with a layer of granular activated carbon (GAC).

Filter No. 4 has historically had problems related to structural or foundation issues. These issues have manifested themselves in cracks in the concrete that propagate into the clay underdrains. The filter has consistently experienced short circuiting and turbidity break through as a result of the damaged under-drain system. Replacement underdrain tiles that match the existing tiles are not readily available today.

Other problems with the filters are related to level control difficulties. The overflow piping in the filters has a nearly constant stream of water flowing to the backwash lagoon. This condition has been improved through the installation of a VFD on the raw water intake which has allowed the flow of water to be "tuned" to reduce the overflow waste to a minimum. In addition, the filter feed piping does not provide even flow splitting to the four filters resulting in uneven filter loading.

Current loading rate on the filters under peak summer conditions is approximately 3.0 gpm/ft$^2$. Increasing the rate on the filters beyond 3 gpm/ft$^2$ is not recommended thus the filters are at maximum capacity.

The filters are backwashed two filters at a time using finished water from the clearwell. A single 50 HP vertical turbine pump is located in the lower level of the water plant. While the backwash pump has provided good service to the City for nearly 60 years, the location of the pump creates a situation where maintenance or repair of the pump would prove to be very difficult. Failure of the backwash pump would render the plant inoperable after the last filter run was exhausted and such failure has been a growing concern for the City for many years.

### 5.2.4 Disinfection

Chlorine is injected into the water to provide the required disinfection and free chlorine residual in the distribution system. A combination of pre-chlorination (before treatment) and post-chlorination (after filters) is necessary at the Newport plant to meet disinfection requirements since post-chlorination contact time is insufficient. Pre-chlorination has also been used to help oxidize iron and manganese. Per State and Federal Rules, water must be in contact with the disinfectant for a prescribed amount of time ("contact time") necessary to kill or inactivate microorganisms prior to consumption. In addition, the City must maintain a detectable free chlorine residual in the distribution system at all times.

The Newport facility was originally constructed to utilize gas chlorine for disinfection purposes. However, at some point, the gas chlorine equipment was removed in favor of using liquid sodium hypochlorite for disinfection. Two large plastic double containment tanks are located on the outside of the plant building. The tanks are utilized for storing 12-percent nominal liquid chlorine solution. By the time all of the chlorine is used, the strength of the solution has usually degraded significantly. In recent years, the internal tanks have begun to leak and hypochlorite is visible within the outer secondary containment tank.

Chlorine is fed into the raw and finished water supplies by using simple dosing pumps. Monitoring of chlorine residual is accomplished through online monitoring using a chlorine analyzer. In 2007, an average of 1925 gallons of hypochlorite per month was used. Each gallon of the 12%± hypochlorite used contains the equivalent of 1 pound of chlorine resulting in an average use of 63 ppd. With an average of 2.15 million gallons of water treated per day, the average chlorine dose calculates to a fairly typical 3.5 mg/L including both pre- and post-chlorination.

Following filtration, two separate filtrate lines drop into a clearwell under the building and no combined filtrate pipe exists. Sodium hypochlorite is injected directly into the clearwell since two separate feed pumps and injection points do not exist as would be required for the two separate filtrate lines. Poor mixing results from injection into the clearwell rather than into the filtrate piping. Space constraints make correction of the problem difficult.

Post-chlorination contact time is provided in the below-grade concrete clearwell basin and in the short section of plant discharge piping prior to the first water user. The clearwell is part of the original 1953 plant and measures 32 feet by 36 feet. Water depth in the clearwell is normally around 9 feet but ranges from 8 to 10 feet. There are no baffle walls in the clearwell which allows the water to short-circuit much of the clearwell and travel directly to the service pump suction, resulting in poor contact time efficiency. Past measurements showed a contact time of 15 minutes in the clearwell at 2800 gpm and a total contact time to the first user (nearby City Park) of 20 minutes. The complete lack of mixing makes the results of a single contact time test insufficient to establish a worst case and it is likely that contact time is much less than the tested result at times.

Even though the use of pre-chlorination is causing problems for the City with disinfection byproducts (DBPs), the lack of adequate post-chlorination contact time necessitates the continuance of the procedure. In 2005 several tests showed excessive TTHM and HAA5 (DBPs). In 2007, excessive TTHMs were measured in September however no actual MCL violations occurred. Improvements are needed to increase available contact time after filtration to avoid the necessity of pre-chlorinating just to obtain sufficient contact time.

### 5.2.5 Instrumentation and Controls

Operation of the existing water treatment facility is relatively manual in nature. Simple controls and analog instruments are still used to control the basic operation of the plant.

Water quality instrumentation is typical to water treatment plants anywhere. Raw and finished water turbidimeters monitor the turbidity of water passing through the treatment process.

pH is monitored by an online pH analyzer. This information is used to make manual adjustments to the lime feed system to adjust the pH of the water.

An online chlorine analyzer monitors the chlorine levels in the clearwell. The chlorine dosage rates are manually adjusted based on the feedback from the analyzer.

In general there is adequate basic instrumentation to operate the facility properly. However, no comprehensive SCADA (supervisory control and data acquisition) system is currently available to operations staff.

### 5.2.6 Finish Water Pumping

The finished water service pumps are located in the lower level of the water treatment plant. Different combinations of pumps are operated depending on the desired throughput of the water plant. The following finished water pumps are currently utilized in Newport:

200 HP Pump.........................................2,250 gpm at 275 feet TDH
75 HP Pump...........................................700 gpm at 275 feet TDH
250 HP Pump.........................................3,000 gpm at 275 feet TDH

The finished water pumps lift water out of the clearwell and into the system up to the main water tank pressure level at approximately 275 feet of elevation.

### 5.2.7 Treatment Performance

The water treatment plant in Newport is well operated and generally produces high quality water. Several operational and physical limitations do create challenges for staff as well as water quality problems related to taste, odor, and manganese which results in complaints from customers.

Generally, the water plant is fed with relatively high quality raw water with a low turbidity. The clarifiers, filters, and other system components are generally capable of meeting water quality standards and no recent treatment violations have occurred. TOC reduction over the last few years has ranged from 25% to 47% with an average TOC reduction of 36%. Occasional excessive TTHM and HAA5 levels have been measured in the distribution system but violations have not occurred. Finished water turbidity averages around 0.04 NTU.

The major limiting factors associated with the water treatment process are the age and condition of the equipment and the plant's inability to make sufficient water during peak demand seasons. With plant run times now approaching 24 hours per day to meet summer demands and no reserve capacity remaining, the plant can now be considered undersized and at the end of its useful life.

## 5.3 Treated Water Storage

Treated water reserves are critical for attenuating peak demands caused by high consumptive use (peak hours) as well as maintaining an adequate reserve for firefighting capabilities. A summary of the City's storage reserves as well as a brief description and evaluation of each tank is provided in this Section.

### 5.3.1 Storage Summary

The City currently owns and operates seven storage tanks including five steel tanks located throughout the system and two concrete tanks near the City Shops. The tanks are situated at various elevations and serve specific areas (pressure zones) within the system. A summary of each tank is provided below.

**Table 5.3.1 - Storage Summary**

| Name | Nominal Volume | Year Installed | Base Elevation | Overflow Elevation | Diameter (ft) | Height (ft) | Max. Working Volume (gal) | Service Elev. (40-80 psi) | Max. Serv. El. (25 psi static) |
|---|---|---|---|---|---|---|---|---|---|
| Main Tank #1 | 2.0 MG | 1972 | 241.0 | 275.0 | 100 | 34.75 | 1,968,187 | 90' to 183' | 217' |
| Main Tank #2 | 2.0 MG | 1978 | 241.0 | 275.0 | 100 | 34.75 | 1,968,187 | 90' to 183' | 217' |
| Smith Tank | 0.25 MG | 1958 | 271.5 | 302.5 | 38 | 31.5 | 258,755 | 118' to 210' | 245' |
| Yaquina Hts. Tank | 1.6 MG | 1993 | 360.25 | 410.0 | 75 | 51.5 | 1,627,610 | 225' to 318' | 352' |
| South Beach Tank | 1.3 MG | 1998 | 160.25 | 200.0 | 75 | 41.5 | 1,297,131 | 15' to 108' | 142' |
| City Shops Tanks | 1.1 MG | 1910 | | 219.0 | | | 1,100,000 | 34' to 127' | 161' |
| | | | | Total Maximum Existing Storage | | | 8,219,871 | | |

### 5.3.2 Main Storage Tanks

The Main Storage Tanks are located south and west of the water treatment plant site at a base elevation of around 241 feet. The tanks are constructed with "Core-ten" steel which is designed to remain unpainted and to form a protective rust layer. The tank interiors are coated with an epoxy paint system for sanitary reasons. The first 2 MG tank was constructed in 1972 and the second was constructed in 1978.

The overflow elevation for both tanks is approximately 275 feet. The tanks provide service pressure and storage volume for a large area of the water system. For the ideal municipal system pressure range of 40 to 80 psi, the Main Tanks can serve elevations between 90 and 183 feet above sea level. Connections to the pressure zone served by the Main Tanks located below 90 feet elevation should have individual pressure reducing valves on the service line while connections above 183 feet would likely need individual booster pumps. Connections above 215 feet should not be allowed since pressures below 20 psi would occur in the main piping. The reservoirs are generally in good condition today and appear to have significant useful life remaining.

### 5.3.3 City Shops Storage Reservoirs

The oldest reservoirs still being used in the Newport system are the City Shops tanks. The cast-in-place concrete tanks were originally constructed around 1910 as below grade, open air tanks. Eventually, wooden trusses and steel sided buildings were constructed over the open ponds.

The two tanks contain up to 1.1-million gallons of storage when full. The overflow elevation of the tanks is set at around 219 feet.

The existing tanks include interior walkways and planks that allow for inspection and maintenance in the tank. However, this increases the risk for potential contamination from debris falling from boots or other situations possible when people enter the tank interior above the unprotected water surface.

The Shop tanks serve the lower elevation areas on the north side of Yaquina Bay where service from the Main Tanks would provide excessive pressure.

For the ideal municipal system pressure range of 40 to 80 psi, the Shop Tanks can serve elevations between 34 and 127 feet above sea level. Connections to the pressure zone served by the Shop Tanks located below 34 feet should have individual pressure reducing valves on the service line while connections above 127 feet would likely need individual booster pumps or service off other pressure zones. Connections above 160 feet should not be allowed since pressures below 20 psi would occur in the main piping.

The 100-year old Shop tanks should eventually be replaced with a modern conventional tank providing better sealing against foreign objects (birds, insects, mice, etc.).

### 5.3.4 Smith Storage Tank

The Smith Storage Tank is a 0.25 MG welded steel tank constructed in 1958 near Yaquina Head as part of the old Agate Beach water system. The tank was acquired by the City along with the old water system and was cleaned and refurbished in the late 1990s. The tank serves nearby elevations too high for the Main Tank service zone and allows fire flows to the BLM site. The Smith Tank has an overflow elevation of 302 feet. The tank site is fenced however the secluded area results in trespassers and vandals. A 6-inch Cla-Val Model 210-16 Altitude Valve on the tank inlet functions to close when full to prevent overflow.

For the ideal municipal system pressure range of 40 to 80 psi, the Smith Tank can serve elevations between 118 and 210 feet above sea level. Connections to the pressure zone served by the Smith Tank located below 118 feet should have individual pressure reducing valves while connections above 210 feet would likely need booster pumps. Connections above 245 feet should not be allowed since pressures below 20 psi would occur in the main piping.

The Smith tank will likely need to be repainted around the year 2015 if left in service.

### 5.3.5 Yaquina Heights Storage Tank

The 1.6 MG Yaquina Heights Tank is a welded steel tank constructed in 1993 with a base elevation of 360 feet and an overflow elevation of 410 feet. The tank serves areas north of the bay and east of downtown which are too high for service off the main pressure zone.

For the ideal municipal system pressure range of 40 to 80 psi, the Yaquina Heights Tank can serve elevations between 225 and 318 feet above sea level. Connections above 350 feet should not be allowed since pressures below 20 psi would occur in the main piping which is prohibited. The Yaquina Heights booster pump station pulls water from the tank and serves the surrounding areas above 318 feet.

The tank is generally in good condition. The tank roof and handrails exhibit significant corrosion and will need refurbishment in the near future. Based on a typical coating life of 20 years, the tank will need to be repainted around the year 2013.

### 5.3.6 South Beach Storage Tank

The 1.3 MG South Beach Tank is a welded steel tank constructed in 1998 with a base elevation of 160 feet and an overflow elevation of 200 feet. The tank serves areas south of the bay.

For the ideal municipal system pressure range of 40 to 80 psi, the South Beach Tank can serve elevations between 15 and 108 feet above sea level. Connections above 140 feet should not be allowed since pressures below 20 psi would occur in the main piping.

The tank is in good condition but does need pressure washing. Based on a typical coating life of 20 years, the tank will need to be repainted before or around the year 2018.

## 5.4 Distribution Pumping Facilities

### 5.4.1 Candletree Pump Station

The Candletree Pump Station (PS) is located on NE 7th Street at an elevation of approximately 187 feet. The Candletree PS serves a large area essentially covering all of east Newport (east of John Moore Road) with a potential for many new homes. The PS was constructed around 1985 to serve the Candletree Park area as a booster pump station but now serves to pump water from the main pressure zone into the Yaquina Heights Storage Tank.

The PS contains two 40 Hp PACO pumps rated for 400 gpm each and one 20 Hp PACO pump rated for 200 gpm. All pumps are single-stage centrifugal type mounted vertically. Fire flows are not required from the pumps (as originally designed) since this protection is now provided by the Yaquina Heights Storage Tank.

On/off control of the pumps is based on water level in the Yaquina Heights Storage Tank determined with a submersible transducer. Suction pressure is 35 to 38 psi and the station discharge pressure is around 100 psi (Hydraulic Grade Line, HGL of 410 feet).

The Candletree PS is in fair condition but is inefficient and becoming antiquated. Refurbishment of the 20-year old PS should occur during the planning period. New pumping equipment can be placed inside the existing building however it will be necessary to maintain service during installation. It is likely that pumps matching the larger pumps in the newer Yaquina Heights BPS will adequately serve 20-year development of the Candletree PS service area.

### 5.4.2 NE 54th Street Booster Pump Station

The NE 54th St. Booster Pump Station (BPS) is located at the corner of NE 54th Street and NE Lucky Gap Street at an elevation of 165 feet. The station boosts pressure to nearby areas and also functions to fill the Smith Storage Tank (via PRV). The station contains one 20 Hp PACO pump rated for 200 gpm at 170 feet of total dynamic head (TDH) which runs continuously and two 40 Hp PACO pumps rated for 400 gpm at 170' TDH each that run as needed. All pumps are horizontal centrifugals.

Suction pressure ranges from 40 to 45 psi depending on pumping rate and water level in the Main Storage Tanks. Discharge pressure is currently about 115 psi (HGL = 430'). Discharge piping runs north and east of the pump station to serve higher areas while a separate pipe heads west and through a pressure reducing valve (6-inch Cla-Val 90G-01AB W/X101) set to fill the Smith Storage Tank without overflow (downstream setting of approximately 60 psi, HGL = 302'). Pumps are controlled with a flow switch with multiple pumps turning on based on increased demand flow. The smaller 20 Hp pump runs continuously.

The NE 54th St. BPS must provide fire flows to the surrounding service area since no storage tank exists. All three pumps must run simultaneously to provide even marginal fire flows. The majority of homes served by the BPS on the east side of Highway 101 lie in elevations ranging from 170 to 260 feet with a few homes located as low as 150 feet in elevation along the south side of NE 54th Street. To provide a pressure of 44 psi at the high elevations of 260 feet on the east side of the highway, discharge pressure at the pump station could be reduced to 85 psi (HGL = 360').

The NE 54th St. BPS is in good mechanical condition however the constant running of the smaller pump near its shutoff head is inefficient and the discharge pressure of 115 psi is excessive. If the Agate Beach upper storage tank is constructed the BPS can be simplified and converted to an on/off pump station functioning to fill the tank only. The addition of VFD drives and a hydro-pneumatic tank would improve station efficiency in the meantime.

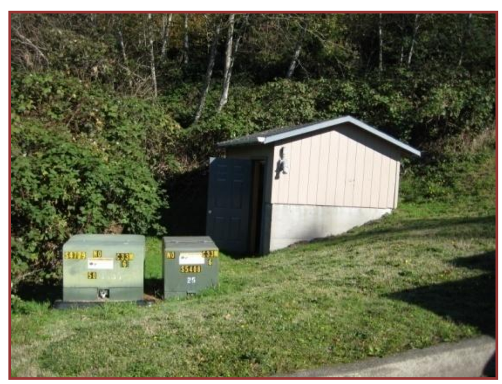
### 5.4.3 Yaquina Heights Booster Pump Station

The Yaquina Heights BPS is located on the Yaquina Heights Tank site at an elevation of 360 feet. The BPS pulls water from the tank inlet/outlet pipe and boosts pressure to serve surrounding areas too high for gravity service from the tank. Discharge pressure is 65 psi (HGL = 510'). Suction pressure can range from 15 to 21 psi depending on pumping rate and water level in the Yaquina Heights Tank. Ground elevations in the current service area range from 285 to 360 feet.

The station equipment is a Grundfos Booster PAQ with on/off control based on pressure in a hydro-pneumatic tank located inside the building. Power supply is 460 volt, 3 phase. Four Grundfos vertical multi-stage centrifugal pumps are utilized including two 25Hp CR90-2-2 rated for 440 gpm at 155' TDH, and two 7.5Hp CRE 16-40 rated for 75 gpm at 230' TDH at full speed. Variable speed drives are used to provide lower flows for typical daily demands.

The station was constructed in 2004 and should need no improvements within the planning period. Painting of the interior ductile iron fittings and the addition of a vertical downflow-flowmeter should be considered.

### 5.4.4 Lakewood Booster Pump Station



The Lakewood BPS is located on NE Lakewood Drive at an elevation of 130 feet. The station pumps water from the main pressure zone and boosts pressure for the surrounding small neighborhood. The station contains two 10 Hp Cornell close coupled centrifugal pumps that were relocated from an older pump station. An associated pressure tank is located at the top of Lakewood Drive at a ground elevation of around 285 feet. The pumps turn off and on based on pressure switch settings. Discharge pressure at the pump station is approximately 135 psi (HGL = 440') providing a pressure of 65 psi at the pressure tank at the top of the hill.

The Lakewood BPS contains pumps which likely are at the end of their expected service life and which are too small to provide fire protection in the service area. The Lakewood BPS should be replaced as soon as possible during the planning period with equipment designed to provide normal service to 50 lots and to provide fire flows. Discharge pressure should be reduced.

### 5.4.5 Salmon Run Booster Pump Station

The Salmon Run BPS is located south of NE 71st Street at an elevation of 165 feet. The BPS pulls water from the main pressure zone and boosts for nearby higher elevations. The station contains one 15 Hp PACO pump rated for 180 gpm at 159' TDH and two 25 Hp PACO pumps rated for 420 gpm at 159' TDH each. All pumps are horizontal centrifugal type. On/Off control is based on pressure in a hydro-pneumatic tank located inside the building.

Suction pressures range from 40 to 47 psi depending on pumping rate and water level in the Main Storage Tanks. Discharge pressure of 80 psi in the pressure tank (HGL = 350') provides a pressure of about 52 psi at the top of the service area (elev. 230' ±). The service area is relatively small and is unlikely to increase in size unless service outside the UGB is provided in the future.

Fire flows must be provided by the BPS since no storage exists. With all three pumps running simultaneously approximately 1000 gpm is expected.

The Salmon Run BPS is in good condition and no major improvements should be needed during the planning period.

### 5.4.6 OCCC Booster Pump Station

During the preparation of this Master Plan, 12-inch waterline extensions and a booster pump station were being constructed to serve South Beach Village and the planned central county campus for the Oregon Coast Community College. The pump station, hereinafter called the OCCC BPS, is located off Southeast 40th Street at a ground elevation of approximately 45 feet. The pump station will serve elevations above the 105 foot elevation limit imposed by the existing South Beach Tank water surface at 200 feet. If the discharge pressure at the station is 100 psi, the service area can extend to elevation 185 feet for 40 psi. Suction pressure is expected to be around 65 psi.

## 5.5 Distribution Piping System

### 5.5.1 Pipe Inventory

Newport's distribution system contains a mixture of ductile iron, PVC, asbestos cement, polyethylene, and galvanized pipe totaling over 90 miles. Approximately one-third of the system is 6-inch diameter pipe used primarily for grid loops and installed long ago. A 10-inch main constructed in 1985 runs approximately 4.5 miles north-south along Highway 101. The largest piping is the 16-inch main which runs from the treatment plant to the two main storage tanks, then to the pressure reducing valve station at the corner of N.E. 3rd and N.E. Harney Street, and continues a few hundred feet south. In 1973, the 12-inch bay crossing pipe was constructed to provide service to the South Beach area. Over the years numerous extensions to the 12-inch piping have been constructed to improve flow distribution and fire flow to specified areas in accordance with recommendations in the past Water Master Plan.

The following table provides an inventory of the lengths of various sizes of waterlines within Newport's present distribution system.

**Table 5.5.1 – Pipe Inventory, Existing Distribution System**

| Diameter (inches) | Length (feet) | % Total |
|---|---|---|
| 2 | 35,000 | 7.4% |
| 3 | 800 | 0.2% |
| 4 | 27,500 | 5.8% |
| 6 | 154,000 | 32.4% |
| 8 | 130,200 | 27.4% |
| 10 | 23,900 | 5.0% |
| 12 | 85,600 | 18.0% |
| 14 | 3,300 | 0.7% |
| 16 | 15,600 | 3.3% |
| Total | 475,900 | feet |
| | 90.1 | miles |

Historically, portions of the City south of Southeast 35th Street were served by the Seal Rock Water District. Recently the City took over service to areas previously served by the District, including Idaho Point and the area south of the bay down to Southwest 68th Street. Areas inside the City south of Southwest 68th Street, including the airport, are still served by the Seal Rock Water District.

A Map of the existing water system is included at the end of this Section as Figure 5.5.1.

### 5.5.2 Pressure Zones

The Newport service area is separated into 9 pressure zones as necessitated by terrain. The main pressure zone (Main Zone), served by gravity from the Main Storage Tanks with a maximum water service elevation of 275 feet, covers the majority of the town north of the bay extending to the northern City Limits. A pressure reducing station located at NE Harney and 3rd reduces pressure from the main zone to create a hydraulic grade of 219 feet to match the City Shops Tanks level and provide reasonable pressures along the north side of Yaquina Bay (North Bayside Zone). A 12-inch pipe crosses under the bay from the North Bayside Zone and another pressure reducing station, located on SE OSU Drive just south of the bay crossing, reduces pressure again to create a hydraulic grade of 200 feet to match the South Beach Tank water level (South Beach Zone).

In addition to the three large pressure zones served by gravity (once water is pumped from the plant to the Main Tanks), various other zones exist to serve higher elevation areas. The largest of these is that served by pumping water from the Main Zone through the Candletree pump station to the Yaquina Heights Storage Tank with a water surface elevation of 410 feet (Yaquina Heights Zone). A smaller area near the Yaquina Heights Tank, too high for gravity service from the tank, is served through the Yaquina Heights booster pump station (Yaquina Booster Zone). The following table presents the various pressure zones along with the associated hydraulic grade and recommended service elevations.

**Table 5.5.2 – Pressure Zone Summary**

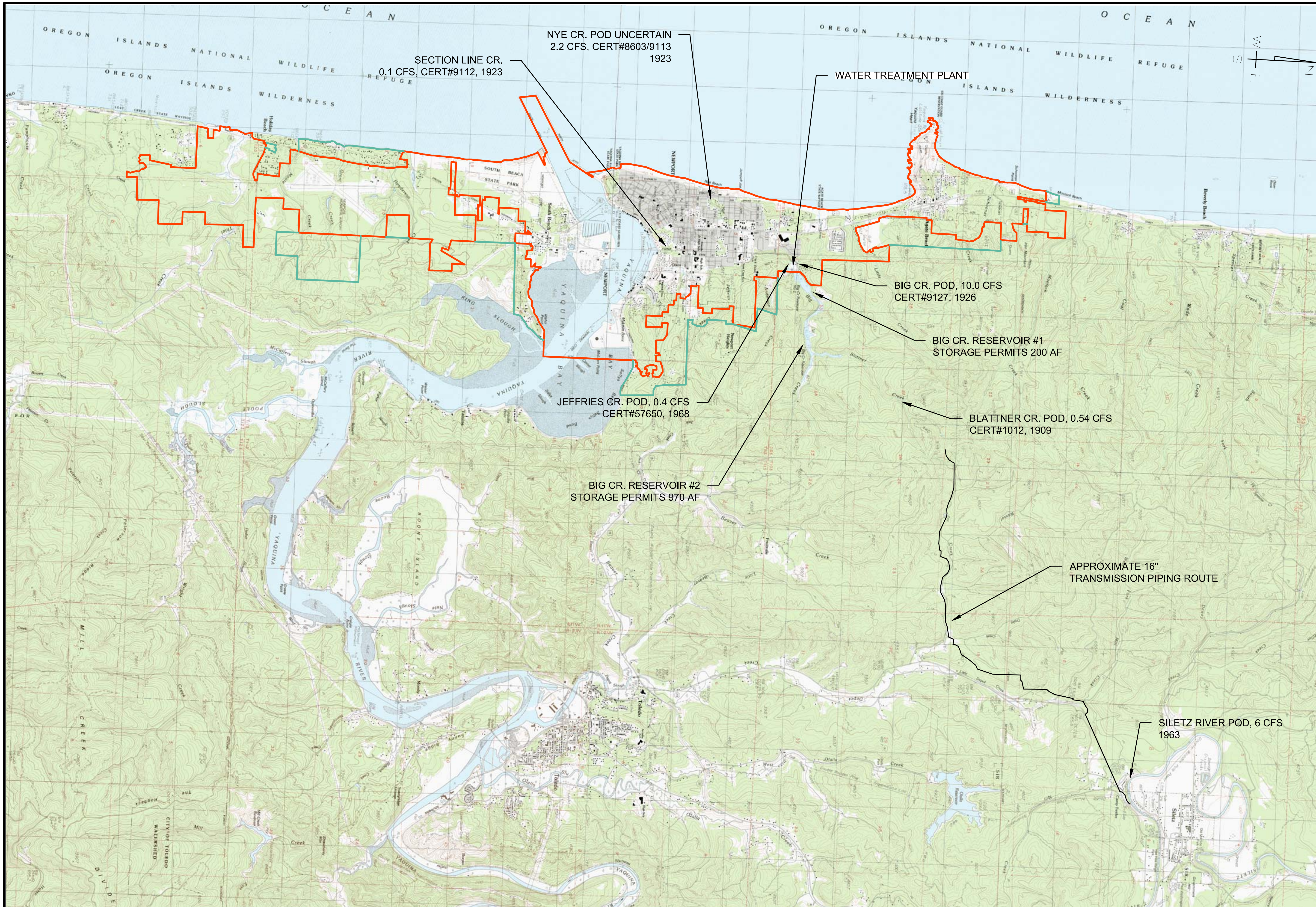
| Pressure Zone | Hydraulic Grade Control | Hydraulic Grade | Maximum Service Elevation (~25 psi static) | Ideal Service Elevation (80 to 40 psi) |
|---|---|---|---|---|
| Main Zone | Main Storage Tanks | 275 feet | 215 feet | 90 to 180 feet |
| North Bayside Zone | PRV, NE Harvey and 3rd | 219 feet | 160 feet | 35 to 125 feet |
| | City Shops Tanks | | | |
| South Beach Zone | PRV, SE OSU Drive | 200 feet | 140 feet | 15 to 105 feet |
| | South Beach Tank | | | |
| Yaquina Hts. Zone | Yaquina Hts. Tank | 410 feet | 350 feet | 225 to 315 feet |
| Yaquina Booster Zone | Yaquina Hts. BPS | 510 feet (65 psi) | 450 feet | 325 to 415 feet |
| Upper Agate Beach Zone | NE 54th BPS | 430 feet (115 psi) | 370 feet | 245 to 340 feet |
| Salmon Run Zone | Salmon Run BPS | 350 feet (80 psi) | 290 feet | 165 to 260 feet |
| OCCC Zone | OCCC BPS | | | |
| Lakewood Zone | Lakewood BPS | 360 feet (100 psi) | 300 feet | 175 to 265 feet |
| Smith Tank Zone | Smith Tank | 302.5 feet | 245 feet | 115 to 210 feet |

### 5.5.3 Fire Protection

The 2007 Oregon Fire Code requires average hydrant spacing of no more than 500 feet when fire flow requirements are 1750-gpm or less, and no more than 250 feet from hydrant to any point on street frontage (Appendix C "Fire Hydrant Locations and Distribution"). Closer spacing is required for greater flows and specific situations such as dead-end streets.

The Newport distribution system contains approximately 520 fire hydrants with fairly uniform coverage. Isolated small areas around the system lack ideal hydrant coverage, however in general the system is well covered. Figures 5.5-2a through 5.5-2c show the locations of existing fire hydrants with a 250-foot radius circle shown to indicate hose reach. Areas outside these circles cannot be reached without utilizing more than 250 feet of fire hose and indicate greater than 500 foot hydrant spacing.

Significant fire flow deficiencies exist in the north end of town due to undersized piping and significant distance from storage tanks. Results of computer hydraulic modeling and associated improvements needed to remedy fire protection problems are presented in Section 7.




Civil West Engineering Services, Inc.

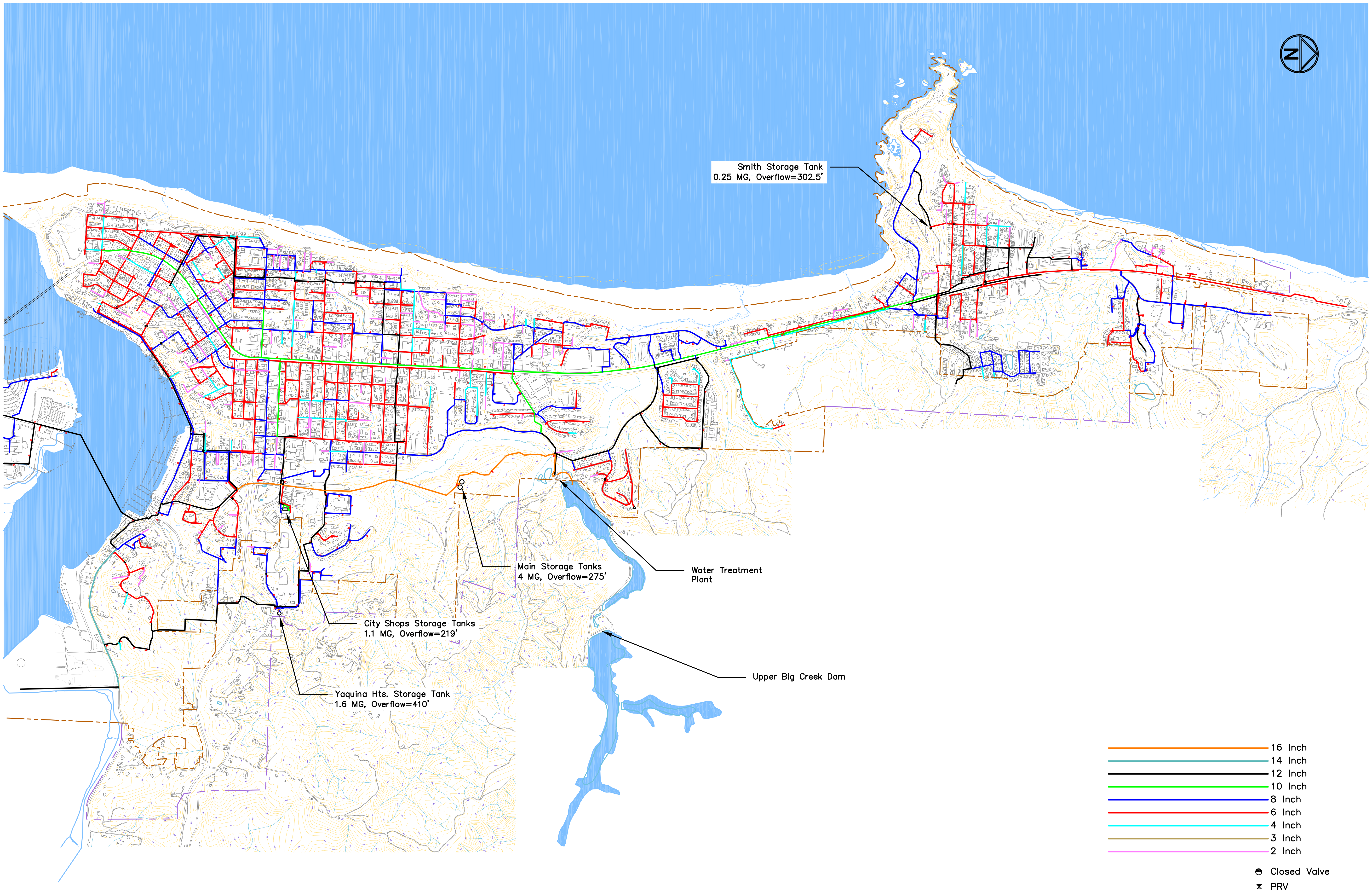
City of Newport
Lincoln County, Oregon

Water Rights Locations
USGS Topographical Base

0 1" = 1 MILE 1"

DRAWN BY: REB
DATE: OCT. 9, 2008

FIG.
5.1.1




Civil West Engineering Services, Inc.

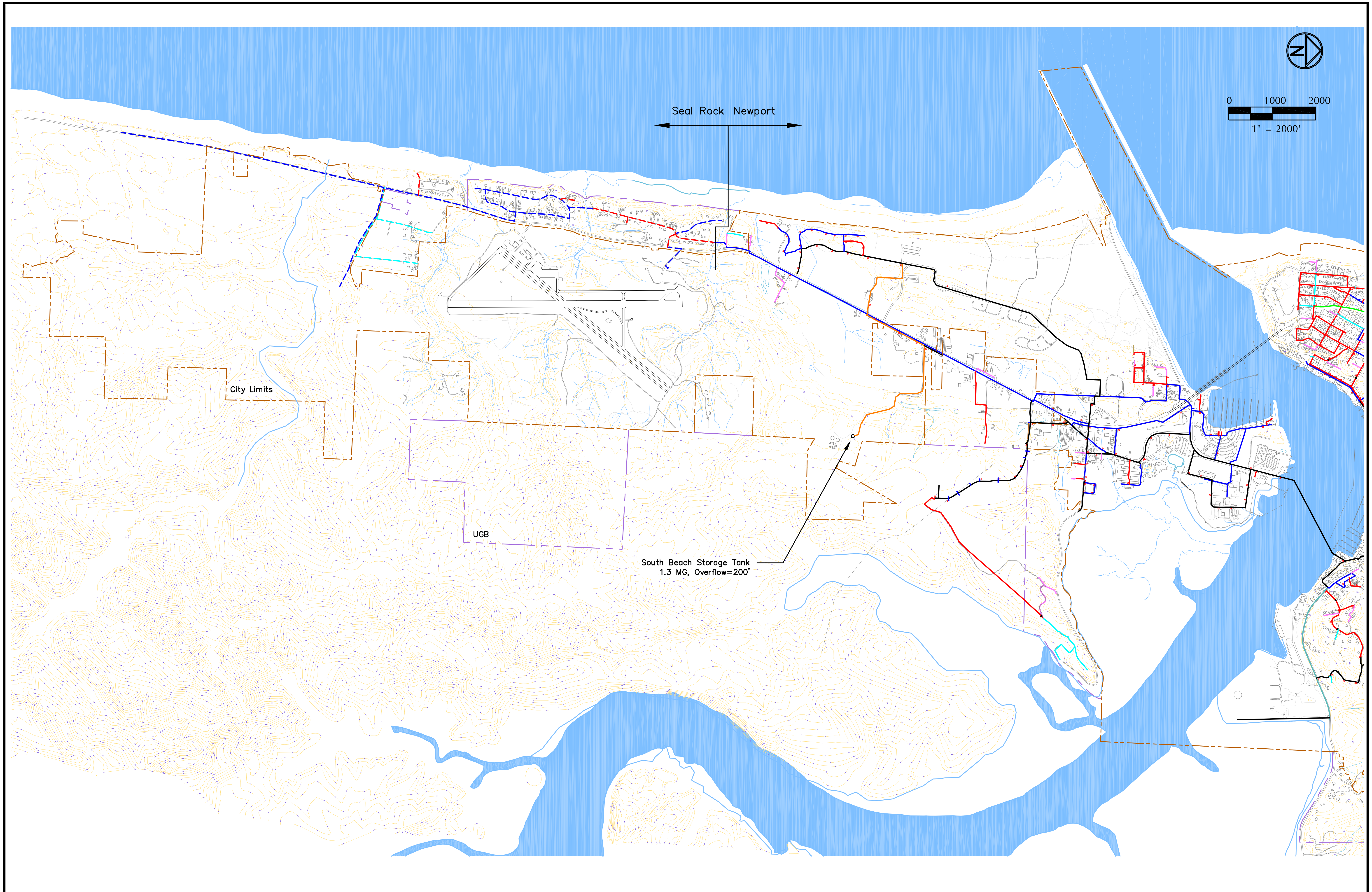
City of Newport
Lincoln County, Oregon

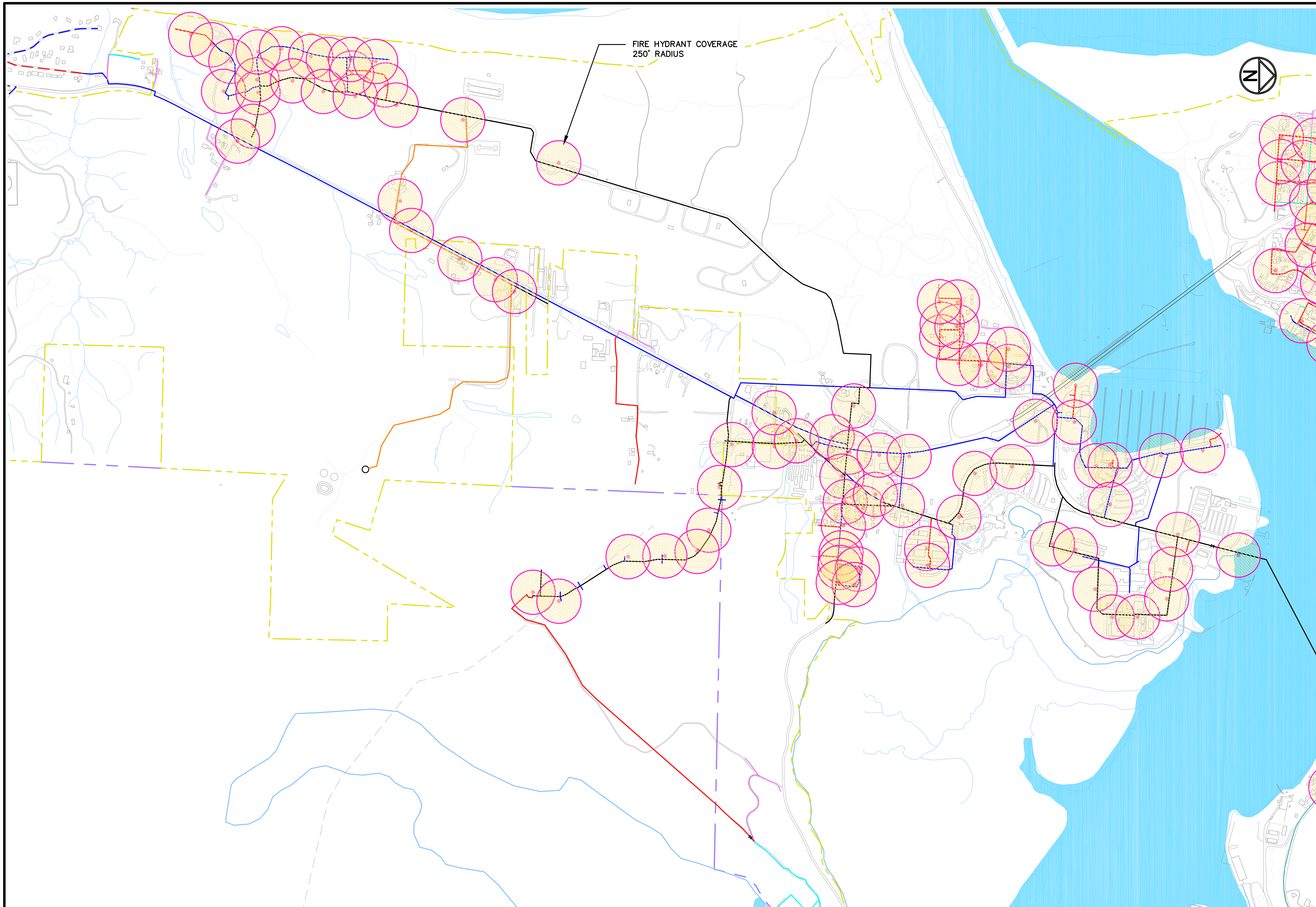
City Map
Existing Water System

1" = 2000'

DRAWN BY: REB
DATE: OCT. 9, 2008

FIG.
5.5-1


Seal Rock Newport
0 1000 2000
1" = 2000'
City Limits
UGB
South Beach Storage Tank
1.3 MG, Overflow=200'




Civil West Engineering Services, Inc.

City of Newport
Lincoln County, Oregon

Fire Hydrant Coverage
Existing Water System

0
1"
1" = 1000'

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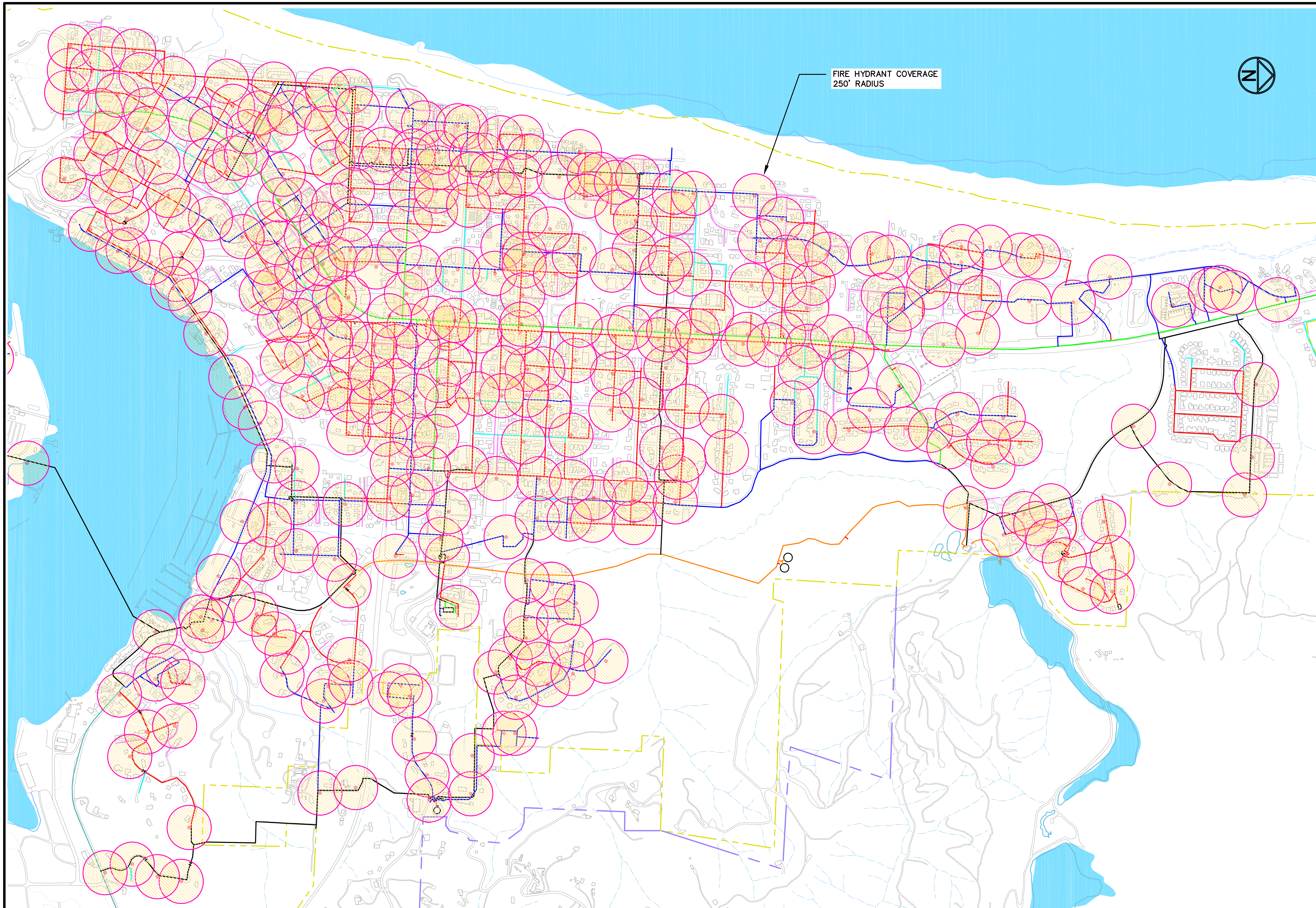
DATE: Oct. 14, 2008

FIG.
5.5-2a




CIVIL WEST
Engineering Services, Inc.

CITY OF NEWPORT
LINCOLN COUNTY, OREGON

FIRE HYDRANT COVERAGE
EXISTING WATER SYSTEM

0
1"
1" = 1000'

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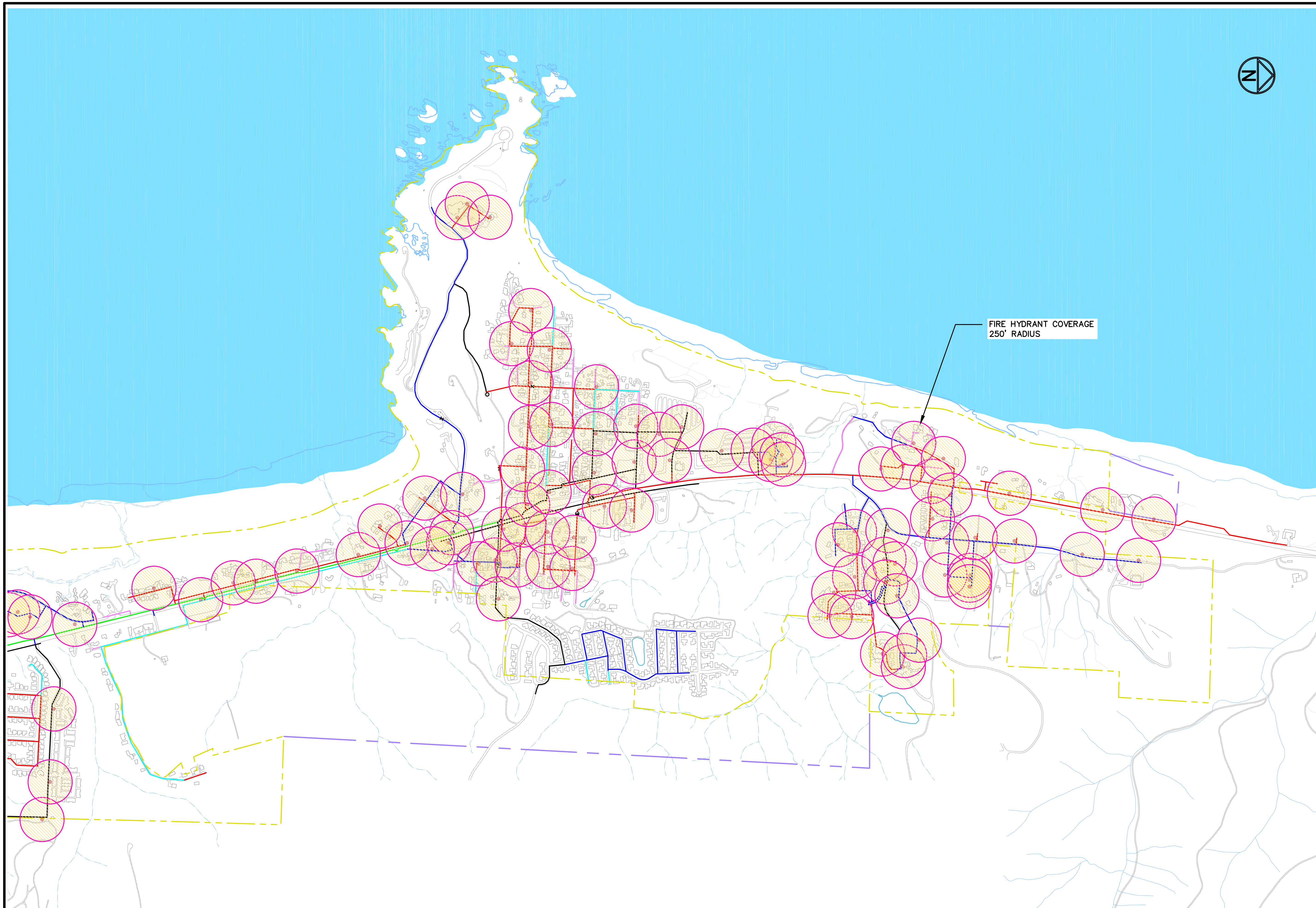
DATE: OCT. 14, 2008

FIG.
5.5-2b




CIVIL WEST
Engineering Services, Inc.

CITY OF NEWPORT
LINCOLN COUNTY, OREGON

FIRE HYDRANT COVERAGE
EXISTING WATER SYSTEM

0 1"
1" = 1000'

DRAWN BY: REB
DATE: OCT. 14, 2008

FIG.
5.5-2c

# Water Demand Analysis

Section 6

## 6.1 Existing Water Use

### 6.1.1 Definitions

System water demand is the quantity of water that the treatment plant must produce in order to meet all water needs in the community. Water demand includes water delivered to the system to meet the needs of consumers, water supply for fire fighting and system flushing, and water required to properly operate the treatment facilities. Additionally, virtually all systems have a certain amount of leakage that cannot be economically removed and thus total demand typically includes some leakage. The difference between the amount of water sold and the amount delivered to the system is referred to as unaccounted water. Unaccounted water can result from system flushing, leakage, fire fighting, meter inaccuracies, and other non-metered usage. Water demand varies seasonally with the lowest usage in winter months and the highest usage during summer months. Variations in demand also occur with respect to time of day. Diurnal peaks typically occur during the morning and early evening periods, while the lowest usage occurs during nighttime hours.

The objective of this section is to determine the current water demand characteristics and to project future demand requirements that will establish system component adequacy and sizing needs. Water demand is described in the following terms:

*Average Annual Demand (AAD)* - The total volume of water delivered to the system in a full year expressed in gallons. When demand fluctuates up and down over several years, an average is used.

*Average Daily Demand (ADD)* - The total volume of water delivered to the system over a year divided by 365 days. The average use in a single day expressed in gallons per day.

*Maximum Month Demand (MMD)* - The gallons per day average during the month with the highest water demand. The highest monthly usage typically occurs during a summer month.

*Peak Weekly Demand (PWD)* - The greatest 7-day average demand that occurs in a year expressed in gallons per day.

*Maximum Day Demand (MDD)* - The largest volume of water delivered to the system in a single day expressed in gallons per day. The water supply, treatment plant and transmission lines should be designed to handle the maximum day demand.

*Peak Hourly Demand (PHD)* - The maximum volume of water delivered to the system in a single hour expressed in gallons per day. Distribution systems should be designed to adequately handle the peak hourly demand or maximum day demand plus fire flows, whichever is greater. During peak hourly flows, storage reservoirs supply the demand in excess of the maximum day demand.

Demands described above, expressed in gallons per day (gpd), can be divided by the population or Equivalent Dwelling Units (EDUs) served to come up with a demand per person or per capita which is expressed in gallons per capita per day (gpcd), or demand per EDU (gpd/EDU). These unit demands can be multiplied by future population or EDU projections to estimate future water demands for planning purposes.

### 6.1.2 Existing Water Demand

Existing water demand in Newport has been determined from daily plant operational records from 2004 through 2007. At the Newport water treatment plant, water demand records include quantities of water pumped into the distribution system plus water used for plant operations; primarily filter backwashing. On average 95% of the water treated is sent into the distribution system while 5% is used for plant operation. Daily water production (water pumped to system plus backwash water) for the period of record is shown below.

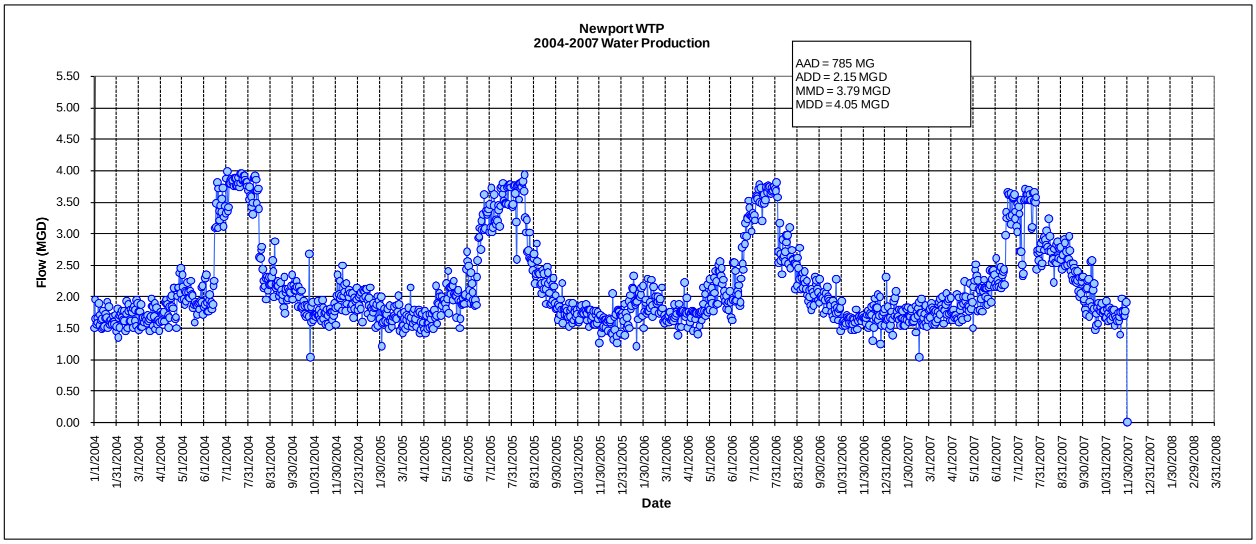



**Figure 6.1.2-1 – Daily Water Production, 2004-2007**

Total annual demand has ranged from 776 to 795 million gallons with an average (AAD) of 785 million gallons. Peaks occur in the summer (June, July, August) as is typical for most communities. Maximum month flows ranged from 100 to 117 million gallons per month, always in July, resulting in a MMD range of 3.2 to 3.9 mgd. The average daily demand (ADD) for the period is 2.15 mgd. The measured maximum day demands ranged from 3.7 to 4.0 mgd however these peaks are not representative of the true MDD as discussed below.

For the last several years the water treatment plant has operated at full capacity during peak summer demand periods but sometimes is unable to produce enough water to keep up with use in the system. During these times the plant runs virtually 24 hours per day while water levels in the distribution system storage tanks continue to drop. The plant should be able to meet maximum daily needs while keeping system storage full with only peak hourly demands or fire demands causing the storage levels to drop temporarily. This situation prevents the true maximum daily demand (MDD) from being measured. As can be seen in the graphical representations of plant data in Figures 6.1.2-1 through 6.1.2-6, summer peaks of the annual demand curves are truncated where plant capacity is reached near 24 hour run times.

To determine actual MDD flows storage tank levels were evaluated during peak days to measure volume demanded by the system in excess of plant output. On the peak days measured in 2004 and 2006, storage levels dropped by 61,100 gallons and 235,000 gallons respectively. Plant output was sufficient to maintain tank levels in 2005 and 2007. These storage tank volume reductions are added to the measured plant output to estimate the actual current MDD at 4.1 mgd.

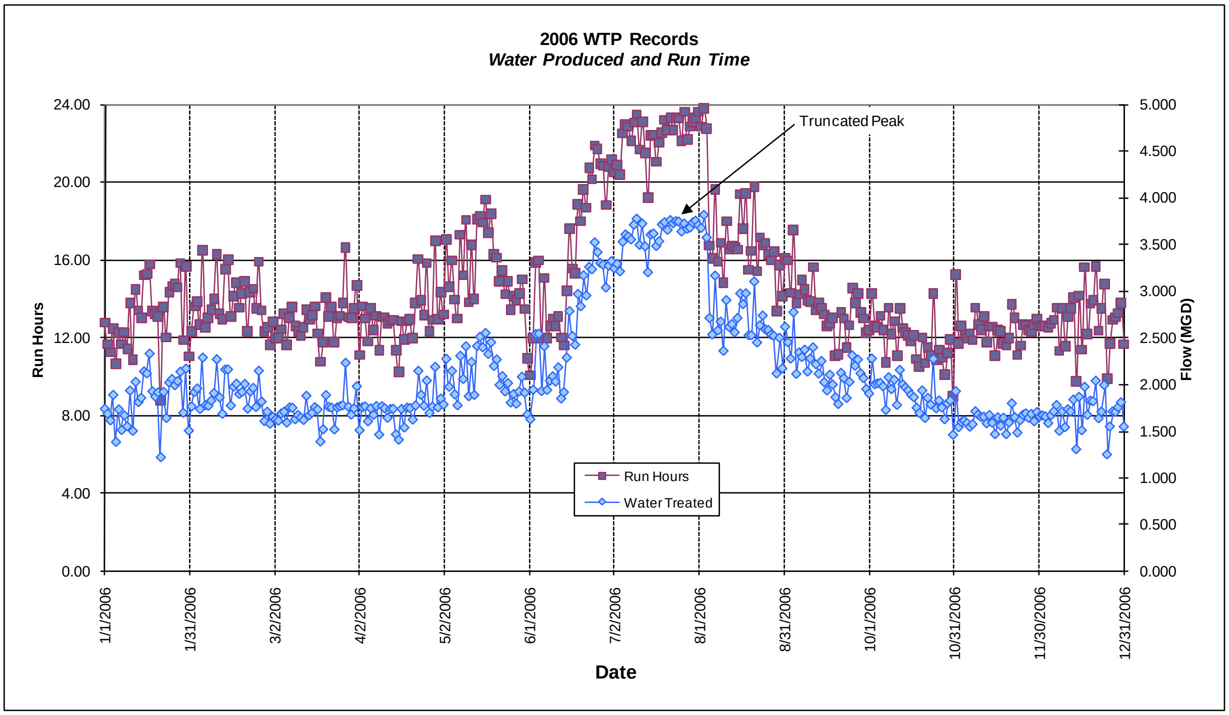



**Figure 6.1.2-2 – Plant Run Hours and Daily Production, 2006**

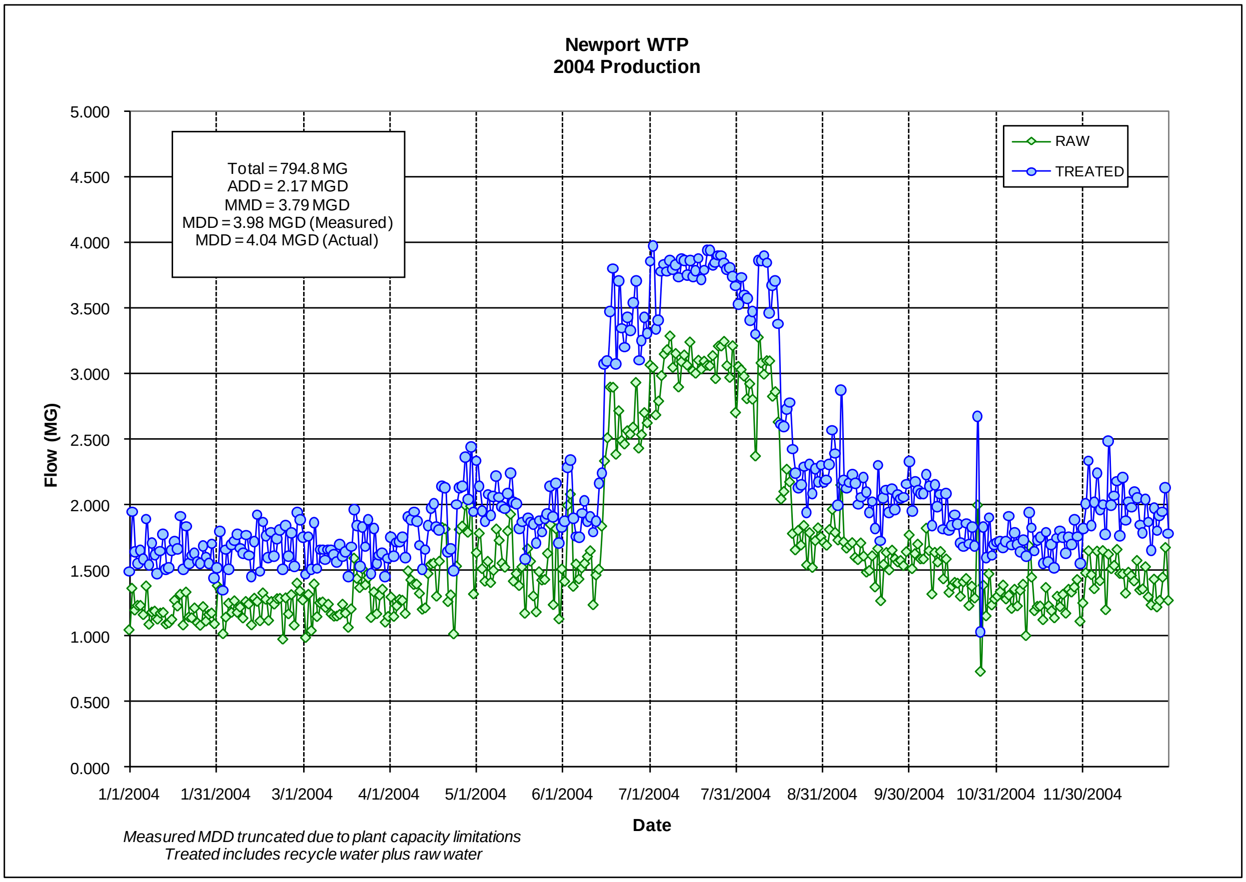



**Figure 6.1.2-3 – 2004 WTP Production**

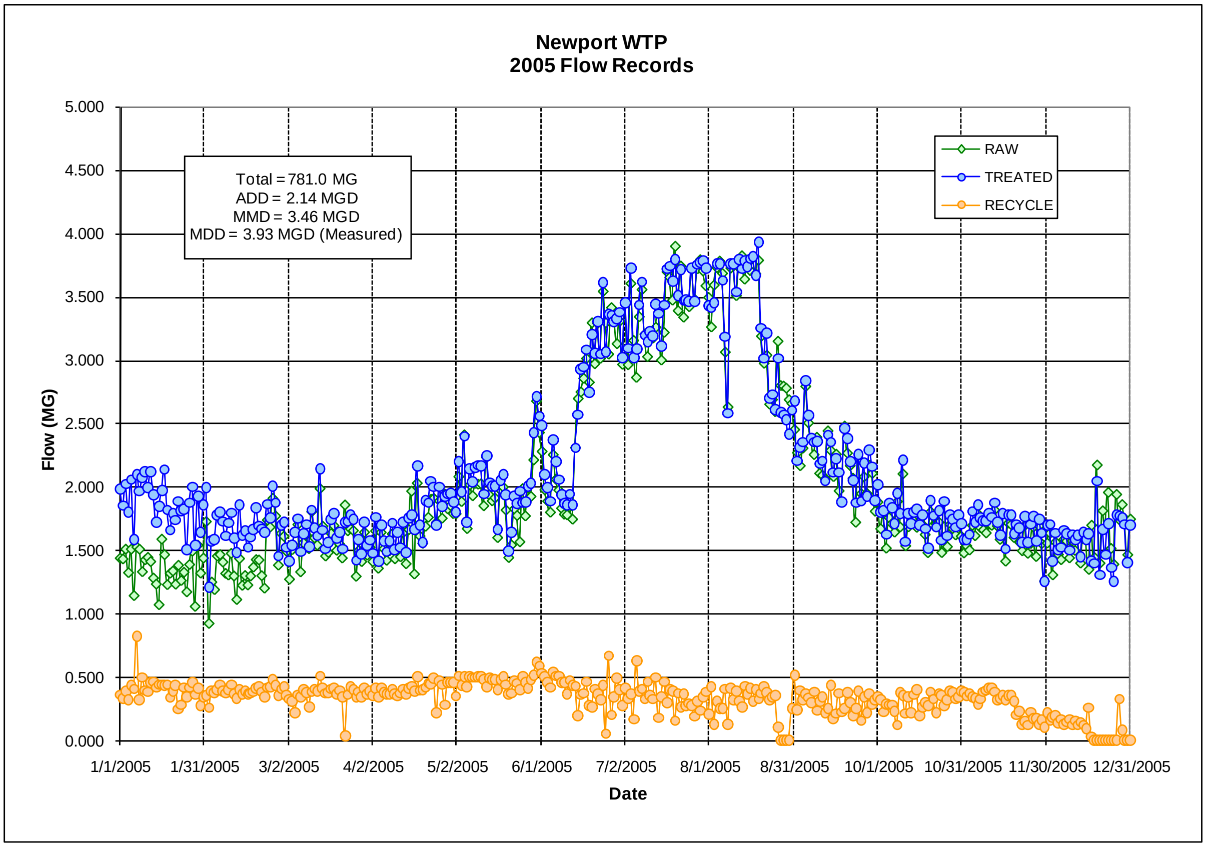
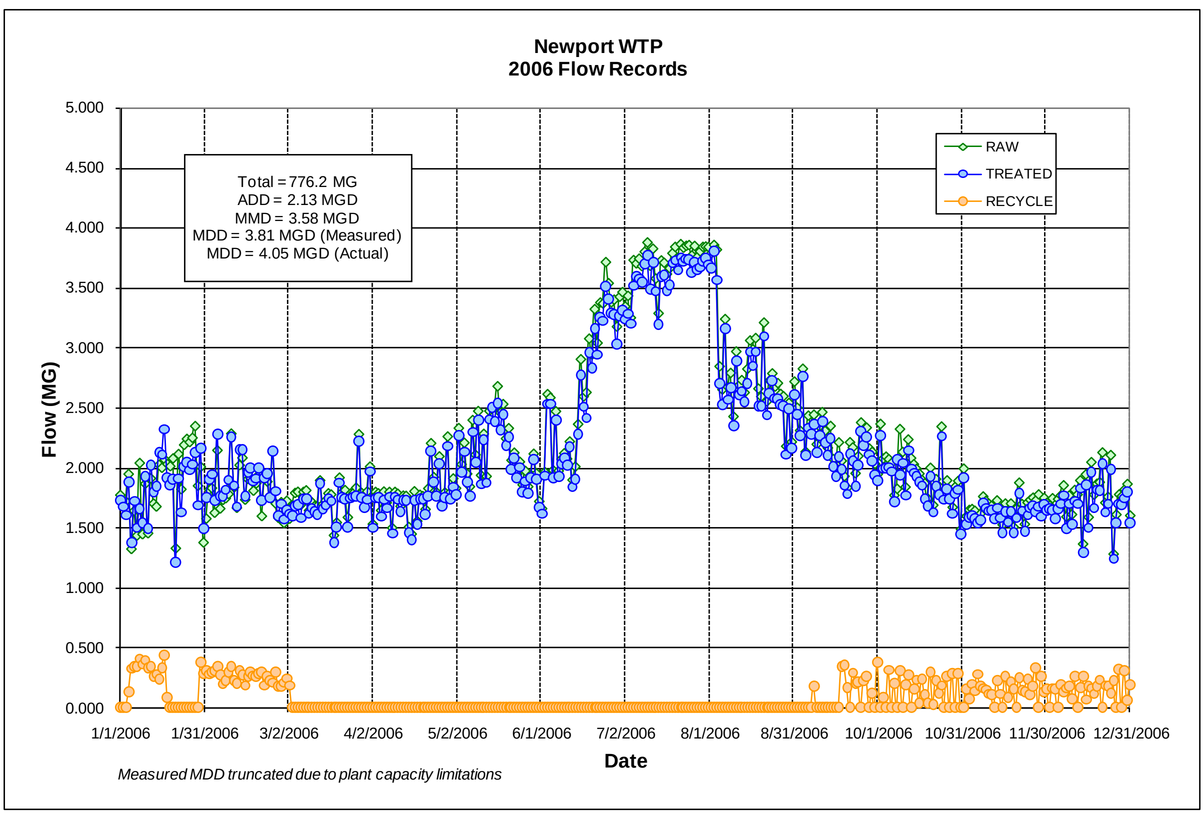
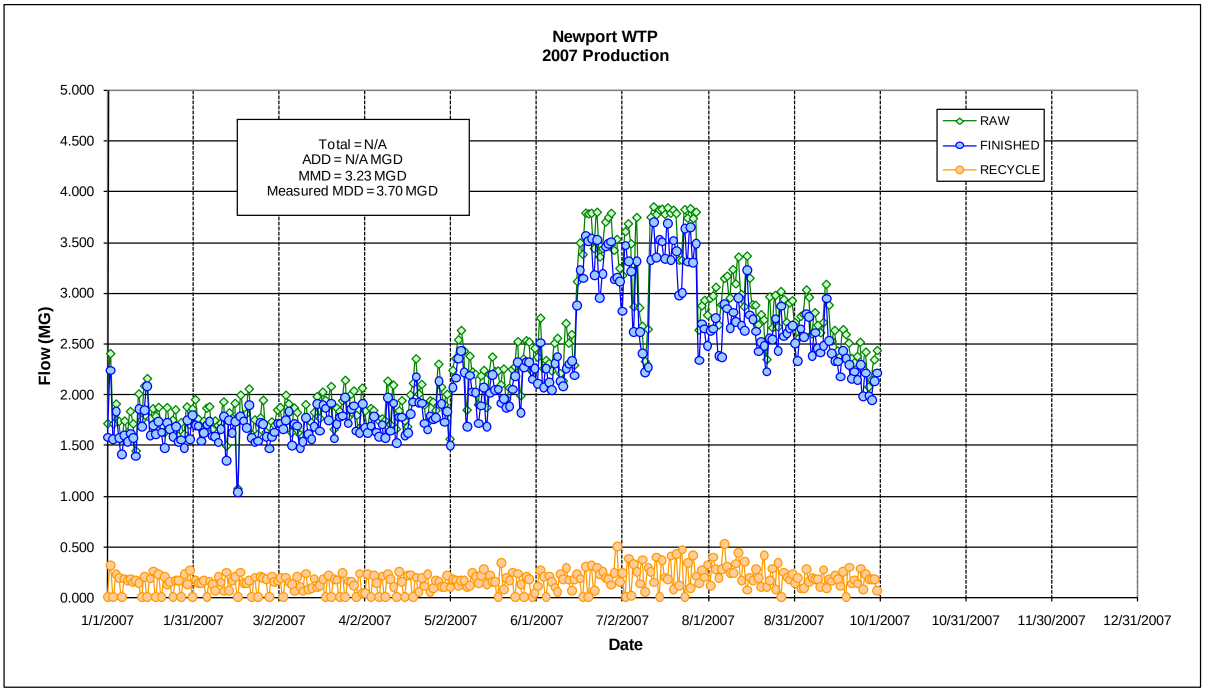



**Figure 6.1.2-4 – 2005 WTP Production**



### Figure 6.1.2-5 – 2006 WTP Production




### Figure 6.1.2-6 – 2007 WTP Production

Water system design literature suggests typical MDD/ADD peaking factors ranging from 1.5 to 3.0 and PHD/ADD peaking factors ranging from 2.5 to 5.0. For most communities in Oregon the MDD is 2.0 to 3.0 times the ADD and a value of 2.5 is commonly used when measured data is not available. An analysis of several Oregon communities with data readily available shows MDD peaking factors ranging from 2.03 to 3.2 with an average of 2.37.

### Table 6.1.2-1 – Oregon Community Peaking Factors

| Municipality | Year | MMD/ADD P.F. | MDD/ADD P.F. |
|---|---|---|---|
| Oregon City | 2004 | 1.6 | 2.1 |
| Tri-City | 2006 | 1.55 | 2.56 |
| Neskowin | 2006 | 1.72 | 2.56 |
| Adair Village | 2001 | 1.55 | 3.2 |
| Sherwood | 2003 | n/a | 2.19 |
| Sutherlin | 2005 | 1.62 | 2.03 |
| Ashland | 2002 | n/a | 2.25 |
| Bend | 2007 | | 2.38 |
| Salem | 1994 | | 2.07 |
| Average | | 1.61 | 2.37 |

For the City of Newport a MDD/ADD peaking factor of 1.86 to 1.90 results from the measured data. MMD/ADD peaking factors ranged from 1.68 to 1.74. A peaking factor of 4.0 is assumed for peak hour flow estimates.

**Table 6.1.2-2 – Current Water Demand Values**

| Year | AAD (MG) | ADD (MGD) | MMD (MG) | MMD (MGD) | P.F. MMD/ADD | MDD (MGD) | P.F. MDD/ADD |
|---|---|---|---|---|---|---|---|
| 2004 | 794.8 | 2.17 | 117.46 | 3.79 | 1.74 | 4.04 | 1.86 |
| 2005 | 781.0 | 2.14 | 107.24 | 3.46 | 1.62 | 3.93 | 1.84 |
| 2006 | 776.2 | 2.13 | 111.01 | 3.58 | 1.68 | 4.05 | 1.90 |
| 2007 | | | 100.15 | 3.23 | | 3.70 | |
| *Average* | *784.0* | *2.15* | *109.0* | *3.51* | *1.68* | *3.93* | *1.87* |

| Current Design Values | | | | |
|---|---|---|---|---|
| AAD | 785 MG | Million gallons per year | | |
| MMD | 112 MG | Million gallons per month | | |
| ADD | 2.15 | MGD | 1493 | gpm |
| MMD | 3.80 | MGD | 2639 | gpm |
| MDD | 4.10 | MGD | 2847 | gpm |
| PHD | 8.60 | MGD | 5972 | gpm |
| MMD P.F. | 1.77 | | | |
| MDD P.F. | 1.91 | | | |
| PHD P.F. | 4.00 | | | |

| Year | PSU Est. Population | ADD (gpcd) | MMD (gpcd) | MDD (gpcd) | PHD (gpcd) |
|---|---|---|---|---|---|
| 2004 | 9,760 | 222 | 388 | 414 | 890 |
| 2005 | 9,925 | 216 | 349 | 396 | 862 |
| 2006 | 10,240 | 208 | 350 | 396 | 831 |
| 2007 | 10,455 | 206 | 363 | 392 | 823 |

Per capita water use for Oregon is documented by the U.S. Department of the Interior in the 2000 U.S. Geological Survey - Circular 1268. According to the study, the average per capita water use for Oregon is 207 gallons per capita day (gpcd) including domestic, commercial, industrial, public use and loss. Of the total 207 gpcd, 63% is residential, commercial and public use/loss; 34% is industrial; and 3% is related to thermoelectric power generation. Note that the ADD values in 2006 and 2007 for Newport are almost identical to the State average as documented in the USGS Survey.

For comparison, the unit water demand values determined for Newport in the 1988 Water Master Plan based on the 1973-1987 average were: ADD = 210 gpcd, MMD = 282 gpcd, MDD = 460 gpcd, and PHD = 770 gpcd.

### 6.1.3 Existing Water Sales

Water consumption data for this Plan is based on the city's water sales records for years 2004, 2005 and 2006. For this period total annual sales ranged from 599 to 640 million gallons with a 3-year average of 622 million gallons. Approximately 53% of water is sold to residential users (apartments, residential, single-family residential, and multi-family account types). The second largest consumption sector is the fish processing plants with an average of just under 12% of total volume sold.

The total number of water accounts climbed from 3893 in January 2004 to 4188 in December 2006. Records show that the total number of accounts has risen to 4256 by June 2007. For the 2004-2006 data the overall consumption per account ranged from 8,480 to 22,540 gallons per month with an average of 12,960 gallons per month per account. Maximum use per account occurs in August or September.

### Table 6.1.3-1 – Water Sales Summary

| | Annual Water Sales (gallons) | | | | |
|---|---|---|---|---|---|
| **Customer Type** | **2004** | **2005** | **2006** | **Average** | **% of Total** |
| Airport | 131,000 | 135,000 | 116,000 | 127,333 | 0.02% |
| COCAS | 13,000 | 14,000 | 20,000 | 15,667 | 0.00% |
| Commercial | 22,874,000 | 24,340,000 | 24,271,000 | 23,828,333 | 3.83% |
| Retail & Service | 44,342,000 | 43,018,000 | 42,084,000 | 43,148,000 | 6.94% |
| Motels | 48,327,000 | 46,409,000 | 42,471,000 | 45,735,667 | 7.35% |
| RV Parks | 20,935,000 | 19,834,000 | 22,123,000 | 20,964,000 | 3.37% |
| Apartments | 137,687,280 | 132,913,760 | 130,934,440 | 133,845,160 | 21.52% |
| Restaurants | 25,626,000 | 25,159,000 | 25,671,000 | 25,485,333 | 4.10% |
| Fish Plants | 82,860,000 | 85,830,000 | 49,980,000 | 72,890,000 | 11.72% |
| Non-Water Process | 1,280,000 | 2,309,000 | 4,615,000 | 2,734,667 | 0.44% |
| Public Institution | 56,078,000 | 56,014,000 | 57,599,000 | 56,563,667 | 9.09% |
| Residential | 6,742,440 | 6,941,680 | 7,856,440 | 7,180,187 | 1.15% |
| Single-Family Res. | 167,767,000 | 161,629,000 | 167,481,150 | 165,625,717 | 26.63% |
| Multiple Dw elling | 24,678,000 | 23,082,000 | 23,208,250 | 23,656,083 | 3.80% |
| Res. Commercial | 251,000 | 282,000 | 262,000 | 265,000 | 0.04% |
| Totals | 639,591,720 | 627,910,440 | 598,692,280 | 622,064,813 | 100% |

COCAS = Central Oregon Coast Air Service, Fixed Base Operator, City Owned

### Table 6.1.3-2 – Single-Family Residential Water Sales Summary

| Account | 2004 Avg. Use Each per Month (gal) | 2005 Avg. Use Each per Month (gal) | 2006 Avg. Use Each per Month (gal) | 3-Yr Average Avg. Use Each per Month (gal) |
|---|---|---|---|---|
| Single Family Res. Inside 3/4 | 4,727 | 4,525 | 4,549 | 4,600 |
| Single Family Res. Inside 1 | 6,600 | 5,648 | 5,558 | 5,935 |
| Single Family Res. Inside 1 1/2 | 9,055 | 7,517 | 7,450 | 8,007 |
| Single Family Res. Outside 3/4 | 6,281 | 7,906 | 8,165 | 7,451 |
| Single Family Res. Outside 1 | 7,750 | 9,471 | 11,056 | 9,425 |
| Average, All SFR Accounts | 6,883 | 7,013 | 7,356 | 7,084 |
| SFR, 3/4", Inside, Max Month | 7,019 | 5,912 | 5,879 | 6,270 |
| SFR, 3/4", Inside, Min Month | 3,807 | 3,737 | 3,541 | 3,695 |

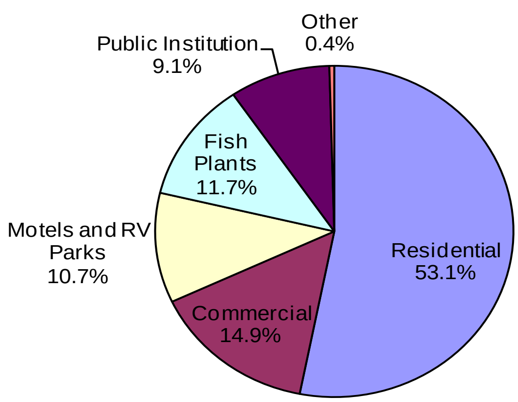



**Figure 6.1.3-1 – Water Sales Percentage by Customer Type (Volume Basis)**

### 6.1.4 Existing EDU Analysis

Based on sales records, the average quantity of water used by a single-family dwelling in Newport has been determined. This amount is considered to be the average consumption of 1 equivalent dwelling unit (EDU). When water consumption for other non-residential users is known, a comparison can be made to the consumption for 1 EDU and the number of EDUs for the non-residential user can be determined.

As shown in Table 6.1.3-2, the average monthly water consumption for the typical dwelling (single-family dwelling inside City limits with ¾-inch meter) is 4,600 gallons per month. This monthly consumption for a single EDU varies from 3,695 gallons in the winter months to 6,270 gallons in August/September.

**Table 6.1.4-1 – System EDU Summary**

| Customer Type | 2004 EDU | 2005 EDU | 2006 EDU | Average EDU |
|---|---|---|---|---|
| Airport | 2.3 | 2.5 | 2.1 | 2.3 |
| COCAS | 0.2 | 0.3 | 0.4 | 0.3 |
| Commercial | 403.3 | 448.2 | 444.7 | 432.1 |
| Retail & Service | 781.7 | 792.2 | 771.0 | 781.7 |
| Motels | 852.0 | 854.6 | 778.1 | 828.2 |
| RV Parks | 369.1 | 365.3 | 405.3 | 379.9 |
| Apartments | 2,427.4 | 2,447.7 | 2,398.8 | 2,424.6 |
| Restaurants | 451.8 | 463.3 | 470.3 | 461.8 |
| Fish Plants | 1,460.8 | 1,580.6 | 915.7 | 1,319.0 |
| Non-Water Process | 22.6 | 42.5 | 84.5 | 49.9 |
| Public Institution | 988.7 | 1,031.5 | 1,055.2 | 1,025.1 |
| Residential | 118.9 | 127.8 | 143.9 | 130.2 |
| Single-Family Res. | 2,957.7 | 2,976.5 | 3,068.3 | 3,000.9 |
| Multiple Dwelling | 435.1 | 425.1 | 425.2 | 428.4 |
| Res. Commercial | 4.4 | 5.2 | 4.8 | 4.8 |
| Total EDU | 11,276 | 11,563 | 10,968 | 11,269 |
| *1 EDU = 1 SFR 3/4" meter inside City = 4600 gallons per month annual average* | | | | |

The current number of EDUs in Newport is estimated at 11,270. The MDD water demand per EDU is therefore 364 gpd/EDU and the ADD is 191 gpd/EDU.

### 6.1.5 Unaccounted Water

The difference between the quantity of water pumped from the water treatment plant into the distribution system and the quantity of water measured at the individual customer water meters (water sold) is unaccounted water. This comparison is typically called a “water balance.” Water pumped from the WTP into the system is the amount of water produced minus the amount of water used at the plant for backwashing and other plant use.

Unaccounted water is a combination of “apparent” water loss which results from inaccurate water meters or billing discrepancies and “real” water loss resulting from leakage, water theft, and authorized unbilled usage such as firefighting and main flushing.

If there were no leakage in the system, all water meters were 100% accurate, and every drop of water used for fire fighting and system flushing was measured, there would be zero unaccounted water. In reality every water system has a certain amount of leakage, water meters are not 100% accurate, and it is rare for every drop of water used in town to be metered and measured. Therefore virtually every community water system has unaccounted water.

To quantify unaccounted water in Newport water sales records are compared to plant production records for a specific time period. Records for the 3-year period from 2004 to 2006 show an average unaccounted water quantity of 16.3% of the total water pumped to town from the treatment plant. In the 1988 Water Master Plan, unaccounted water was 16.2% for the 1973-1987 period of analysis.

**Table 6.1.5-1 – Unaccounted Water**

| Year | Total WTP Pumped (MG) | Total Sales (MG) | Unaccounted (MG) | Unaccounted % |
|---|---|---|---|---|
| **2004** | 738.904 | 639.592 | 99.312 | 13.44% |
| **2005** | 743.438 | 627.910 | 115.528 | 15.54% |
| **2006** | 747.213 | 598.692 | 148.521 | 19.88% |

# 6.2 <u>Projected Water Demand</u>

## 6.2.1 Basis for Projections

Water demand estimates for future years are determined by multiplying the current unit demand design values (gpcd or gpd/EDU) by the projected number of future users in the water system. It is assumed new users added to the system will consume water at the same rate as current users. Population and other water user projections are presented in Section 2.3.2. The unit water demand design values (gpcd) are presented in Section 6.1.2; the following table reiterates the design values as developed therein.

**Table 6.2.1-1 – Unit Water Demand Values**

| Demand | 2007 MGD | gpcd | gpd/EDU |
|---|---|---|---|
| ADD | 2.15 | 206 | 191 |
| MMD | 3.80 | 363 | 337 |
| MDD | 4.10 | 392 | 364 |
| PHD | 8.60 | 823 | 763 |
| Current Population | | 10,455 | |
| Current EDU | | 11,270 | |

## 6.2.2 Water Demand Projections

With the projected increase in system EDUs from the current 11,270 to a total of 15,970 EDU in the year 2030 the maximum day water demand is projected to increase to 5.8 MGD from the current 4.1 MGD. This becomes the primary planning demand for this Master Plan (20 year MDD).

If the same growth rate were to continue past the planning period the MDD would increase to 7.5 MGD in 2050 and 9.6 MGD in 2070.

Water demand projections through the planning period are shown in Table 6.2.2-1.

### Table 6.2.2-1 – Water Demand Projections

| Year | Population | EDU | ADD (mgd) | MMD (mgd) | MDD (mgd) | PHD (mgd) |
|---|---|---|---|---|---|---|
| 2007 | 10,455 | 11,270 | 2.15 | 3.80 | 4.10 | 8.60 |
| 2008 | 10,586 | 11,411 | 2.18 | 3.85 | 4.15 | 8.71 |
| 2009 | 10,718 | 11,554 | 2.20 | 3.90 | 4.20 | 8.82 |
| 2010 | 10,992 | 11,817 | 2.25 | 3.98 | 4.30 | 9.02 |
| 2011 | 11,129 | 12,375 | 2.36 | 4.17 | 4.50 | 9.44 |
| 2012 | 11,269 | 12,525 | 2.39 | 4.22 | 4.56 | 9.56 |
| 2013 | 11,409 | 12,676 | 2.42 | 4.27 | 4.61 | 9.67 |
| 2014 | 11,552 | 12,829 | 2.45 | 4.33 | 4.67 | 9.79 |
| 2015 | 11,696 | 12,985 | 2.48 | 4.38 | 4.72 | 9.91 |
| 2016 | 11,843 | 13,142 | 2.51 | 4.43 | 4.78 | 10.03 |
| 2017 | 11,991 | 13,301 | 2.54 | 4.48 | 4.84 | 10.15 |
| 2018 | 12,140 | 13,462 | 2.57 | 4.54 | 4.90 | 10.27 |
| 2019 | 12,292 | 13,625 | 2.60 | 4.59 | 4.96 | 10.40 |
| 2020 | 12,446 | 14,201 | 2.71 | 4.79 | 5.17 | 10.84 |
| 2021 | 12,601 | 14,368 | 2.74 | 4.84 | 5.23 | 10.96 |
| 2022 | 12,759 | 14,537 | 2.77 | 4.90 | 5.29 | 11.09 |
| 2023 | 12,918 | 14,709 | 2.81 | 4.96 | 5.35 | 11.22 |
| 2024 | 13,080 | 14,882 | 2.84 | 5.02 | 5.41 | 11.36 |
| 2025 | 13,243 | 15,058 | 2.87 | 5.08 | 5.48 | 11.49 |
| 2026 | 13,409 | 15,236 | 2.91 | 5.14 | 5.54 | 11.63 |
| 2027 | 13,577 | 15,416 | 2.94 | 5.20 | 5.61 | 11.76 |
| 2028 | 13,746 | 15,599 | 2.98 | 5.26 | 5.67 | 11.90 |
| 2029 | 13,918 | 15,783 | 3.01 | 5.32 | 5.74 | 12.04 |
| 2030 | 14,092 | 15,970 | 3.05 | 5.38 | 5.81 | 12.19 |

# Water System Needs and Alternatives

Section 7

## 7.1 Needs Summary

This Section evaluates water system improvement needs over the 20-year planning period due to the projected growth presented in Section 2 and corresponding increases in water demand presented in Section 6. This growth will require expansion of system capacity and improvements to ensure the ability to deliver potable water and fire protection water for the entire service area. Additionally, public infrastructure components will continue to age and degrade over time potentially requiring improvements to remain functional and reliable.

The purpose of this section is to present various alternatives for the major infrastructure components along with analysis and background information that will be required to make an informed selection from the presented alternatives.

For the purposes of this study, the major infrastructure components are divided into the following divisions:

- Raw Water Supply
- Water Treatment
- Water Storage
- Distribution

The following subsections will address each of these areas independently.

## 7.2 Raw Water Supply Alternatives

Perhaps the most critical long-term issue facing the City of Newport is that of raw water supply. Without adequate raw water, treatment and distribution capacity is of little importance. Therefore, it is critical that viable alternatives are explored to ensure adequate supply for the planning period. Since it is often difficult and costly to develop new raw water supplies, and such efforts can take many years, the City should also be preparing for long-term needs beyond the planning period such as required in 30, 40 or even 50 years.

The City should be capable of providing water (supply and treatment) for the projected maximum daily demand (MDD). Diurnal flows such as peak hourly flows occurring for shorter periods each day will exceed supply and treatment capacity however these demands are met through distribution storage. Section 6 includes analysis and development of the maximum daily demand for the current planning period as well as projections beyond the planning period. A summary of the MDD flows that are to be used for this analysis are as follows:

**Table 7.2-1 – Summary of Maximum Daily Flow Projections**

| Year | Flow (MGD) | Flow (gpm) | Flow (cfs) |
|---|---|---|---|
| 2008 | 4.10 | 2,847 | 6.34 |
| 2030 | 5.80 | 4,028 | 8.97 |
| 2050 | 7.50 | 5,208 | 11.60 |
| 2070 | 9.60 | 6,667 | 14.85 |

Based on the above table, the City must ensure that they have raw water supplies totaling around 5.80 MGD for the planning period, 7.50 MGD for the next planning period, and 9.60 MGD beyond.

Newport's existing supply consists of runoff in the Big Creek basin supplemented in summer months by pumping from the Siletz River into the Big Creek Reservoir. Existing supply is adequate for the current MDD of 4.1 MGD. Analysis is needed to determine what improvements if any are needed to meet the 2030 MDD and beyond. Detailed planning for needs beyond the 20-year planning period is beyond the scope of this Plan however a general analysis and alternatives are presented.

### 7.2.1 Groundwater Alternatives

It is generally understood that groundwater wells along the coastal zone are a "hit and miss" proposition and that obtaining adequate supply for a City the size of Newport through wells is unlikely.

As part of this analysis, the well logs for all of the township/range combinations in and around the study area were reviewed to determine the average and maximum well yields in the area. Data was obtained from the Oregon Water Resources Department database and the maximum well yields reviewed for Townships 10S, 11S, and 12S in Range 11W. The results of that analysis are as follows:

**Table 7.2-2 – Groundwater Well Yields in Newport Area**

| Township/Range | Average Maximum Yield (gpm) | Maximum Yield (gpm) |
|---|---|---|
| 10S-11W | 6 | 45 |
| 11S-11W | 7.5 | 60 |
| 12S-11W | 9.5 | 85 |

As stated earlier in this section, the City will require source water on the order of thousands of gallons per minute. Therefore, the small yields that could be expected from coastal wells will not make an appreciable contribution toward solving Newport's water needs.

No additional efforts were made to investigate the potential for development of groundwater resources for the purposes of providing raw water to Newport.

### 7.2.2 Surface Water Alternatives

Along the Oregon Coast, the vast majority of public water systems rely on surface water supplies to provide adequate volumes of raw water to serve their customers. Section 5 outlines the current raw water supplies utilized by the City of Newport and the corresponding water rights.

**Siletz River –** The City currently holds water rights on the Siletz River totaling 6.0 cfs or 2,693 gpm. This water right will meet the 2030 planning requirements when combined with the Big Creek water right and storage reservoir assuming that the City of Newport will always be able to divert the entire water right from the river during summer periods.

An analysis of Siletz River streamflows recorded at USGS gauging station 1430550 near the City's intake was completed using data from 1904 to 2006. Average mean monthly flow ranged from a high of 2364 cfs in 1933 to a low of 863 cfs in 1944 with an average of 1516 cfs. The lowest streamflow month is August with a mean of 130 cfs. The lowest monthly flow recorded was 62.5 cfs in August 2003. The lowest daily flow recorded was 42 cfs on September 6, 2003. In terms of streamflow, the driest year on record was 1944. Figure 7.2-1 illustrates the daily streamflows in the Siletz River near the City's intake between 1990 and 2006.

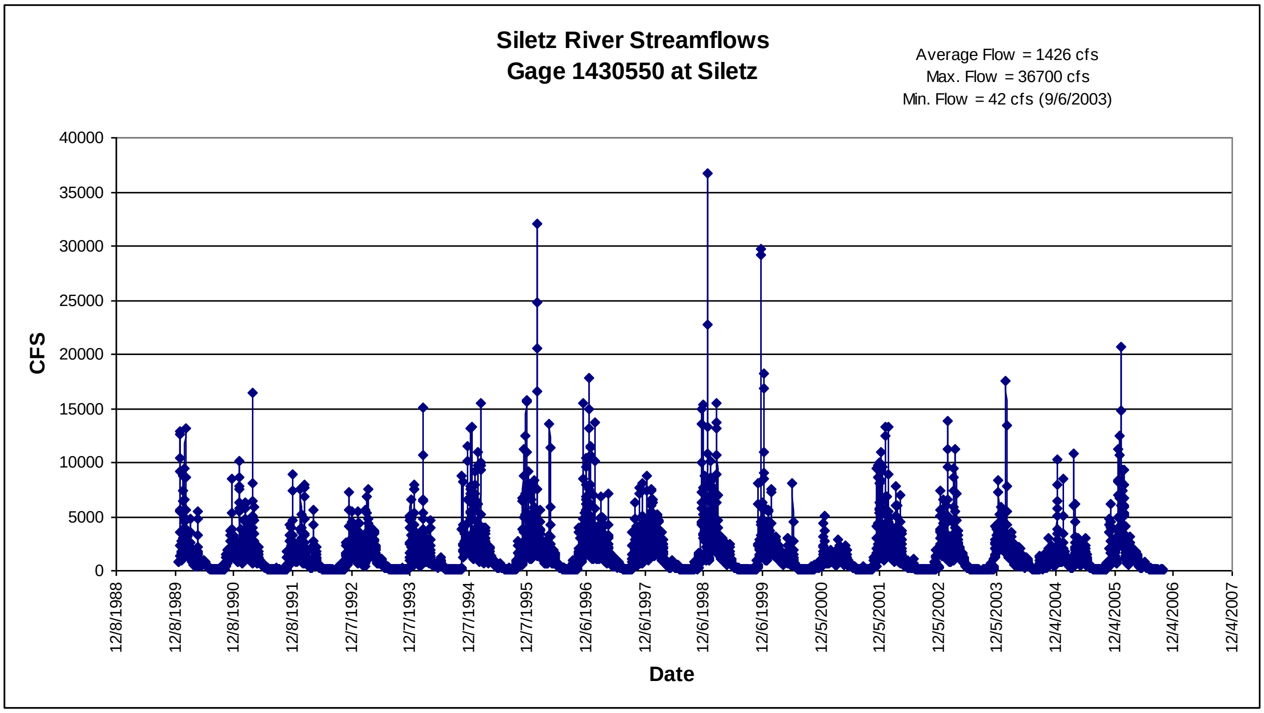



**Figure 7.2-1 – Siletz River Daily Streamflows, 1990-2006**

The Siletz River basin includes approximately 202 square miles of drainage area. A number of other large water rights exist on the Siletz River. Streamflows have always been great enough to supply Newport's water right as well as all other senior municipal rights. Georgia Pacific's large industrial right is through a combination of Siletz River flows, Olalla Creek flows, and Olalla dam storage. A summary of these rights is provided below in Table 7.2-3.

**Table 7.2-3 – Siletz River Water Right Summary - (Priority Dates Senior to 9/24/1963)**

| Holder of Right | Priority Date | Water Right (MGD) | Water Right (cfs) |
|---|---|---|---|
| *City of Newport* | *9/24/1963* | *3.88* | *6.0* |
| Siletz Tribe | 1957 | | 0.26 |
| City of Siletz | 1944 & 1953 | 0.48 | 0.75 |
| City of Toledo | 1929 | 2.59 | 4.0 |
| City of Toledo | 1937 | 1.13 | 1.75 |
| JJ Killip | 1934 | 0.65 | 1.0 |
| US Public Housing Admin. | 1945 | 1.94 | 3.0 |
| | | | |
| Georgia Pacific (Industrial) | 1956 &1963 | 22.62 | 35.0 |
| Int. Paper (Industrial) | 1933 | 1.29 | 2.0 |

As part of this planning effort, some discussions have been held with other communities regarding the potential for a water rights purchase or transfer. There has been no interest from any of the parties we talked with as water rights in this area are a tightly held and valuable commodity. It is extremely unlikely that any new municipal water rights on the Siletz will be given.

**Big Creek Basin**

The Big Creek basin currently provides water to the City of Newport through the collection of runoff from the basin within the Big Creek Reservoirs. The entire Big Creek basin is around 2.8 square miles in area. The entire basin above the City's allowed point of diversion is collected in the reservoirs and cannot be expanded; therefore, all of the water that could be collected and used from the Big Creek Basin is being utilized.

The only potential improvement to the Big Creek Basin that would enhance the City's raw water supply is to increase the capacity of the Big Creek storage reserves. This could be accomplished by either raising the existing upper dam or by constructing a new and higher dam in front of the existing dam. These options will be discussed further below in the raw water storage discussion in Section 7.2.3.

**Rocky Creek Basin**

Another potential source of raw water for Newport would be the Rocky Creek basin located north of the City and south of Depoe Bay. The basin that drains into Rocky Creek and into the Pacific has long been the subject of discussion as a potential location for a dam and reservoir that could benefit a regional area as a drinking water supply. The Rocky Creek basin has an overall drainage area of approximately 5.35 square miles.

Without a dam and major reservoir, Rocky Creek itself cannot provide adequate water to the City of Newport during the summer months. In preparation for long-term supply from Rocky Creek, the City applied for water rights on Rocky Creek totaling 6 cfs. The water rights are currently in the application stage.

Additional discussion on the potential for the Rocky Creek Dam is discussed below in Section 7.2.3.

### 7.2.3 Raw Water Storage Alternatives

**Big Creek Reservoir – New Dam**

The City currently utilizes two reservoirs located at the base of the Big Creek drainage basin. According to records, the upper reservoir includes approximately 970 acre feet of storage. The lower reservoir is credited with an additional 200 acre feet of storage.

The City utilizes flows generated within the Big Creek basin much of the year when rains generate adequate runoff to maintain full reservoirs. As rainfall diminishes and demand increases, the City must pump water from the Siletz River into the Big Creek Reservoir to maintain adequate reservoir levels and raw water reserves. Historically, the City has only pumped from the Siletz when it was absolutely necessary in an effort to minimize pumping and operating costs.

One alternative to increase raw water reserves would be to increase the volume of storage that is available within the Big Creek reserves. This would require raising the upper dam or constructing a new dam on Big Creek that would increase the volume in reserves through either an increased water surface, and expanded area, or both.

The City's long-range water supply study (Fuller and Morris, June 1997) developed costs for the development of a new dam located midway between the upper and lower reservoir. This approach would allow the new dam to be constructed and utilize the existing dams to act as cofferdams to protect the construction site and provide water to the City in the interim.

Positive points for this approach include:

- The City already owns most of the property
- The existing dams could provide service and protection during construction
- The higher dam would flood mostly wooded forest areas which is conducive to a healthy watershed.
- Much of the existing infrastructure and the existing plant site can be reused.
- The deeper reservoir would result in less warming and improved water quality.

Negatives to this approach include:

- Cost. The 1997 cost estimate for this project was nearly $10-million. Today, the project would be estimated somewhere between $15 and $20-million. As this project would only benefit Newport customers rather than providing a regional benefit, the individual burden of paying for this project would be great.
- Potential for weak soils in the vicinity could make design and construction a challenge. The cost of the dam could increase dramatically if drilling and geotechnical analysis indicated that special soils work would be required.
- Permitting and environmental issues could prove to be a challenge.
- Residential areas downstream would be further threatened by a larger (higher) dam and the increased volume of stored water.
- There are a few residences constructed in the Big Creek basin near the upper reservoir. These properties would be flooded and the homes would have to be purchased and/or relocated. This may prove difficult from a political perspective.

**Big Creek Reservoir – Increased Pumping and Water Volume Management (Water Balance)**

The current practice for Big Creek is to utilize runoff originating within the basin for as much of the year as possible. As levels in the reservoir fall, the City begins pumping from the Siletz River to provide the flows needed to provide drinking water until seasonal rains begin filling the reservoir again.

Another alternative is to maximize the amount of water that is diverted from the Siletz River in an effort to keep the Big Creek reservoir as full as possible, as long as possible. This could be accomplished manually or through improved data acquisition and SCADA controls that would be designed to monitor water levels within the reservoir and automatically operate the Siletz River pumps to maintain a full condition through more of the year. Programming could be developed and adapted to take into consideration the output from the reservoir, the time of year, rainfall levels, and other conditions to determine if and when water should be pumped from the Siletz. Furthermore, the programming could be adapted to operate the pumps at night and on an off-peak schedule to reduce power cost impacts as much as possible.

To complete this analysis, all of the available records from the period between 1905 and 2007 were reviewed to determine the driest overall year. The driest year on record thus far was 1944. Table 7.2-4 illustrates the analysis that was completed considering the flows that would be available from the Big Creek Basin, the volume of water that is needed by the City in 2008, the volume of water that is projected to be needed in 2030, and the amount of makeup water that will be required from the Siletz River.

As the table indicates, the City will need to pump water from the Siletz, at a minimum, between June and November to avoid lowering water level in the reservoirs with 2030 water demands. Allowing a slight drop in reservoir levels is also possible by pumping less and perhaps not pumping in late October and November. Based on available flow data, there is adequate water available within the Siletz, and within the City's current water right to be able to meet all of the City's needs for the planning period.

**Table 7.2-4 – Big Creek/Siletz Water Balance Analysis**

Big Creek Drainage Flows to Reservoir #2

| | 1988 Master Plan (mgd) | 1997 Supply Plan (mgd) | Ratio* Method (mgd) | Big Creek Stream Flow** (MG) | 2008 Demand (MG) | 2030 Demand (MG) | 2008 Siletz Need (MG) | 2030 Siletz Need (MG) | Siletz Allowed (MG) |
|---|---|---|---|---|---|---|---|---|---|
| January | | 25 | 15.36 | 476 | 55 | 78 | | | 120 |
| February | | 19 | 16.65 | 483 | 50 | 71 | | | 112 |
| March | | 14.5 | 12.54 | 389 | 52 | 73 | | | 120 |
| April | 6.2 | 10 | 12.69 | 186 | 53 | 76 | | | 116 |
| May | 3.8 | 6 | 4.60 | 118 | 63 | 89 | | | 120 |
| June | 2.35 | 4 | 4.96 | 71 | 79 | 112 | 8 | 41 | 116 |
| July | 1.35 | 2.5 | 1.56 | 42 | 112 | 159 | 70 | 117 | 120 |
| August | 0.75 | 1.3 | 0.95 | 23 | 94 | 133 | 70 | 109 | 120 |
| September | 0.4 | 0.9 | 0.88 | 12 | 66 | 93 | 54 | 81 | 116 |
| October | 0.25 | 0.2 | 1.20 | 6 | 58 | 82 | 51 | 75 | 120 |
| November | 1.1 | 2 | 11.27 | 33 | 50 | 71 | 17 | 38 | 116 |
| December | 6 | 7 | 10.15 | 186 | 54 | 77 | | | 120 |
| | | | | 2024 | 785 | 1112 | 271 | 462 | 1416 |

* Ratio of Siletz Gage Drainage Area to Big Creek Reservoir #2 Drainage Area (2.8 $mi^2$ / 202 $mi^2$), Driest Year on Record of 1944
** Based on lowest of 3 Data Sets

This analysis is, perhaps, made clearer through a graphic representation. Figure 7.2-2 illustrates the water balance for the Big Creek reservoir using a combination of flows from Big Creek augmented with flows from the Siletz River.

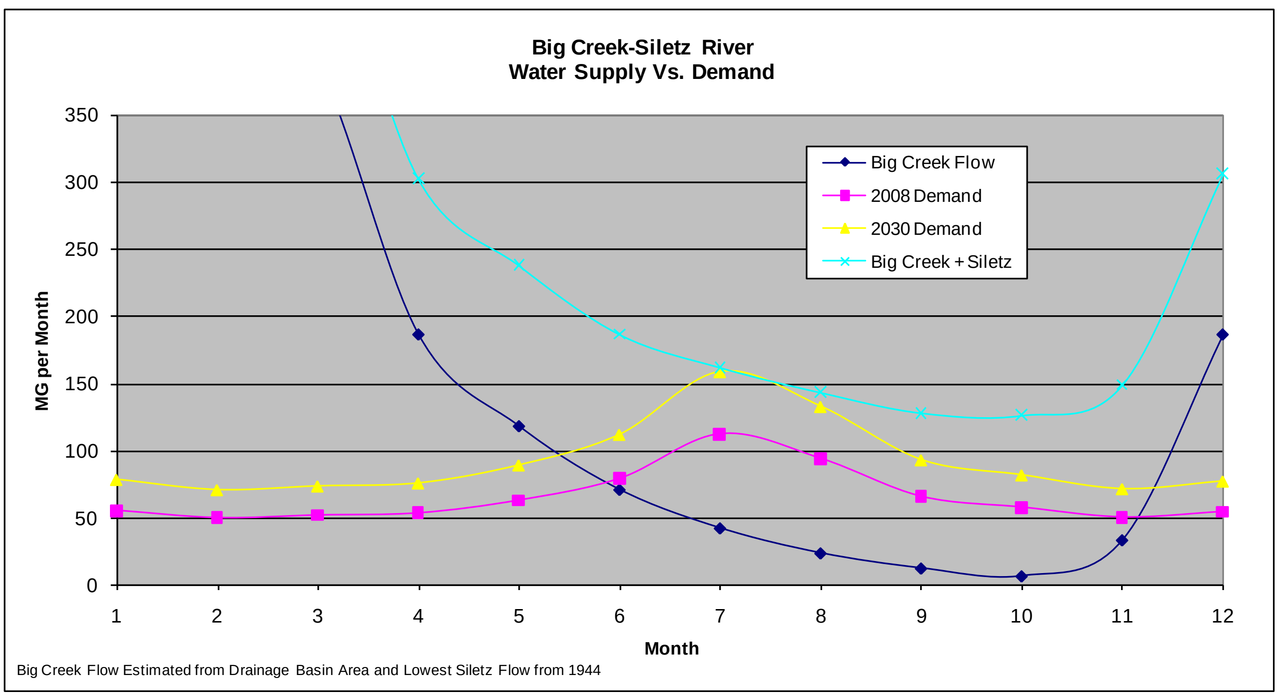



**Figure 7.2-2 – Big Creek/Siletz Water Balance Graph**

Figure 7.2-2 illustrates that the maximum 2030 water demand for the City of Newport is just met during the driest part of the summer through a combination of Big Creek and Siletz River flows. It is important to remember that this analysis is based upon the driest year on record and should represent a conservative analysis of the available water in the Big Creek and Siletz River basins.

The water balance analysis suggests that no additional storage is required within the planning period or before the projected 2030 demand levels. However, beyond this period, additional reserves will be required or an alternative source of raw water will need to be developed to provide for the potable water needs of the community.

While the water balance approach would allow the City to postpone major improvement costs for their raw water facilities for some time, there will be some increased operating costs due to increased pumping and electrical costs to operate the Siletz pumps more than they are currently operated.

**Rocky Creek Reservoir**

For some time, there has been an effort underway to develop a regionally-based water supply in the Rocky Creek basin located north of Newport and south of Depoe Bay. To develop this water supply, a relatively large dam would need to be constructed to impound Rocky Creek. Water could then be delivered north to Lincoln City and south to Newport, Seal Rock and beyond.

In 2002, the Central Coast Water Council undertook a study (Rocky Creek Regional Water Supply Project, Preliminary Water Management Plan, CH2MHill, Fuller & Morris, David Evans, January 2002) to investigate the feasibility of developing a regional water supply around Rocky Creek. This effort was preceded by a study completed in 1997 by Fuller & Morris that also touched on the feasibility of a Rocky Creek dam and reservoir project.

Newport and Lincoln City have been the main proponents of the investigation of the Rocky Creek option for some time. While in recent years the Central Coast Water Council has been relatively inactive, the topic of Rocky Creek has not been forgotten.

Without significant additional study, it is difficult to estimate the cost of developing Rocky Creek as a regional water source. Various issues must be addressed including:

- Should Rocky Creek be developed as a full regional facility or building a smaller facility for just Newport and Lincoln City with the ability to expand in the future?
- Does the project include the development of treatment facilities at Rocky Creek so that treated water can be distributed? Or, is raw water distributed?
- What is the alignment and cost of the distribution piping to deliver water from Rocky Creek to the contributing communities?
- What are the environmental, political, legal, or other challenges that will have to be addressed in order to build a new dam on a coastal stream?
- Are there geotechnical or soils issues that are currently unknown? Seismic concerns?
- Who is willing to participate in the project and what will be the financial impact to rate payers for each system participating?
- How will the facility be organized, managed, operated, and maintained? Will a new water entity have to be created? Will a regional water entity operate all of the systems?

Rough calculations place the likely cost of constructing a dam on Rocky Creek and extending piping to the City of Newport to deliver raw water to the treatment plant in excess of $60-million. At that cost, it is clearly not feasible for the City to undertake this project alone.

For Rocky Creek to be viable, it must be undertaken as a regional water effort with as many participating agencies as possible. At a minimum, the Central Coast Water Council should seek to include the following agencies in the discussion about the development of a regional facility at Rocky Creek:

1. City of Newport
2. City of Lincoln City
3. City of Depoe Bay
4. Seal Rock Water District

Additional discussion on the Rocky Creek alternative along with comparison of costs is provided later in this section.

## 7.3 Water Treatment Alternatives

### 7.3.1 Current Deficiencies

As discussed in Section 5, the existing water treatment plant is effectively at the end of its useful life. Overall treatment capacity struggles to meet current MDD, structural problems affect the existing clariflocculators and filters, disinfection contact time within the clearwell is insufficient, the existing backwash pump is well beyond its expected service life, plant controls are antiquated and require careful operator attention, and other structural and equipment problems render the existing treatment plant inadequate for the City's future water needs. As water treatment regulations continue to become more stringent, it is increasingly difficult to meet treatment standards using conventional methods. In addition to the treatment problems discussed above, the existing backwash pond has become silted in over the years and there is no practical means for cleaning it. For these reasons, new treatment process equipment and new backwash ponds are recommended to provide for the City's future water treatment needs. Several alternatives capable of meeting the City's future water treatment needs are discussed below.

In addition, it was identified is Section 5 that the lower Big Creek reservoir experiences elevated levels of iron and manganese as well as significant algae growth during the summer months. Treatment is difficult when these conditions persist and it can result in periods of poor water quality. In order to address water quality issues present in the lower reservoir, it is recommended that improvements be made to facilitate use of raw water from a source other than the lower Big Creek reservoir. Alternative raw water sources are discussed below in conjunction with each treatment alternative.

### 7.3.2 Desalination Treatment (RO)

Many parts of the world struggle to obtain adequate supplies of "fresh" raw drinking water to treat for potable use. These areas are often located in arid regions where surface water is scarce and groundwater is not plentiful. Arid coastal regions, deserts, islands, and other similar areas often struggle to produce enough or an appreciable amount of potable water from fresh water supplies.

The technology to produce potable water from seawater has been available for many decades. However, production of potable water from seawater, normally referred to as desalination or "desal", has historically been considered very expensive. This has been due to expensive equipment and materials as well as high energy costs.

Today, the cost to produce potable water through the use of desalination technologies has been greatly reduced. However, when comparing the cost of desal to treating “fresh” water supplies, the cost remains relatively high.

Desal is currently accomplished through the use of membrane treatment referred to as reverse osmosis or “RO”. The exact equipment required and the treatment process varies greatly depending on the quality of the water being treated. Quality parameters that should be considered for desal include:

- TDS (total dissolved solids)
- Conductivity
- Salinity (brackish, seawater, etc.)
- Temperature
- TOC (total organic compounds)

Seawater typically has a much higher level of TDS. TDS levels that would make seawater a good desal candidate would typically be around 5,000 mg/L. TDS levels in the Pacific Ocean near the coastal regions are likely to run between 40,000 and 50,000 mg/L.

Brackish or bay water would be far superior in quality in terms of TDS though the TOC levels can be very high during high runoff periods as well as by tidal impacts. In general, brackish water is considered to require nearly half of the energy costs for treatment as seawater if a suitable brackish source can be obtained.

Normal desalination processes include multiple treatment steps. While the actual processes required may vary depending on the source of the raw water, the following steps or process components are common to a desal treatment process:

1. **Raw Water Intake:** Such as is the case with a conventional treatment facility, a raw water intake is required to divert untreated water into the desal process. Choices for intakes may include

    a. An ocean intake or bay intake with screening to prevent debris, plants, or animals from being pumped into the system. As is the case with any surface water intake, keeping the screen clean and from plugging up is difficult. This would be amplified in a marine environment. Also, there are significant regulatory requirements for intakes to protect fish and other aquatic life from harm.

    b. A beach or bayside well intake. Drilling shallow wells in the sand on the beach or adjacent to brackish sources has the potential to provide a level of pretreatment and avoid screening and other intake issues. However, guaranteeing yield and longevity for any well is often a difficult proposition.

2. **Pretreatment:** Some level of pretreatment is often required to prepare the raw water for further treatment. Depending on the raw water quality, this may include conventional treatment approaches such as chemical flocculation and clarification. The goal of this step in the process would be to eliminate larger debris in the water and reduce dissolved organics such as TOC and TDS. This would typically require conventional flocculation and clarification equipment.

3. **Micro or Ultra filtration (Membranes):** To protect the sensitive and fragile RO membranes, it is not uncommon for a desal facility to include an additional level of pretreatment. This is generally accomplished through the use of micro or ultra filtration membranes or “low pressure”

membranes. The membrane treatment step further reduces debris in the raw water and produces water that is very clean compared to the sea or brackish water source.

4. **Reverse Osmosis (RO or high pressure membranes):** The final step in a typical desal process is RO or high pressure membrane treatment. While regular membranes operate at low pressures often below 50 psi, the RO process generally requires very high pressures to force water through the very small pores in the membrane fibers. While pressures vary depending on the equipment used and the quality of the raw water, it is not uncommon to see desal equipment operating at pressures between 700 and 900 psi. Regular household water pressure is generally between 40 and 80 psi. This high operating pressure accounts for the high energy costs associated with desal or RO treatment. The energy required to generate this high head pressure is costly and usually associated with electrical (pumping) costs.

5. **Waste Disposal:** The desal process takes water that is filled with impurities and produces clean, and nearly pure water. As a result, a significant amount of debris, TOC, TDS and other impurities are generated as they are separated from the finished water. On average, for every gallon of water that is produced using desal, a gallon of highly concentrated waste water must be disposed of. The levels of impurities in the wastewater are significant. As a result, it is difficult to dispose of the waste stream from a desal process in an easy and inexpensive manner. In some cases, the desal waste stream is returned to the ocean. However, fishing industry concerns, dead zone issues, and other environmental concerns make that alternative difficult. It may be possible to introduce the waste stream from the desal plant into the outfall water from a sewage facility. However, this may cause a community to violate their NPDES permit requirements for quality. Treating the waste stream at a wastewater treatment facility may be possible though the highly saline water is problematic for most biological (activated sludge) treatment processes. Also, the volume of water that must be treated is significant. A 10 mgd desal plant in Newport would generate in excess of 10 mgd of waste water that would have to be treated and disposed of (must pull 2 gallons of sea water to generate 1 gallon of treated water plus 1 gallon of waste). The ultimate disposal plan and cost for disposal of a desal waste stream is difficult to predict without significantly more study on the matter.

Many of the desal facilities that are in use in various parts of the world are much larger than the facility that would be required by Newport. The unit cost per gallon (or gallon per day) to construct and operate a desal facility decreases as the size of the facility increases. Figure 7.3.2 indicates the approximate relationship to size and facility cost. The figure shows the approximate capital costs of constructing a typical desal facility vs. the size of the facility. While the costs to construct a facility will vary greatly from one installation to another, the trend is clear that larger plants are less expensive relative to capacity to construct than smaller facilities.

For Newport demands, the unit cost for a desalination plant would be very high and toward the left side of figure 7.3-1. For the current 20-year planning period desalination is not prudent since sufficient lower cost fresh water is available through the Big Creek/Siletz sources. Even for future planning periods beyond 20 years, the unit cost for desal is very high since the City will still first be using the lower cost fresh water in Big Creek/Siletz resulting in a relatively small desal plant.

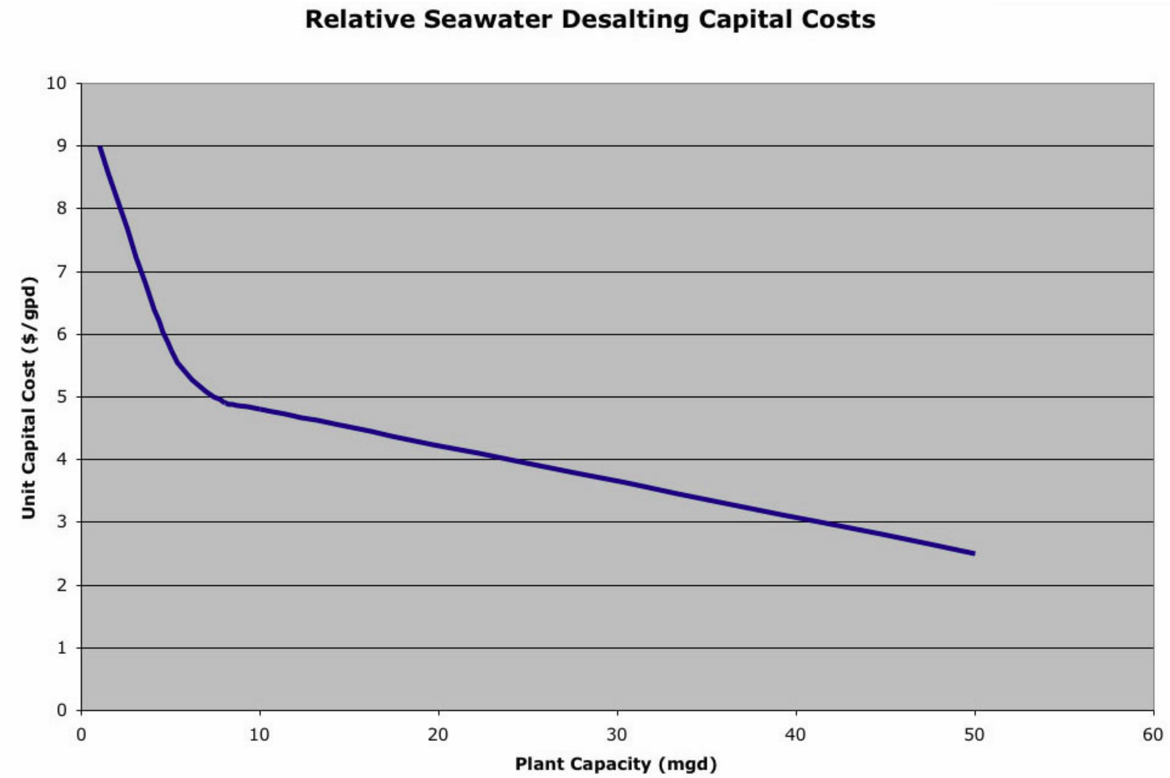



**Figure 7.3-1 – Desalination Plant Relative Costs**

A preliminary cost estimate was prepared in an effort to quantify the capital cost to construct a desal facility in the Newport area. While significant additional study would be required to refine the estimate, Table 7.3.2 summarizes the preliminary estimate prepared for this planning effort.

**Table 7.3.2 – Desalination Treatment Facilities Preliminary Cost Estimate**

| **Desal water plant improvements - 7 MGD** | | | | | |
|---|---|---|---|---|---|
| **Item No.** | **Description** | **Units** | **Quantity** | **Unit Cost** | **Total Cost** |
| 1 | Bonds, Insurance, Overhead, and Mobilization Costs | ls | 100% | $7,000,000.00 | $7,000,000.00 |
| 2 | Seawater intake facility | ls | 100% | $4,000,000.00 | $4,000,000.00 |
| 3 | Raw water piping to plant site | ls | 100% | $750,000.00 | $750,000.00 |
| 4 | New treatment plant building | sf | 5,000 | $250.00 | $1,250,000.00 |
| 5 | Treatment equipment (pre, MF, RO) | MGD | 7 | $4,000,000.00 | $28,000,000.00 |
| 6 | Process piping, valves, etc. | ls | 100% | $2,000,000.00 | $2,000,000.00 |
| 7 | Outfall/brine discharge facilities | ls | 100% | $2,500,000.00 | $2,500,000.00 |
| 8 | Electrical Improvements | ls | 100% | $1,000,000.00 | $1,000,000.00 |
| 9 | Controls and telemetry | ls | 100% | $200,000.00 | $200,000.00 |
| 10 | Road and site improvements | ls | 100% | $500,000.00 | $500,000.00 |
| 11 | Backwash and holding lagoons | ls | 100% | $1,000,000.00 | $1,000,000.00 |
| 12 | Backup power generation equipment | ls | 100% | $500,000.00 | $500,000.00 |
| | | Construction Total | | | $48,700,000.00 |
| | | Contingency (20%) | | | $9,740,000.00 |
| | | Subtotal | | | $58,440,000.00 |
| | | Engineering (20%) | | | $11,688,000.00 |
| | | Administrative costs (3%) | | | $1,753,200.00 |
| | | **Total Project Costs** | | | **$71,881,200.00** |

Based on this estimate, constructing a desalination facility in Newport capable of serving the community's current planning horizon needs would likely cost in excess of $70-million. This does not include any considerations for increased operating costs. Section 7.3.5 discusses operating costs when comparing the various treatment plant alternatives.

As the subject of desalination has been a popular topic, a brief discussion of the pros and cons of the technology, as they relate to water treatment choices for Newport, would be appropriate.

**Pro's of Desal:**

- There is an abundance of water supplies in terms of seawater and brackish water.
- The capital costs and operating costs for desal are gradually falling as technology seeks to make the process less energy intensive.
- In locations where "fresh" water is simply not available, desal can produce a reliable supply of potable water.

**Con's of Desal:**

- A significant waste stream is produced that must be properly disposed of.
- High chemical cost to adjust potentially aggressive water resulting from RO.
- High-pressure membranes have correspondingly high energy costs.
- The capital investment for desal equipment is significantly more than conventional treatment alternatives for fresh water supplies.
- The ability to obtain a water right in the ocean is uncertain. Oregon Water Resources has not received or accepted an application to divert seawater for producing potable water.
- The desal system may require significant pretreatment as well as RO treatment. In effect, the system could be equivalent to constructing three separate facilities to accomplish water treatment using sea or brackish water.
- The overall cost of desal is still very high when compared to freshwater alternatives.

Packaged Desal Equipment (RO)

While desal offers tremendous potential in arid regions to provide large volumes of potable water, its application in the northwest is unlikely to gain popularity due to the high costs that are still associated with the technology, especially for smaller communities.

### 7.3.3 Upgrade Existing Water Treatment Plant with Membrane Equipment

One alternative that has been discussed during the preparation of this Master Plan to provide adequate capacity to meet projected demand and proper treatment to meet present and future treatment regulations is to replace the existing process equipment with membrane treatment equipment at the existing water treatment plant site. The proposed upgrade would include construction of a new addition to the existing treatment plant building with a new clearwell located beneath the addition. The addition would be sized to house all membrane treatment equipment, pumps, cleaning chemicals, and other related equipment. The planned clearwell would be designed to work in conjunction with the existing clearwell to provide adequate disinfection contact time at the 20-year peak design flow. Additional space would be set aside for future expansion of the clearwell to meet long term peak design flows. In addition to the planned building addition, new concrete lined backwash ponds would be constructed northwesterly of the existing treatment plant building in the area currently occupied by the clariflocculators.

Following construction of the proposed addition and membrane treatment equipment installation, the existing treatment plant building could be gutted and refurbished. Planned improvements include new SCADA controls for all phases of water acquisition, treatment, and storage, as well as new laboratory equipment, motor controls and electrical systems, pumps, standby generator, backwash waste basins, and other items.

The planned improvements can be completed while the existing treatment plant continues to treat water. The small footprint of membrane equipment makes continued treatment during construction and installation of needed facilities on the existing site feasible. Upon completion of the proposed upgrades, the existing clariflocculators would be demolished and the proposed concrete lined backwash ponds constructed in their place. The existing backwash pond would be used during construction and until new ponds are complete. Temporary controls for the new membrane equipment may be necessary during construction in order to allow final placement of control equipment within the refurbished portion of the plant.

A conceptual layout of the proposed water treatment plant upgrade is provided in Figure 7.3.3. A cost estimate of the proposed water treatment plant improvements is provided in the table below.

### Table 7.3.3a – Water Treatment Plant Upgrade Cost Estimate

| Big Creek Water Treatment Plant Improvements | | | | | |
|---|---|---|---|---|---|
| **Item No.** | **Description** | **Units** | **Quantity** | **Unit Cost** | **Total Cost** |
| 1 | Bonds, Insurance, Overhead, and Mobilization Costs | ls | 100% | $1,000,000.00 | $1,000,000 |
| 2 | Demolition | ls | 100% | $250,000.00 | $250,000 |
| 3 | New Process Piping | ls | 100% | $200,000.00 | $200,000 |
| 4 | Concrete Flatwork | ls | 100% | $10,000.00 | $10,000 |
| 5 | Building Foundations | cy | 100 | $500.00 | $50,000 |
| 6 | Building Addition | sf | 4,500 | $250.00 | $1,125,000 |
| 7 | Membrane Filtration Equipment | ls | 100% | $2,500,000.00 | $2,500,000 |
| 8 | Electrical Improvements | ls | 100% | $300,000.00 | $300,000 |
| 9 | Controls and Instrumentation | ls | 100% | $200,000.00 | $200,000 |
| 10 | Clearwell Baffling & Modifications | ls | 100% | $80,000.00 | $80,000 |
| 11 | Reinforced Concrete Clearwell Expansion | cy | 500 | $600.00 | $300,000 |
| 12 | New Finished Water Pumps | ea | 3 | $50,000.00 | $150,000 |
| 13 | Remodel Lab and Office | ls | 100% | $150,000.00 | $150,000 |
| 14 | New Parking Area and Road improvements | ls | 100% | $50,000.00 | $50,000 |
| 15 | Backup power generation equipment | ls | 100% | $200,000.00 | $200,000 |
| 16 | Pretreatment Clarifier - Ballasted Floc system & Raw Water Pumps | ls | 100% | $1,250,000.00 | $1,250,000 |
| 17 | Backwash Lagoon Improvements | ls | 100% | $400,000.00 | $400,000 |
| | | Construction Total | | | $8,215,000 |
| | | Contingency (20%) | | | $1,643,000 |
| | | Subtotal | | | $9,858,000 |
| | | Engineering (20%) | | | $1,971,600 |
| | | Administrative costs (3%) | | | $295,740 |
| | | **Total Project Costs** | | | **$12,125,340** |

In addition to the above water treatment plant improvements, it is recommended that a new raw water transmission pipe be constructed from the upper Big Creek reservoir to the treatment plant site in order to eliminate treatment difficulties associated with water obtained from the lower reservoir during summer months. This will require construction of a new water intake structure within the upper reservoir sized for the City's long term needs in addition to the approximately 4,500 lineal feet of new raw water piping to the existing treatment plant location. Separate cost estimates are provided below for the water intake and raw water transmission piping improvements.

### Table 7.3.3b – Water Intake Structure Cost Estimate

| **Item No.** | **Description** | **Units** | **Quantity** | **Unit Cost** | **Total Cost** |
|---|---|---|---|---|---|
| 1 | Bonds, Insurance, Overhead, and Mobilization Costs | ls | 100% | $65,000.00 | $65,000.00 |
| 2 | Concrete anchored Johnson Screen Intake Group | ls | 100% | $100,000.00 | $100,000.00 |
| 3 | Anchored piping from intake up and over dam | ls | 100% | $100,000.00 | $100,000.00 |
| 4 | Vacuum prime pump system, electrical upgrades, for syphon system | ls | 100% | $100,000.00 | $100,000.00 |
| 5 | Compressor, air-burst system for Johnson Screens | ls | 100% | $50,000.00 | $50,000.00 |
| | | Construction Total | | | $415,000.00 |
| | | Contingency (20%) | | | $83,000.00 |
| | | Subtotal | | | $498,000.00 |
| | | Engineering (20%) | | | $99,600.00 |
| | | Administrative costs (3%) | | | $14,940.00 |
| | | **Total Project Costs** | | | **$612,540.00** |

**Table 7.3.3c – Raw Water Transmission Pipe Cost Estimate**

| Item No. | Description | Units | Quantity | Unit Cost | Total Cost |
|---|---|---|---|---|---|
| 1 | Bonds, Insurance, Overhead, and Mobilization Costs | ls | 100% | $115,000.00 | $115,000.00 |
| 2 | 24" IPS DR17 HDPE Pipe | lf | 4,500 | $150.00 | $675,000.00 |
| 3 | Fittings and Thrust Restraints & outlet to lower lake | ls | 100% | $50,000.00 | $50,000.00 |
| | | Construction Total | | | $840,000.00 |
| | | Contingency (20%) | | | $168,000.00 |
| | | Subtotal | | | $1,008,000.00 |
| | | Engineering (20%) | | | $201,600.00 |
| | | Administrative costs (3%) | | | $30,240.00 |
| | | **Total Project Costs** | | | **$1,239,840.00** |

### 7.3.4 Construct New Water Treatment Plant

Another alternative to satisfy the City's water treatment needs through the planning period and into the future would be to construct a new treatment plant at an alternative site. At this time no alternative site has been identified for complete analysis, although some consideration has been given to locating a new plant near the upper Big Creek dam. The advantage of a treatment plant near the upper dam is that it could take advantage of the superior water quality within the upper reservoir and eliminate the need to construct approximately 4,550 feet of new raw water piping to the existing treatment plant location.

However, these savings would be more than offset by other development costs applicable to a new site including, land acquisition, site clearing and grading, extension of three phase power, construction of finished water piping from the site to the distribution system, roadway improvements, and the like. In addition to these costs, construction of a treatment plant building exceeding the size identified for the proposed addition as well as all equipment, electrical, pump, controls, and other miscellaneous costs would apply to the new site. Based on the understanding that costs of a new water treatment plant at an alternative site would well exceed the costs of upgrading the existing plant, this alternative was not developed further at this time.

### 7.3.5 Expand Existing Plant with Conventional Equipment

The previous master planning in 1988 showed future plant expansion through the construction of additional clarifier basins and gravity filters added to the existing. Since that time, settlement of one clarifier and filter bay has resulted in concrete cracking and improper function. If the original approach was to be taken now 20-years later, the damaged clarifier and filter would need to be removed and replaced and to accommodate projected flows today the size of the existing clarifier and filters areas would need to be doubled. All existing equipment would also need to be replaced. This creates additional complexity in even flow distribution and difficulties in providing continued treatment during construction. In addition, the major concern with the location of the backwash pump and lack of adequate chlorine contact time would need to be addressed through building expansions. Essentially, due to space constraints at the site, the expense of ensuring continued water treatment during summer construction, and the newer technology common today, expanding the plant in this manner is not economical and is not the prudent choice. This alternative is therefore not considered further.

### 7.3.6 Comparison of Treatment Alternatives

Three primary alternatives were discussed to address the City's treatment needs within this planning effort. To summarize, the three alternatives considered are:

1. Expand the existing water treatment plant utilizing membrane technology and utilize portions of the existing facility.
2. Construct a new treatment facility (utilizing membranes) on an alternative site, potentially near the upper reservoir.
3. Construct a desalination facility on an alternative site and treat sea or brackish water to produce potable water.

A brief discussion of each major alternative is provided below. An effort was made to discuss the pro's and con's of each alternative and identify any fatal flaws and other information useful in making a decision as to which direction the City should move with regard to water treatment.

**Alternative 1: New Plant at Existing Site.** This alternative would take advantage of property currently owned by the City. It would also provide some potential for utilizing existing facilities including existing office and storage areas, existing laboratory facilities, existing clearwell volume, and other facilities. The alternative would also allow the new improvements to be constructed while the existing plant provides potable water service to the community.

**Pro's of Alternative 1- New Plant at Big Creek:**

- Lowest cost
- Utilize existing facilities
- Close to Big Creek water supplies
- City owns property already

**Con's of Alternative 1 – New Plant at Big Creek:**

- Site has limited unused space
- Some of the site is within a flood plain
- Demolition costs
- Potential seismic code issues when retrofitting existing facilities
- Will need to construct raw water piping from upper reservoir to bypass the lower reservoir

**Alternative 2: Construct a new Facility at Alternative Site.** This alternative addresses concerns with the Alternative 1 plan. Utilizing an alternative site would allow the existing plant to be abandoned or demolished after the new plant is placed in service. It would also avoid potential seismic code issues related to the existing structure. Potential sites considered included locating the plant near the upper reservoir as well as locating the plant near the two large storage reservoirs.

**Pro's of Alternative 2 – New Plant at Alternative Site:**

- Avoid potential seismic retrofitting issues
- The City could avoid working in a crowded space on the existing site
- The facility could be fully planned out from "scratch"
- The facility would not have to rely on any existing components

**Con's of Alternative 2 – New Plant at Alternative Site:**

- City does not own other suitable property – property acquisition costs
- Potentially more piping required to access site
- Potentially higher costs for pumping facilities and power

- Most likely to have a higher development cost than utilizing the existing site and some of the existing components

**<u>Alternative 3: Desal</u>**. This alternative would address the City's need to expand raw water supplies by utilizing sea or brackish water as a raw water source. The development of this alternative would most likely require the City to obtain property nearer to the source, and construct new facilities for the raw water intake, pretreatment facilities, and RO membranes. Additional considerations would have to be made to deal with the significant waste stream that will be produced from a desal process.

**Pro's of Alternative 3 – Desal:**

- Potentially limitless supply of raw water
- Potable water quality is high when using RO
- Desal technology is improving and costs are going down

**Con's of Alternative 3 – Desal:**

- High capital and operating costs when compared to fresh sources
- Significant waste stream disposal issue
- May be difficult to obtain water rights
- Treatment costs greatly impacted by electrical costs

### 7.3.7 Other Alternatives

In addition to the three primary treatment alternatives discussed above, two other alternatives involving both source water supply and water treatment improvements have been considered in conjunction with the possible future development of Rocky Creek as a municipal water source. The alternatives involving Rocky Creek include either the construction of a dam and transmission system to send additional raw water to the Big Creek site for treatment, or the construction of a dam and water treatment facility at Rocky Creek. In either case, water treatment improvements would need to be completed at the Big Creek site to allow continued use of the current source and provide for the City's short-term water needs. If a water treatment plant were constructed at Rocky Creek, it would allow for smaller capacity improvements to be completed at Big Creek. Neither of these alternatives has been fully developed at this time as the costs associated with construction of a dam and potentially an additionally water treatment plant are expected to be far greater than the other alternatives considered.

The Rocky Creek Dam and facilities have been under consideration for some time, including the option of providing raw or treated water to Newport and possibly other surrounding communities. The project becomes more viable when Lincoln City and other communities are included, resulting in a regional water system improvement project with costs shared among multiple entities. Environmental, political, and technical issues are significant. However, Newport will require additional raw water supplies in the future based on the long term projections developed herein. The City and their neighbors should be vigilant over the coming years to continue working on the development of future water supplies.

### 7.3.8 Treatment Alternative Cost Comparison

A comparison of capital costs, operating costs, and the potential impact to a typical rate payer is useful when considering these treatment and water supply alternatives. Table 7.3.7 illustrates the comparative costs for each alternative. The following data was utilized for this comparison:

- An analysis of water consumption records suggests that there are approximately 11,269 equivalent dwelling units (EDU's) in the City's water system including all residential, commercial, and industrial water consumption. Normalizing all of the water use in the system to a base equivalent dwelling unit allows analysis and insight into the estimated impact to a typical household customer.
- Operation and maintenance costs estimated from existing budgetary figures for the Big Creek facilities and from industry standards for the desal facilities.

**Table 7.3.8 – Treatment Alternative Cost Comparison Summary**

| Supply/Treatment Option | Big Creek, WTP, 7 MGD | Rocky Creek Dam 7 MGD* | Rocky Creek Dam 10 MGD* | Desalination, 7 MGD |
|---|---|---|---|---|
| | | | | |
| Total estimated project costs | $14,619,780 | $60,765,340 | $64,078,840 | $71,881,200 |
| | | | | |
| Total estimated annual operating costs | $120,000 | $120,000 | $150,000 | $3,960,250 |
| | | | | |
| Annual payments on a 20 year, 6% interest | $1,274,619 | $5,297,799 | $5,586,685 | $6,266,931 |
| | | | | |
| Cost per day comparison (O&M and Capital) | $3,820.87 | $14,843.29 | $15,716.95 | $28,019.67 |
| | | | | |
| Cost of water per 1000 gallons | $0.55 | $2.12 | $2.25 | $4.00 |
| | | | | |
| Avg. rate increase for 11,269 EDU's | $10.31 | $40.06 | $42.42 | $75.63 |

* Assumes treatment will be provided at the Big Creek site

Based on the above analysis, the estimated impact to the average rate payer varies from a low of just over $10 per month for the Big Creek Alternative to a high of over $75 per month for implementation of a desal alternative.

Based on a financial analysis, the most cost effective alternative to address the treatment needs is to implement Alternative 1 and expand and upgrade the existing facility at Big Creek. It is worth reiterating that additional reserves will be required before the end of the planning period and the City should diligently work toward a permanent solution. This should include further consideration and discussion regarding the Rocky Creek and Big Creek dams.

## 7.4 Treated Water Storage Alternatives

### 7.4.1 Current Deficiencies and Need

Section 4.2.3 discusses storage needs and goals and Section 5.3 describes the existing storage facilities in Newport. Existing total system storage volume is 8.2 million gallons when all tanks are at maximum operating levels. The estimated planning period storage need is coincidently also 8.2 million gallons. Thus from quantity standpoint alone the existing storage volume is adequate for the planning period. However, due to the lack of a significant storage tank at the north end of town, the system is not able to properly deliver fire flows to areas north of NW 66$^{th}$ Street. This deficiency was identified in past planning efforts as well and steps have been taken, including land acquisition and 12-inch piping extensions, to accommodate a future storage tank on NE 71$^{st}$ Street called the "Agate Beach Lower Storage Tank". The tank will be installed in the main pressure zone with a water surface elevation of 275 feet.

To ensure proper delivery of water from this tank to the Agate Beach area and those areas north of 66$^{th}$ Street, additional 12-inch piping is required to tie the proposed tank to the system. As previously stated, 12-inch piping was installed in the past on NE 71$^{st}$ Street in preparation of the Agate Beach Lower Tank.

New 12-inch is needed to connect the tank to the upper end of the existing 12-inch. In addition, new 12-inch is required to connect the lower end of the existing 12-inch on NE 71st Street to the existing 12-inch backbone piping through Agate Beach along Highway 101. The proposed Agate Beach Lower Tank will not replenish properly with water from the treatment plant unless this 12-inch backbone is completed.

Since the 12-inch piping described above is crucial to both water delivery from the tank as well as proper re-filling of the tank, it is included as an integral part of the tank cost. Estimated cost for the Agate Beach Lower Tank and associated connection piping is presented below.

**Table 7.4.1 – Agate Beach Lower Storage Tank Cost Estimate**

| **Agate Beach Lower Storage Tank - 1.0 MG GFS** | | | | | |
|---|---|---|---|---|---|
| **Item No.** | **Description** | **Units** | **Quantity** | **Unit Cost** | **Total Cost** |
| 1 | Bonds, Insurance, Overhead, and Mobilization Costs | ls | 100% | $180,000.00 | $180,000 |
| 2 | Grading and Site Preparation | ls | 100% | $25,000.00 | $25,000 |
| 3 | 12-inch piping intertie into system | lf | 4,300 | $80.00 | $344,000 |
| 4 | Site Piping, Valves, Flow Meter and Vault | ls | 100% | $50,000.00 | $50,000 |
| 5 | 1.0 MG GFS Bolted Tanks | ls | 1 | $750,000.00 | $750,000 |
| 6 | Level Sensing and Telemetry | ls | 100% | $15,000.00 | $15,000 |
| 7 | Site Fencing | ls | 100% | $20,000.00 | $20,000 |
| | | Construction Total | | | $1,384,000 |
| | | Contingency (20%) | | | $276,800 |
| | | Subtotal | | | $1,660,800 |
| | | Engineering (18%) | | | $298,950 |
| | | Administrative costs (3%) | | | $49,825 |
| | | **Total Project Costs** | | | **$2,009,575** |

## 7.4.2 Future Storage Needs

As discussed in Section 5.3.3, the 100-year old concrete Shop tanks will require replacement at some point. Considering the age and condition of the tanks, it is prudent to plan for replacement during this planning period (within the next 20 years). Probable cost data for this project is presented below.

**Table 7.4.2a – City Shops Storage Tank Cost Estimate**

| **City Shops Tank Replacement - 1.0 MG GFS** | | | | | |
|---|---|---|---|---|---|
| **Item No.** | **Description** | **Units** | **Quantity** | **Unit Cost** | **Total Cost** |
| 1 | Bonds, Insurance, Overhead, and Mobilization Costs | ls | 100% | $155,000.00 | $155,000 |
| 2 | Demolition | ls | 100% | $85,000.00 | $85,000 |
| 3 | Grading and Site Preparation | ls | 100% | $20,000.00 | $20,000 |
| 4 | Site Piping, Valves, Flow Meter and Vault | ls | 100% | $50,000.00 | $50,000 |
| 5 | 1.0 MG GFS Bolted Tanks | ls | 1 | $750,000.00 | $750,000 |
| 6 | Level Sensing and Telemetry | ls | 100% | $15,000.00 | $15,000 |
| 7 | Site Fencing | ls | 100% | $20,000.00 | $20,000 |
| | | Construction Total | | | $1,095,000 |
| | | Contingency (20%) | | | $219,000 |
| | | Subtotal | | | $1,314,000 |
| | | Engineering 18%) | | | $236,520 |
| | | Administrative costs (3%) | | | $6,570 |
| | | Land Acquisition | | | $100,000 |
| | | **Total Project Costs** | | | **$1,657,090** |

Much of the remaining land available for development in the Agate Beach area is higher in elevation than can be served by gravity from the main pressure zone. Currently, service to these areas is provided by the NE 54th St. Booster Pump Station with fire protection dependent on multiple pumps running and grid power supply active. Depending on the rate of development, a storage tank constructed above the main pressure zone with a water surface of 360 to 400 feet should be considered. With completion of the Agate Beach Upper Storage Tank it will be possible to simplify the NE 54th St. BPS to function as a tank fill pump station only. It may also be possible to eliminate the Smith Storage Tank.

### Table 7.4.2b – Agate Beach Upper Storage Tank Cost Estimate

| **Agate Beach Upper Storage Tank - 1.0 MG GFS** | | | | | |
|---|---|---|---|---|---|
| **Item No.** | **Description** | **Units** | **Quantity** | **Unit Cost** | **Total Cost** |
| 1 | Bonds, Insurance, Overhead, and Mobilization Costs | ls | 100% | $150,000.00 | $150,000 |
| 2 | Grading and Site Preparation | ls | 100% | $20,000.00 | $20,000 |
| 3 | 12-inch piping intertie into system | lf | 1,560 | $80.00 | $124,800 |
| 4 | Site Piping, Valves, Flow Meter and Vault | ls | 100% | $50,000.00 | $50,000 |
| 5 | 1.0 MG GFS Bolted Tanks | ls | 1 | $750,000.00 | $750,000 |
| 6 | Level Sensing and Telemetry | ls | 100% | $15,000.00 | $15,000 |
| 7 | Site Fencing | ls | 100% | $20,000.00 | $20,000 |
| | | Construction Total | | | $1,129,800 |
| | | Contingency (20%) | | | $225,960 |
| | | Subtotal | | | $1,355,760 |
| | | Engineering (18%) | | | $244,037 |
| | | Administrative costs (3%) | | | $40,673 |
| | | Land Acquisition | | | $100,000 |
| | | **Total Project Costs** | | | **$1,740,470** |

The need for a second storage tank at the south end of the City will be dictated by development patterns and rates. At this time, much of the south portion of the City is served by the Seal Rock Water District. Much of the south end of town, including the airport, is too high for gravity service from Newport's current facilities. For this planning period such a tank is not needed for hydraulic or for storage volume reasons however significant growth at the extreme southern end of town could change this as could a change in the Seal Rock/Newport service boundary. A site on King Ridge has been identified as the likely location for a southern tank and a cost is presented below.

### Table 7.4.2c – King Ridge Storage Tank Cost Estimate

| **King Ridge Storage Tank - 1.0 MG GFS** | | | | | |
|---|---|---|---|---|---|
| **Item No.** | **Description** | **Units** | **Quantity** | **Unit Cost** | **Total Cost** |
| 1 | Bonds, Insurance, Overhead, and Mobilization Costs | ls | 100% | $250,000.00 | $250,000 |
| 2 | Grading and Site Preparation | ls | 100% | $20,000.00 | $20,000 |
| 3 | 12-inch piping intertie into system | lf | 8,000 | $80.00 | $640,000 |
| 4 | Site Piping, Valves, Flow Meter and Vault | ls | 100% | $50,000.00 | $50,000 |
| 5 | 1.0 MG GFS Bolted Tanks | ls | 1 | $750,000.00 | $750,000 |
| 6 | Level Sensing and Telemetry | ls | 100% | $15,000.00 | $15,000 |
| 7 | Site Fencing | ls | 100% | $20,000.00 | $20,000 |
| | | Construction Total | | | $1,745,000 |
| | | Contingency (20%) | | | $349,000 |
| | | Subtotal | | | $2,094,000 |
| | | Engineering (18%) | | | $376,920 |
| | | Administrative costs (3%) | | | $62,820 |
| | | Land Acquisition | | | $100,000 |
| | | **Total Project Costs** | | | **$2,533,740** |

# 7.5 Distribution Alternatives

## 7.5.1 Analysis and Deficiencies

The water distribution system piping and storage network was analyzed using WaterCAD V8. Spatial layout of piping was imported from the AutoCAD base maps developed from aerial photographs and GIS shape files. Elevation data for pipe nodes was taken from topographical data developed by others through aerial photogrammetric methods. The system was analyzed for existing and future conditions to determine where deficiencies exist as well as the optimal correction alternatives. Criteria for determining system problems include the need to accommodate peak hourly flows while maintaining near normal pressures, and the need to provide fire flows during maximum day water demands while maintaining at least 20 psi in the system. Section 4.2.4 and 4.2.5 discuss system capacity and fire flow goals.

Deficiencies in pipe capacity such as inadequate pipe size and/or lack of sufficient looping create restrictions which prevent proper flow to fire hydrants or excessive pressure drops during peak demands. Additionally, hydrant spacing can be too great leading to lengthy hose pulls to reach buildings. Figures 5.5-2a through 5.5-2c show existing hydrant spacing and identify areas where additional hydrants may be added over time to cover gaps. Such minor projects which merely require adding a fire hydrant to existing piping are not detailed in this Plan. Areas where significant fire flow deficiencies exist and improvements are needed include:

1) All areas of the City north of NW 66$^{th}$ Street
2) Bottleneck area between NE 36$^{th}$ Street and Circle Way, including Golf Course Drive
3) All areas along Hwy. 101 south of South Beach State Park
4) All of the Idaho Point Area
5) Lakewood Area
6) Various minor areas where small pipe (less than 6") exists and hydrants are needed

A system map showing general fire flow/capacity problem areas is presented in Figure 7.5. Other water distribution system issues include:

1) Only single Bay crossing pipe
2) Suspected leakage in 8-inch along Hwy. 101 in wetland area north of SE 62$^{nd}$ St.
3) Poor water turn-over and slow filling in South Beach Tank
4) Aging pump stations

## 7.5.2 Piping Improvements - South

To correct the fire flow deficiencies at the south end of the Newport water system, to facilitate delivery of water to and from the South Beach Tank, and to eliminate significant leakage in the piping along the wetland area north of SE 62$^{nd}$ St. and south of SE 50$^{th}$ St., additional 12-inch piping is recommended. First, the existing 12-inch piping in South Shore should be connected to the Hwy. 101 8-inch piping by boring or directional drilling and installing a new 12-inch pipe under the Highway. With this connection completed, the existing 8-inch piping through the wetland area can be abandoned. Second, new 12-inch piping should be installed from just north of SE 50$^{th}$ St. to SE 40$^{th}$ St. providing a better connection between the South Beach tank piping and the 12-inch primary looping. The cost for this 12-inch pipe is presented below:

### Table 7.5.2-1 – Hwy. 101 SE 40th to 50th and Bore Piping Cost Estimate

| Highway 101 SE 40th to 50th Waterline, Hwy. Bore Crossing | | | | | |
|---|---|---|---|---|---|
| **Item No.** | **Description** | **Units** | **Quantity** | **Unit Cost** | **Total Cost** |
| 1 | Bonds, Insurance, Overhead, and Mobilization Costs | ls | 100% | $40,000.00 | $40,000 |
| 2 | 2" Waterline extensions | lf | 300 | $38.00 | $11,400 |
| 3 | 12-inch Waterline | lf | 2900 | $80.00 | $232,000 |
| 4 | 12-inch Directional Drill Waterline | lf | 125 | $300.00 | $37,500 |
| 5 | Fire Hydrant Assemblies | ea | 4 | $3,000.00 | $12,000 |
| 6 | Fittings and appurtenances | ls | 100% | $25,000.00 | $25,000 |
| | | Construction Total | | | $357,900 |
| | | Contingency (20%) | | | $71,580 |
| | | Subtotal | | | $429,480 |
| | | Engineering (20%) | | | $85,896 |
| | | Administrative costs (3%) | | | $12,884 |
| | | **Total Project Costs** | | | **$528,260** |

To eliminate a dead-end pipe and correct a fire flow deficiency the 2-inch piping on SW Coho St. should be replaced with new 8-inch from SW 27th to SW 29th.

### Table 7.5.2-2 – SW Coho Piping Cost Estimate

| SW Coho Street (27th to 29th) Waterline Replacement | | | | | |
|---|---|---|---|---|---|
| **Item No.** | **Description** | **Units** | **Quantity** | **Unit Cost** | **Total Cost** |
| 1 | Bonds, Insurance, Overhead, and Mobilization Costs | ls | 100% | $10,000.00 | $10,000 |
| 2 | 8-inch Waterline | lf | 700 | $80.00 | $56,000 |
| 3 | Fittings and appurtenances | ls | 100% | $6,000.00 | $6,000 |
| | | Construction Total | | | $72,000 |
| | | Contingency (20%) | | | $14,400 |
| | | Subtotal | | | $86,400 |
| | | Engineering (20%) | | | $17,280 |
| | | Administrative costs (3%) | | | $2,590 |
| | | **Total Project Costs** | | | **$106,270** |

### 7.5.3 Piping Improvements – Bay Crossing

A significant system vulnerability is the single 12-inch ductile iron bay-crossing pipe installed in 1973 which conveys water to all areas south of Yaquina Bay. A failure of this line could not be repaired quickly and would leave the entire area south of the Bay with only the storage in the South Beach Tank. Most of the developed bay front with steep terrain immediately behind Bay Boulevard is not conducive to bore pit construction. Likely areas for feasible construction occur east of Vista Drive with a crossing beginning at the point of land holding the LNG tank. Likely termination locations are near the Hatfield Marine Science Center or Idaho Point.

Two locations have been considered for potential horizontal directional drilling installation of a new redundant Bay crossing pipe. The first option begins at McLean Point, roughly parallels the existing bay crossing waterline, and terminates near the Hatfield Marine Science Center (HMSC). The second option begins near the LNG tank and ends at Idaho Point. The Idaho Point option involves more piping in order to connect to the existing system.

**Table 7.5.3-1 – Bay Crossing, HMSC Option Cost Estimate**

| 12" Redundant Bay Crossing, HMSC Option | | | | | |
|---|---|---|---|---|---|
| **Item No.** | **Description** | **Units** | **Quantity** | **Unit Cost** | **Total Cost** |
| 1 | Bonds, Insurance, Overhead, and Mobilization Costs | ls | 100% | $100,000.00 | $100,000 |
| 2 | Ingress and egress pits and accommodations | ls | 100% | $90,000.00 | $90,000 |
| 3 | 12-inch directional drill installed HDPE | lf | 2400 | $300.00 | $720,000 |
| 4 | 12-inch Waterline | lf | 1000 | $80.00 | $80,000 |
| 5 | PRV Station | ls | 100% | $65,000.00 | $65,000 |
| 6 | Fittings and appurtenances | ls | 100% | $30,000.00 | $30,000 |
| 7 | Surface restoration and misc. civil | ls | 100% | $40,000.00 | $40,000 |
| | | Construction Total | | | $1,125,000 |
| | | Contingency (20%) | | | $225,000 |
| | | Subtotal | | | $1,350,000 |
| | | Engineering (20%) | | | $270,000 |
| | | Administrative costs (3%) | | | $40,504 |
| | | **Total Project Costs** | | | **$1,660,504** |

**Table 7.5.3-2 – Bay Crossing, Idaho Point Option Cost Estimate**

| 12" Redundant Bay Crossing, Idaho Point Option | | | | | |
|---|---|---|---|---|---|
| **Item No.** | **Description** | **Units** | **Quantity** | **Unit Cost** | **Total Cost** |
| 1 | Bonds, Insurance, Overhead, and Mobilization Costs | ls | 100% | $140,000.00 | $140,000 |
| 2 | Ingress and egress pits and accommodations | ls | 100% | $40,000.00 | $40,000 |
| 3 | 12-inch directional drill installed HDPE | lf | 2900 | $300.00 | $870,000 |
| 4 | 12-inch Waterline | lf | 4700 | $80.00 | $376,000 |
| 5 | PRV Station | ls | 100% | $65,000.00 | $65,000 |
| 6 | Fittings and appurtenances | ls | 100% | $40,000.00 | $40,000 |
| 7 | Surface restoration and misc. civil | ls | 100% | $50,000.00 | $50,000 |
| | | Construction Total | | | $1,581,000 |
| | | Contingency (20%) | | | $316,200 |
| | | Subtotal | | | $1,897,200 |
| | | Engineering (20%) | | | $379,440 |
| | | Administrative costs (3%) | | | $56,920 |
| | | **Total Project Costs** | | | **$2,333,560** |

### 7.5.4 Piping Improvements – Idaho Point

The Idaho Point area is supplied with a long run (4000 feet) of single 6-inch piping and piping along the streets is too small to allow fire flows. In addition, pressures at the highest areas of the Point are marginal when served by the South Beach Tank. Service is being improved with connection to the OCCC booster pump station however fire protection will still not be available due to the undersized piping. Gravity service to the Point appears feasible if the redundant bay crossing to the Point is constructed. Regardless of how water supply reaches Idaho Point, replacement of the undersized piping at the end of the Point is required to allow fire flows. The cost to install an 8-inch loop at the Point to replace the existing 2- and 4-inch pipe is presented below.

**Table 7.5.4-1 – Idaho Point Piping Cost Estimate**

| **Idaho Point Waterline Replacement and Looping** | | | | | |
|---|---|---|---|---|---|
| **Item No.** | **Description** | **Units** | **Quantity** | **Unit Cost** | **Total Cost** |
| 1 | Bonds, Insurance, Overhead, and Mobilization Costs | ls | 100% | $40,000.00 | $40,000 |
| 2 | 8-inch Waterline | lf | 4530 | $70.00 | $317,100 |
| 3 | Fire Hydrant Assemblies | ea | 4 | $3,000.00 | $12,000 |
| 4 | Fittings and Appurtenances | ls | 100% | $20,000.00 | $20,000 |
| | | Construction Total | | | $389,100 |
| | | Contingency (20%) | | | $77,820 |
| | | Subtotal | | | $466,920 |
| | | Engineering (20%) | | | $93,385 |
| | | Administrative costs (3%) | | | $14,010 |
| | | **Total Project Costs** | | | **$574,315** |

If the Idaho Point redundant bay crossing pipe option is constructed, the 4000 feet of undersized 6-inch piping currently feeding Idaho Point could be abandoned. If the less expensive HMSC bay crossing option was constructed, this 4000 feet of pipe would need to be replaced with 12-inch to allow fire flows from the OCCC pump station; bringing the total cost to around that of the more expensive Idaho Point bay crossing option.

### 7.5.5 Piping Improvements - North

The proposed Agate Beach Lower Storage Tank and associated connecting piping corrects almost all fire protection problems in the City north of NW 66th Street with the exception of fire flows along the northernmost section of 6-inch along Highway 101. To correct this deficiency and to eliminate a dead-end pipe run, an 8-inch pipe is proposed to connect the end of NE Avery St. to the 6-inch on Hwy. 101.

**Table 7.5.5-1 – NE Avery Street Loop Closure Cost Estimate**

| **NE Avery Street Loop Closure** | | | | | |
|---|---|---|---|---|---|
| **Item No.** | **Description** | **Units** | **Quantity** | **Unit Cost** | **Total Cost** |
| 1 | Bonds, Insurance, Overhead, and Mobilization Costs | ls | 100% | $8,000.00 | $8,000 |
| 2 | 8-inch Waterline | lf | 370 | $70.00 | $25,900 |
| 3 | 8-inch Directional Drill Waterline | lf | 120 | $300.00 | $36,000 |
| 4 | Fittings and appurtenances | ls | 100% | $6,500.00 | $6,500 |
| | | Construction Total | | | $76,400 |
| | | Contingency (20%) | | | $15,280 |
| | | Subtotal | | | $91,680 |
| | | Engineering (20%) | | | $18,340 |
| | | Administrative costs (3%) | | | $2,750 |
| | | **Total Project Costs** | | | **$112,770** |

Adequate fire flows are not available along Golf Course Drive and along the east side of Highway 101 from NE 36th Street to Circle Way. Existing 12-inch piping connecting to the main core, the treatment plant, and main storage tanks extends northward but stops at 36th Street. 12-inch backbone piping along the Highway is also available at Circle Way but the connection in between these two 12-inch pipes has not yet been completed creating a bottleneck in capacity. The 4-inch piping on Golf Course Drive is also inadequate for conveying even minimum fire flows.

To remedy this problem area, the 12-inch piping should be extended from NE 36th to 40th Street where new 8-inch can be connected and then installed to replace the existing 4-inch along Golf Course Drive. Between NE 40th and Circle Way, the existing 4-inch piping along the east side of the Highway should be replaced with 12-inch to complete the backbone and provide fire flows without the need to pull fire hose across the Highway.

### Table 7.5.5-2 – Highway 101, NE 36th to NE 40th Waterline Cost Estimate

| Highway 101 NE 36th to NE 40th Waterline | | | | | |
|---|---|---|---|---|---|
| **Item No.** | **Description** | **Units** | **Quantity** | **Unit Cost** | **Total Cost** |
| 1 | Bonds, Insurance, Overhead, and Mobilization Costs | ls | 100% | $20,000.00 | $20,000 |
| 2 | 12-inch Waterline | lf | 1400 | $80.00 | $112,000 |
| 3 | Fire Hydrant Assemblies | ea | 3 | $3,000.00 | $9,000 |
| 4 | Fittings and appurtenances | ls | 100% | $14,000.00 | $14,000 |
| | | Construction Total | | | $155,000 |
| | | Contingency (20%) | | | $31,000 |
| | | Subtotal | | | $186,000 |
| | | Engineering (20%) | | | $37,200 |
| | | Administrative costs (3%) | | | $5,580 |
| | | **Total Project Costs** | | | **$228,780** |

### Table 7.5.5-3 – Golf Course Drive Waterline Cost Estimate

| NE 40th and Golf Course Drive Waterline Replacement | | | | | |
|---|---|---|---|---|---|
| **Item No.** | **Description** | **Units** | **Quantity** | **Unit Cost** | **Total Cost** |
| 1 | Bonds, Insurance, Overhead, and Mobilization Costs | ls | 100% | $25,000.00 | $25,000 |
| 2 | 8-inch Waterline | lf | 2800 | $70.00 | $196,000 |
| 3 | Fire Hydrant Assemblies | ea | 6 | $3,000.00 | $18,000 |
| 4 | Fittings and appurtenances | ls | 100% | $25,000.00 | $25,000 |
| | | Construction Total | | | $264,000 |
| | | Contingency (20%) | | | $52,800 |
| | | Subtotal | | | $316,800 |
| | | Engineering (20%) | | | $63,360 |
| | | Administrative costs (3%) | | | $9,510 |
| | | **Total Project Costs** | | | **$389,670** |

### Table 7.5.5-4 – Highway 101, NE 40th to Circle Way Waterline Cost Estimate

| Highway 101 NE 40th to Circle Way Waterline Replacement | | | | | |
|---|---|---|---|---|---|
| **Item No.** | **Description** | **Units** | **Quantity** | **Unit Cost** | **Total Cost** |
| 1 | Bonds, Insurance, Overhead, and Mobilization Costs | ls | 100% | $35,000.00 | $35,000 |
| 2 | 12-inch Waterline | lf | 3400 | $80.00 | $272,000 |
| 3 | Fire Hydrant Assemblies | ea | 4 | $3,000.00 | $12,000 |
| 4 | Fittings and appurtenances | ls | 100% | $26,000.00 | $26,000 |
| | | Construction Total | | | $345,000 |
| | | Contingency (20%) | | | $69,000 |
| | | Subtotal | | | $414,000 |
| | | Engineering (20%) | | | $82,800 |
| | | Administrative costs (3%) | | | $12,420 |
| | | **Total Project Costs** | | | **$509,220** |

The existing 6-inch on Crestview Place has insufficient capacity to convey adequate fire flow to the hydrant near the cul-de-sac. In addition, the 2-inch and 4-inch piping on 17th Court is undersized. To correct the fire flow problem and eliminate two dead-end pipe runs, it is recommended that new piping be installed on 17th Court connecting to the end of the existing 6-inch on Crestview Place.

### Table 7.5.5-5 –Crestview Place to 17th Court Waterline Cost Estimate

| NE Crestview Pl. to 17th Ct. Waterline Loop | | | | | |
|---|---|---|---|---|---|
| **Item No.** | **Description** | **Units** | **Quantity** | **Unit Cost** | **Total Cost** |
| 1 | Bonds, Insurance, Overhead, and Mobilization Costs | ls | 100% | $9,000.00 | $9,000 |
| 2 | 8-inch Waterline | lf | 1000 | $70.00 | $70,000 |
| 3 | Fire Hydrant Assemblies | ea | 2 | $3,000.00 | $6,000 |
| 4 | Fittings and appurtenances | ls | 100% | $5,000.00 | $5,000 |
| | | Construction Total | | | $90,000 |
| | | Contingency (20%) | | | $18,000 |
| | | Subtotal | | | $108,000 |
| | | Engineering (20%) | | | $21,600 |
| | | Administrative costs (3%) | | | $3,240 |
| | | **Total Project Costs** | | | **$132,840** |

Significant sections of undersized 2-inch piping on NW 19th Street between Highway 101 and Nye Street and on NW Nye Street between NW 18th and 20th create an area where hydrants cannot be installed and fire flows are not available. It is recommended that this 2-inch piping be replaced and several fire hydrants installed.

### Table 7.5.5-6 – NW 19th and Nye Street Waterline Cost Estimate

| NW 19th (Nye St. to Hwy 101) and Nye St. (18th to 20th) Waterline | | | | | |
|---|---|---|---|---|---|
| **Item No.** | **Description** | **Units** | **Quantity** | **Unit Cost** | **Total Cost** |
| 1 | Bonds, Insurance, Overhead, and Mobilization Costs | ls | 100% | $10,000.00 | $10,000 |
| 2 | 8-inch Waterline | lf | 1000 | $70.00 | $70,000 |
| 3 | Fire Hydrant Assemblies | ea | 3 | $3,000.00 | $9,000 |
| 4 | Fittings and appurtenances | ls | 100% | $15,000.00 | $15,000 |
| | | Construction Total | | | $104,000 |
| | | Contingency (20%) | | | $20,800 |
| | | Subtotal | | | $124,800 |
| | | Engineering (20%) | | | $24,960 |
| | | Administrative costs (3%) | | | $3,750 |
| | | **Total Project Costs** | | | **$153,510** |

A long section of 2-inch pipe on NW Ocean View between NW 12th and NW 14th prevents fire flows in this area. In addition, three 2-inch dead-end pipe runs occur in this block. Replacing the 2-inch on Ocean View is recommended as well as replacing the connecting 2-inch on NW 13th and NW Lake Streets. This will solve the area fire flow problems and will eliminate three dead-end pipe runs.

### Table 7.5.5-7 – NW Ocean View Waterline Cost Estimate

| Ocean View (12th to 14th) Waterline Replacement, Loop 13th to 12th | | | | | |
|---|---|---|---|---|---|
| **Item No.** | **Description** | **Units** | **Quantity** | **Unit Cost** | **Total Cost** |
| 1 | Bonds, Insurance, Overhead, and Mobilization Costs | ls | 100% | $13,000.00 | $13,000 |
| 2 | 8-inch Waterline | lf | 1470 | $70.00 | $102,900 |
| 3 | Fire Hydrant Assemblies | ea | 3 | $3,000.00 | $9,000 |
| 4 | Fittings and appurtenances | ls | 100% | $8,000.00 | $8,000 |
| | | Construction Total | | | $132,900 |
| | | Contingency (20%) | | | $26,580 |
| | | Subtotal | | | $159,480 |
| | | Engineering (20%) | | | $31,896 |
| | | Administrative costs (3%) | | | $4,784 |
| | | **Total Project Costs** | | | **$196,160** |

A fire hydrant is needed at the intersection of NE Douglas and NE 5th Streets. This will require the replacement of the undersized 2-inch piping on NE 5th between Benton and Eads. Alternatively, the existing 4-inch piping on NE Douglas between NE 4th and 6th Streets could be replaced.

**Table 7.5.5-8 – NW 5th, Benton to Eads Waterline Cost Estimate**

| NE 5th St., Benton to Eads | | | | | |
|---|---|---|---|---|---|
| **Item No.** | **Description** | **Units** | **Quantity** | **Unit Cost** | **Total Cost** |
| 1 | Bonds, Insurance, Overhead, and Mobilization Costs | ls | 100% | $7,500.00 | $7,500 |
| 2 | 8-inch Waterline | lf | 820 | $70.00 | $57,400 |
| 3 | Fire Hydrant Assemblies | ea | 1 | $3,000.00 | $3,000 |
| 4 | Fittings and appurtenances | ls | 100% | $5,000.00 | $5,000 |
| | | Construction Total | | | $72,900 |
| | | Contingency (20%) | | | $14,580 |
| | | Subtotal | | | $87,480 |
| | | Engineering (20%) | | | $17,496 |
| | | Administrative costs (3%) | | | $2,624 |
| | | **Total Project Costs** | | | **$107,600** |

# 7.6 Distribution Pump Station Alternatives

## 7.6.1 Lakewood Pump Station

The Lakewood BPS contains two 10-Hp pumps which were relocated from an abandoned pump station. The pumps are at the end of their expected service life and are too small to provide fire protection in the service area. The Lakewood BPS should be replaced during the planning period with equipment designed to provide normal service to 50 lots and to provide fire flows. Discharge pressure should be reduced. A site with sufficient elevation to locate a storage tank is not available so fire flows must be provided with pumping equipment only. Either a diesel powered fire pump or an electric pump with a standby generator should be considered. Modern variable frequency drives can be utilized to eliminate the need for the large steel pressure tank at the top of the subdivision.

**Table 7.6.1 – Lakewood Pump Station Cost Estimate**

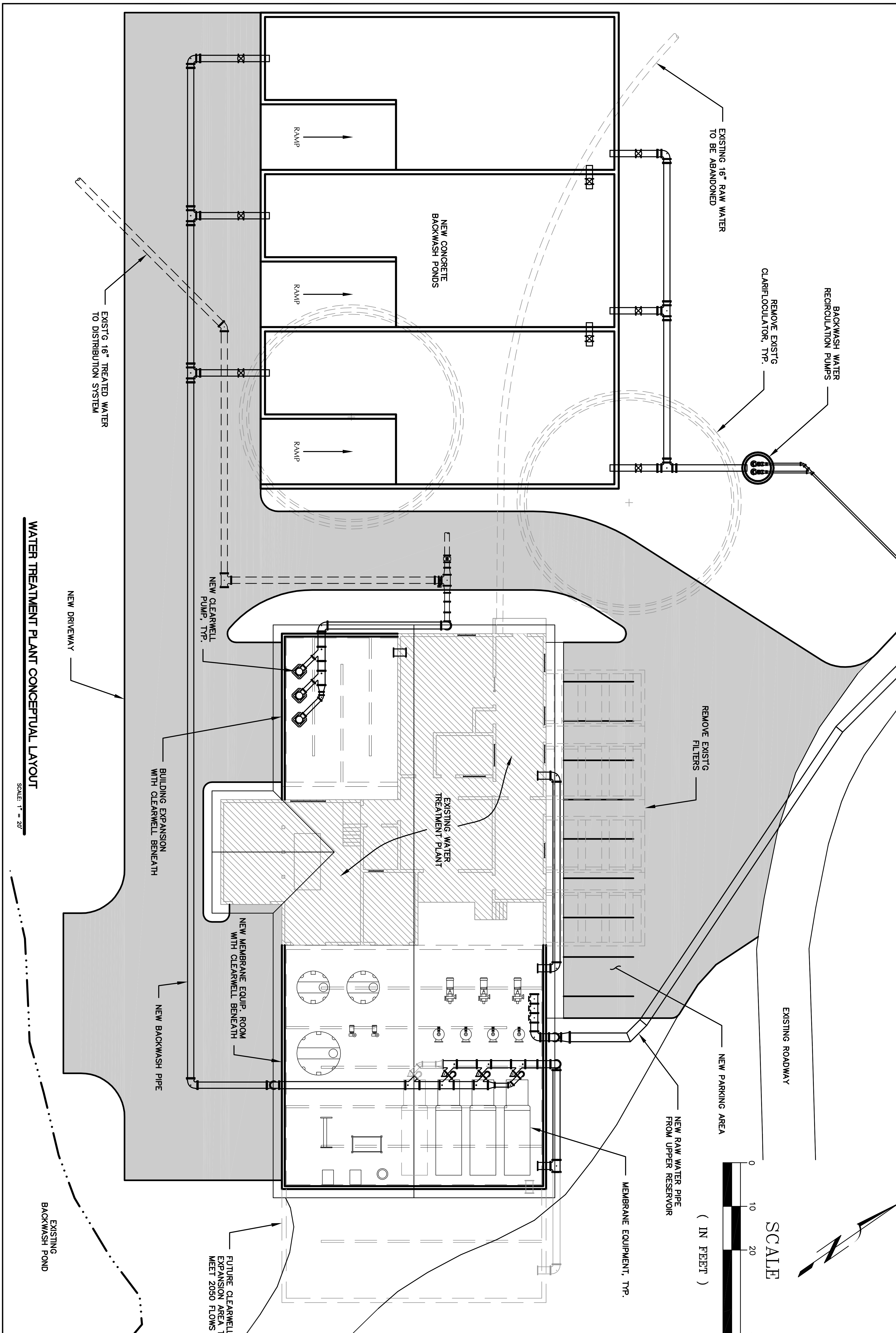
| Lakewood Pump Station Rehabilitation | | | | | |
|---|---|---|---|---|---|
| **Item No.** | **Description** | **Units** | **Quantity** | **Unit Cost** | **Total Cost** |
| 1 | Bonds, Insurance, Overhead, and Mobilization Costs | ls | 100% | $15,000.00 | $15,000 |
| 2 | Pumps and Drives | ls | 1 | $30,000.00 | $30,000 |
| 3 | Mechanical and Electrical Improvements | ls | All | $25,000.00 | $25,000 |
| 4 | Fire Pump | ls | 1 | $45,000.00 | $45,000 |
| 5 | Telemetry Upgrades | ls | All | $12,000.00 | $12,000 |
| | | Construction Total | | | $127,000 |
| | | Contingency (20%) | | | $25,400 |
| | | Subtotal | | | $152,400 |
| | | Engineering (20%) | | | $30,480 |
| | | Administrative costs (3%) | | | $4,570 |
| | | **Total Project Costs** | | | **$187,450** |

### 7.6.2 Candletree Pump Station

The Candletree PS is in fair condition but is inefficient and becoming antiquated. Refurbishment of the 20-year old PS should occur during the planning period. New pumping equipment can be placed inside the existing building however it will be necessary to maintain service during installation. It is likely that pumps matching the larger pumps in the newer Yaquina Heights BPS will adequately serve 20-year development of the Candletree PS service area.

**Table 7.6.2 – Candletree Pump Station Cost Estimate**

| **Candletree Pump Station Rehabilitation** | | | | | |
|---|---|---|---|---|---|
| **Item No.** | **Description** | **Units** | **Quantity** | **Unit Cost** | **Total Cost** |
| 1 | Bonds, Insurance, Overhead, and Mobilization Costs | ls | 100% | $18,000.00 | $18,000 |
| 2 | Pumps and Drives | ls | 1 | $75,000.00 | $75,000 |
| 3 | Mechanical and Electrical Improvements | ls | All | $35,000.00 | $35,000 |
| 4 | Telemetry Upgrades | ls | All | $12,000.00 | $12,000 |
| | | Construction Total | | | $140,000 |
| | | Contingency (20%) | | | $28,000 |
| | | Subtotal | | | $168,000 |
| | | Engineering (20%) | | | $33,600 |
| | | Administrative costs (3%) | | | $5,040 |
| | | **Total Project Costs** | | | **$206,640** |




CIVIL WEST Engineering Services, Inc.

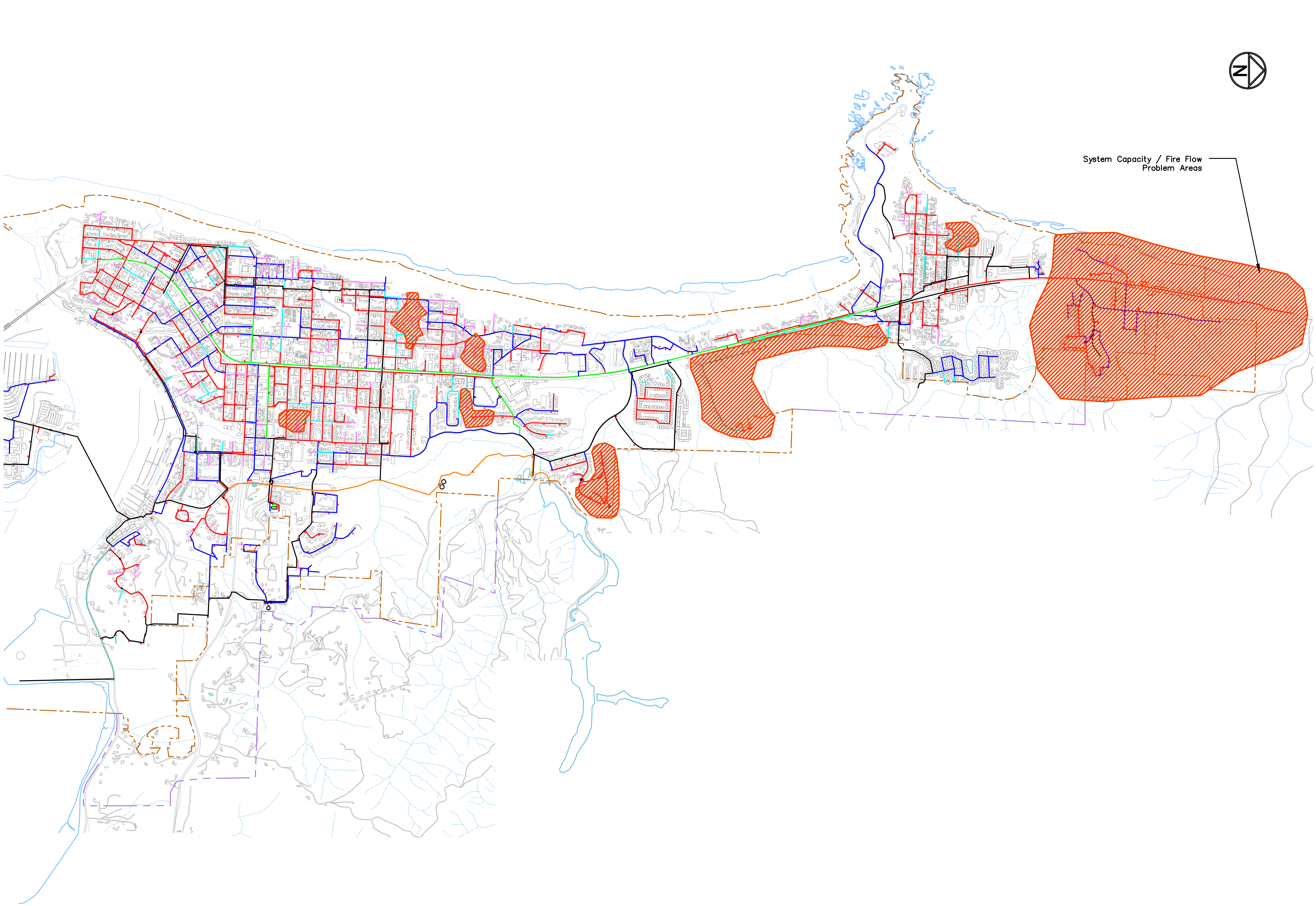
0 1"

DWG BY: DGN
DATE: OCT 20, 2008

WTP CONCEPTUAL LAYOUT

CITY OF NEWPORT
*WATER SYSTEM MASTER PLAN*

FIG 7.3.3




Civil West
Engineering Services, Inc.

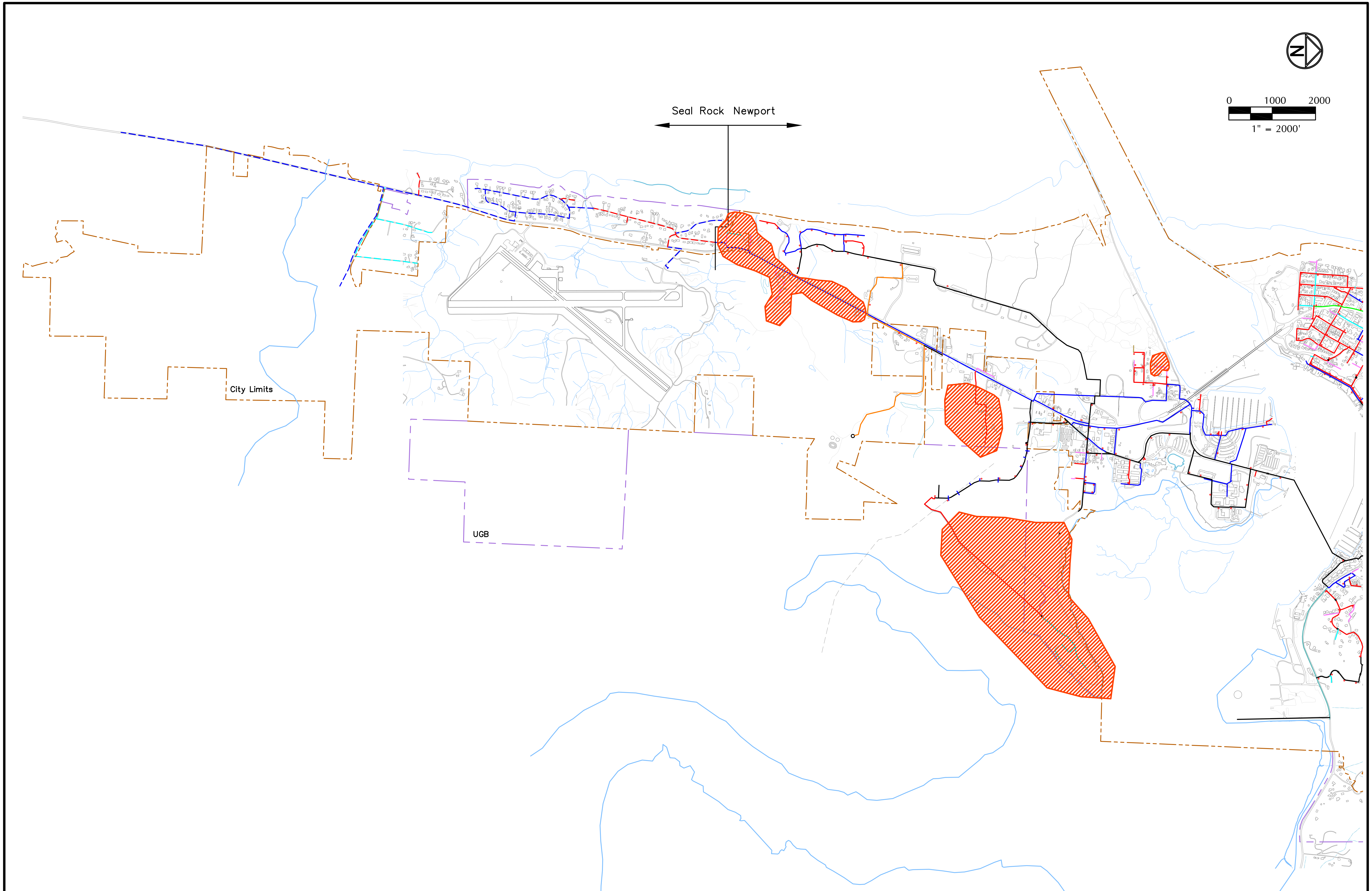
City of Newport
Lincoln County, Oregon

# Existing Water System Problem Areas

0 1"
1" = 2000'

DRAWN BY: REB
DATE: OCT. 24 2008

FIG. 7.5



Seal Rock Newport
City Limits
UGB
0 1000 2000
1" = 2000'
N

## 8.1 Capital Improvement Plan Purpose

This section describes the capital improvement plan for the City of Newport's water system as developed within this master planning effort. The capital improvement plan will include a combination of projects for each sector of the water system including:

- Raw Water Supply Projects
- Water Treatment Projects
- Treated Water Storage Projects
- Distribution System Projects

The project list developed within this master plan constitutes the current City of Newport Water System Capital Improvement Plan or CIP. The CIP will be used to establish system development charges, guide planning for improvements to the system, and aid the City in prioritizing and implementing improvements over time.

As needs arise or as new deficiencies are identified, additional projects may be added to the CIP. As projects are completed, they will transition from planned CIP projects to completed projects. Completed projects may still affect SDC planning if reimbursement SDCs are applicable.

The City should adopt the CIP and move forward in a deliberate manner to undertake high priority projects immediately. Other projects should be undertaken as need and funding availability dictates.

## 8.2 CIP Summary

The overall City of Newport Water System CIP is summarized below in Table 8.2. The projects listed in Table 8.2 are presented according to project type rather than priority. Prioritization follows later in this Section. Detailed descriptions and discussion about each recommended project is provided in Section 7 of this Master Plan.

The projects in Table 8.2 are grouped together as treatment projects (T), storage projects (S), distribution projects (D), and pump station projects (P). Individual project costs are shown for each project. A total CIP budget of just over $32-million dollars has been developed within this master plan.

Figure 8.1, located at the end of Section 8, illustrates the entire water system and shows the approximate location of each water system improvement project on the CIP.

**Table 8.2 – Water System CIP Summary**

| Project | Description | Project Budget |
|---|---|---|
| T1 | Big Creek Water Treatment Plant Improvements | $12,125,340 |
| T2 | Siletz River Pump Station - Pump Replacement | $642,060 |
| T3 | Upper Lake Siphon Intake | $612,540 |
| T4 | Raw Water Transmission Pipe, Dam to Plant | $1,239,840 |
| | | |
| S1 | Agate Beach Lower Storage Tank - 1.0 MG GFS | $2,009,575 |
| S2 | Agate Beach Upper Storage Tank - 1.0 MG GFS | $1,740,470 |
| S3 | City Shops Tank Replacement - 1.0 MG GFS | $1,657,090 |
| S4 | King Ridge Storage Tank - 1.0 MG GFS | $2,533,740 |
| | | |
| D1 | Highway 101 SE 40th to 50th Waterline, Hwy. Bore Crossing | $528,260 |
| D2 | 12" Redundant Bay Crossing, Idaho Point Option | $2,333,560 |
| D3 | Highway 101 NE 36th to NE 40th Waterline | $228,780 |
| D4 | Highway 101 NE 40th to Circle Way Waterline Replacement | $509,220 |
| D5 | NE 40th and Golf Course Drive Waterline Replacement | $389,670 |
| D6 | NE Crestview Pl. to 17th Ct. Waterline Loop | $132,840 |
| D7 | NE Avery Street Loop Closure | $112,770 |
| D8 | NW 19th (Nye St. to Hwy 101) and Nye St. (18th to 20th) Waterline | $153,510 |
| D9 | Ocean View (12th to 14th) Waterline Replacement, Loop 13th to 12th | $196,160 |
| D10 | | |
| D11 | SW Coho Street (27th to 29th) Waterline Replacement | $106,270 |
| D12 | Idaho Point Waterline Replacement and Looping | $574,315 |
| D13 | East Newport Waterline Extensions | $2,096,510 |
| D14 | Water Meter Replacement - Conversion to Touch Read Meters | $1,461,240 |
| D15 | NE 5th St., Benton to Eads | $107,600 |
| | | |
| P1 | Candletree Pump Station Rehabilitation | $206,640 |
| P2 | Lakewood Pump Station Rehabilitation | $187,450 |
| | Total CIP Budget Estimate | $31,885,451 |

# 8.3 Prioritization

To assist the City in implementing their CIP, this section is provided to summarize the recommended prioritization for the CIP projects. The City should schedule and undertake projects based on the prioritization recommendations within this section.

## 8.3.1 Priority 1- High Priority Projects

Priority 1 projects should be undertaken immediately, as soon as the City can fund and implement the improvement projects. Priority 1 projects on the CIP focus on core projects related to water treatment upgrades, fire protection and storage upgrades and critical distribution improvements.

Priority 1 projects should be considered critical for the continued operation and health of the City's water system and should be implemented within the next few years or as soon as funding is available to move forward. The majority of Priority 1 relates to replacement of the 50+ year old water treatment plant.

Table 8.3.1 summarizes the Priority 1 CIP projects for Newport.

**Table 8.3.1 – Priority 1 CIP Projects**

| Project No. | Description | Project Cost |
|---|---|---|
| T1 | Big Creek Water Treatment Plant Improvements | $12,125,340 |
| T3 | Upper Lake Siphon Intake | $612,540 |
| T4 | Raw Water Transmission Pipe, Dam to Plant | $1,239,840 |
| S1 | Agate Beach Lower Storage Tank - 1.0 MG GFS | $2,009,575 |
| D1 | Highway 101 SE 40th to 50th Waterline, Hwy. Bore Crossing | $528,260 |
| | **Total** | **$16,515,555** |

As shown above, priority 1 includes over $16.5-million in project costs.

### 8.3.2 Priority 2- Medium Priority Projects

Priority 2 projects should be undertaken as funding is available and as needs move the project(s) to the forefront. Development pressures, newly discovered deficiencies, failures, and other factors may drive the movement of projects from the Priority 2 list to the Priority 1 list.

Priority 2 projects focus on distribution improvements which are required to achieve fire flows in deficient areas and provide improved circulation and flow path redundancy. All priority 2 projects should be considered important and the City should be working toward implementing these projects during the first half of the planning period, or within the next 5 to 10 years.

Table 8.3.2 summarizes the Priority 2 CIP projects for Newport.

**Table 8.3.2 – Priority 2 CIP Projects**

| Project No. | Description | Project Cost |
|---|---|---|
| T2 | Siletz River Pump Station - Pump Replacement | $642,060 |
| D2 | 12" Redundant Bay Crossing, Idaho Point Option | $2,333,560 |
| D3 | Highway 101 NE 36th to NE 40th Waterline | $228,780 |
| D5 | NE 40th and Golf Course Drive Waterline Replacement | $389,670 |
| D6 | NE Crestview Pl. to 17th Ct. Waterline Loop | $132,840 |
| D7 | NE Avery Street Loop Closure | $112,770 |
| D8 | NW 19th (Nye St. to Hwy 101) and Nye St. (18th to 20th) Waterline | $153,510 |
| D9 | Ocean View (12th to 14th) Waterline Replacement, Loop 13th to 12th | $196,160 |
| D10 | 0 | $0 |
| D11 | SW Coho Street (27th to 29th) Waterline Replacement | $106,270 |
| D12 | Idaho Point Waterline Replacement and Looping | $574,315 |
| P1 | Candletree Pump Station Rehabilitation | $206,640 |
| P2 | Lakewood Pump Station Rehabilitation | $187,450 |
| D15 | NE 5th St., Benton to Eads | $107,600 |
| | **Total** | **$5,371,626** |

### 8.3.3 Priority 3- Low Priority Projects

Priority 3 projects should be undertaken as need necessitates the implementation of the improvement project and as funding is available. Development patterns and pressures and other factors will likely drive the need for priority 3 projects.

Priority 3 projects focus primarily on distribution improvements to improve circulation and flow, expansion of the distribution system into areas that are currently not served, and other general improvements. Priority 3 projects should be considered important but not critical to the system's current operation. The need and importance for priority 3 projects can change as conditions and circumstances change.

Table 8.3.3 summarizes the Priority 3 CIP projects for Newport.

**Table 8.3.3 – Priority 3 CIP Projects**

| Project No. | Description | Project Cost |
|---|---|---|
| D13 | East Newport Waterline Extensions | $2,096,510 |
| D4 | Highway 101 NE 40th to Circle Way Waterline Replacement | $509,220 |
| S2 | Agate Beach Upper Storage Tank - 1.0 MG GFS | $1,740,470 |
| S3 | City Shops Tank Replacement - 1.0 MG GFS | $1,657,090 |
| S4 | King Ridge Storage Tank - 1.0 MG GFS | $2,533,740 |
| D14 | Water Meter Replacement - Conversion to Touch Read Meters | $1,461,240 |
| | **Total** | **$9,998,270** |

It is important to note that Project D14, the conversion to Touch Read Water Meters, has been included as a lower priority since critical needs and fire flow deficiencies should come first. However, analysis provided by meter manufacturers suggests that the City can recoup the cost for this transition in a relatively short period of time and actually begin to save money in the long term. Should funding become available, the City should consider moving forward with this project.

## 8.4 SDC Update

The City of Newport adopted an updated SDC methodology in the early part of 2008. The updated methodology included recommendations for assessing SDCs for all of the City's infrastructure sectors. At the time, updated water master planning information was not yet available. Efforts were made to assemble an interim CIP from past water planning efforts and utilizing internal staff knowledge and feedback about project needs and issues and current assumptions about how project will be funded.

This interim planning, referred to as bridge planning, formed the water system CIP and was used to develop the water system SDC methodology for the City. The intent was to establish an interim methodology that could easily be updated once the master plan was completed and a new CIP was established.

The purpose of this section is to provide a summary of the information required to update the water system SDC methodology. Sections 7 and 8 of this master plan should be utilized by the City as supplementing documentation to their SDC methodology. The recommended water system SDC assessment provided in this section should be adopted by resolution and used for water SDC assessment by the City.

### 8.4.1 SDC Eligibility

An SDC methodology should include an assessment of the SDC eligibility of each improvement project. For a project to be SDC eligible, a nexus or cause/effect relationship should exist between growth and the need for the project or for the need to upsize a facility.

For example, if it is determined that a 500,000 gallon reservoir was needed to satisfy existing deficiencies, but planning suggested constructing a 1,000,000 gallon reservoir to accommodate growth in the system over the planning period, then the project could be considered to be 50% SDC eligible as half of the planned volume is required to address needs related to growth.

An effort was made to identify the SDC eligibility of each project on the CIP. For consistency with the existing SDC methodology, some completed projects are included on Table 8.4.1 for the purposes of calculating the reimbursement SDC later in this section. These projects are part of the current SDC methodology and should be included in the calculation of the updated SDC assessment.

In some cases, a project is planned to be funded, at least in part, by a GO bond. In these cases, the eligibility of these projects has been reduced to reflect the amount of GO bond funds that are anticipated to be used to fund each specific project based on preliminary planning provided by the City of Newport.

**Table 8.4.1 – SDC Eligibility for CIP Projects**

| Project No. | Project Description | Adjusted Cost Estimate (current) | Reimbursement SDC Eligible (Y/N) | Improvement SDC Eligible (Y/N) | % SDC Eligible | SDC Eligible Cost |
|---|---|---|---|---|---|---|
| T1 | Big Creek Water Treatment Plant Improvements | $12,125,340.00 | N | N | 0.00% | $0.00 |
| T3 | Upper Lake Syphon Intake | $612,540.00 | N | N | 0.00% | $0.00 |
| T4 | Raw Water Transmission Pipe, Dam to Plant | $1,239,840.00 | N | N | 0.00% | $0.00 |
| S1 | Agate Beach Lower Storage Tank - 1.0 MG GFS | $2,009,575.00 | N | N | 0.00% | $0.00 |
| D1 | Highway 101 SE 40th to 50th Waterline, Hwy. Bore Crossing | $528,260.40 | N | N | 0.00% | $0.00 |
| T2 | Siletz River Pump Station - Pump Replacement | $642,060.00 | N | Y | 43.00% | $276,085.80 |
| D2 | 12" Redundant Bay Crossing, East Option | $2,333,560.00 | N | Y | 25.00% | $583,390.00 |
| D3 | Highway 101 NE 36th to NE 40th Waterline | $228,780.00 | N | Y | 50.00% | $114,390.00 |
| D5 | NE 40th and Golf Course Drive Waterline Replacement | $389,670.00 | N | Y | 25.00% | $97,417.50 |
| D6 | NE Crestview Pl. to 17th Ct. Waterline Loop | $132,840.00 | N | N | 0.00% | $0.00 |
| D7 | NE Avery Street Loop Closure | $112,770.40 | N | N | 0.00% | $0.00 |
| D8 | NW 19th (Nye St. to Hwy 101) and Nye St. (18th to 20th) Waterline | $153,510.00 | N | N | 0.00% | $0.00 |
| D9 | Ocean View (12th to 14th) Waterline Replacement, Loop 13th to 12th | $196,160.40 | N | N | 0.00% | $0.00 |
| D10 | Project Eliminated | $0.00 | 0 | 0 | 0.00% | $0.00 |
| D11 | SW Coho Street (27th to 29th) Waterline Replacement | $106,270.00 | N | N | 0.00% | $0.00 |
| D12 | Idaho Point Waterline Replacement and Looping | $574,314.60 | N | Y | 25.00% | $143,578.65 |
| P1 | Candletree Pump Station Rehabilitation | $206,640.00 | N | N | 0.00% | $0.00 |
| P2 | Lakewood Pump Station Rehabilitation | $187,450.00 | N | N | 0.00% | $0.00 |
| D15 | NE 5th St., Benton to Eads | $107,600.40 | N | N | 0.00% | $0.00 |
| D13 | East Newport Waterline Extensions | $2,096,510.40 | N | Y | 100.00% | $2,096,510.40 |
| D4 | Highway 101 NE 40th to Circle Way Waterline Replacement | $509,220.00 | N | Y | 50.00% | $254,610.00 |
| S2 | Agate Beach Upper Storage Tank - 1.0 MG GFS | $1,740,469.60 | N | Y | 50.00% | $870,234.80 |
| S3 | City Shops Tank Replacement - 1.0 MG GFS | $1,657,090.00 | N | N | 0.00% | $0.00 |
| S4 | King Ridge Storage Tank - 1.0 MG GFS | $2,533,740.00 | N | Y | 100.00% | $2,533,740.00 |
| D14 | Water Meter Replacement - Conversion to Touch Read Meters | $1,461,240.00 | N | Y | 25.00% | $365,310.00 |
| | | | | | | |
| | | | | | | |
| **Completed Projects** | | | | | | |
| 14 | Siletz River Water Intake | complete | N | N | 0.00% | $0.00 |
| 15 | Siletz River Raw Waterline | complete | N | N | 0.00% | $0.00 |
| 16 | South Beach 1 MG Reservoir | complete | N | N | 0.00% | $0.00 |
| 17 | Yaquine Heights 1 MG Reservoir | complete | N | N | 0.00% | $0.00 |
| 18 | Yaquina Heights 4th Level Pump Station Upgrade | complete | Y | N | 50.00% | $25,000.00 |
| 19 | East Newport Water Project | complete | Y | N | 44.00% | $161,040.00 |
| 20 | 12-inch HDPE - SW 35th & Hwy 101 to Southshore (8" to 12") | complete | Y | N | 100.00% | $150,000.00 |
| | **Totals** | **$31,885,451.20** | | | | **$7,671,307.15** |

Note that the first 5 projects (Priority 1 CIP Projects) are all shown as non-SDC eligible. This is due to the City's financing of 4 of the projects completely through a GO bond and 1 of the projects through urban renewal funding.

Based on this analysis, approximately $7.6-million of the $32-million should be considered as SDC eligible or around 24% of the total project costs.

### 8.4.2 Growth in the System

SDCs are assessed against new users of the system to pay for the impact of growth on the water system and the need to construct excess capacity to accommodate that growth. The growth analysis in the existing SDC methodology was developed as an interim projection of growth in the system. A more detailed analysis of growth in the water system was undertaken for this master planning effort.

Section 2 of the master plan provides a detailed analysis of growth in the Newport water system. The analysis includes the following major planning elements:

- Growth is projected to occur at an average rate of 1.25% per year
- Some growth is anticipated outside of the City Limits but within the water system service area and is assumed to grow at the same rate of 1.25%
- The OCCC campus will add up to 820 EDU's by the end of the planning period

Table 8.4.2 summarizes the growth analysis for the Newport water system.

### Table 8.4.2 – Newport Growth

| | 1.25% Growth Inside City Limits | | | 1.25% Growth Outside City Limits, Inside UGB | | | OCCC Central Campus | Total | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Year | Population | Housing Units | EDU | Population | Housing Units | EDU | EDU | Population | Housing Units | EDU |
| 2007 | 10,455 | 5,501 | 11,270 | | | | | 10,455 | 5,501 | 11,270 |
| 2008 | 10,586 | 5,601 | 11,411 | | | | | 10,586 | 5,601 | 11,411 |
| 2009 | 10,718 | 5,671 | 11,554 | | | | | 10,718 | 5,671 | 11,554 |
| 2010 | 10,852 | 5,742 | 11,698 | 140 | 74 | 119 | | 10,992 | 5,816 | 11,817 |
| 2011 | 10,988 | 5,814 | 11,845 | 142 | 75 | 120 | 410 | 11,129 | 5,889 | 12,375 |
| 2012 | 11,125 | 5,886 | 11,993 | 144 | 76 | 122 | 410 | 11,269 | 5,962 | 12,525 |
| 2013 | 11,264 | 5,960 | 12,143 | 145 | 77 | 124 | 410 | 11,409 | 6,037 | 12,676 |
| 2014 | 11,405 | 6,034 | 12,294 | 147 | 78 | 125 | 410 | 11,552 | 6,112 | 12,829 |
| 2015 | 11,547 | 6,110 | 12,448 | 149 | 79 | 127 | 410 | 11,696 | 6,189 | 12,985 |
| 2016 | 11,692 | 6,186 | 12,604 | 151 | 80 | 128 | 410 | 11,843 | 6,266 | 13,142 |
| 2017 | 11,838 | 6,263 | 12,761 | 153 | 81 | 130 | 410 | 11,991 | 6,344 | 13,301 |
| 2018 | 11,986 | 6,342 | 12,921 | 155 | 82 | 131 | 410 | 12,140 | 6,424 | 13,462 |
| 2019 | 12,136 | 6,421 | 13,082 | 157 | 83 | 133 | 410 | 12,292 | 6,504 | 13,625 |
| 2020 | 12,287 | 6,501 | 13,246 | 159 | 84 | 135 | 820 | 12,446 | 6,585 | 14,201 |
| 2021 | 12,441 | 6,583 | 13,411 | 160 | 85 | 136 | 820 | 12,601 | 6,667 | 14,368 |
| 2022 | 12,596 | 6,665 | 13,579 | 163 | 86 | 138 | 820 | 12,759 | 6,751 | 14,537 |
| 2023 | 12,754 | 6,748 | 13,749 | 165 | 87 | 140 | 820 | 12,918 | 6,835 | 14,709 |
| 2024 | 12,913 | 6,832 | 13,921 | 167 | 88 | 142 | 820 | 13,080 | 6,921 | 14,882 |
| 2025 | 13,075 | 6,918 | 14,095 | 169 | 89 | 143 | 820 | 13,243 | 7,007 | 15,058 |
| 2026 | 13,238 | 7,004 | 14,271 | 171 | 90 | 145 | 820 | 13,409 | 7,095 | 15,236 |
| 2027 | 13,404 | 7,092 | 14,449 | 173 | 91 | 147 | 820 | 13,577 | 7,183 | 15,416 |
| 2028 | 13,571 | 7,181 | 14,630 | 175 | 93 | 149 | 820 | 13,746 | 7,273 | 15,599 |
| 2029 | 13,741 | 7,270 | 14,813 | 177 | 94 | 151 | 820 | 13,918 | 7,364 | 15,783 |
| 2030 | 13,913 | 7,361 | 14,998 | 179 | 95 | 153 | 820 | 14,092 | 7,456 | 15,970 |
| Change | 3,458 | 1,860 | 3,728 | 39 | 21 | 34 | 820 | 3,637 | 1,955 | 4,700 |

Based on this analysis, there is anticipated to be around 4,700 new EDU's in the system before the end of the planning period. The improvements and recommendations in this master plan have been sized and planned to serve this projected service population including all new residential, commercial, institutional, and industrial customers.

For calculating the new SDC assessments, it should be assumed that growth in the system will be equal to approximately 4,700 equivalent dwelling units.

### 8.4.3 Reimbursement SDC Calculation

Reimbursement SDCs are charged to new customers for projects that have already been implemented that include additional capacity for the new customers to join the system. A project transitions from being eligible for improvement SDC funds to reimbursement SDC funds when the project is completed and the improvements are constructed.

A summary of the recommended reimbursement SDC for the City of Newport is provided below in Table 8.4.3. These projects are also shown in Table 8.4.1.

**Table 8.4.3 – Reimbursement SDC Summary – Newport Water System**

| Project No. | Project Description | SDC Eligible Cost |
|---|---|---|
| | | |
| 18 | Yaquina Heights 4th Level Pump Station Upgrade | $25,000.00 |
| 19 | East Newport Water Project | $161,040.00 |
| 20 | 12-inch HDPE - SW 35th & Hwy 101 to Southshore (8" to 12") | $150,000.00 |
| | Total Reimbursement Eligible Costs (A) | $336,040.00 |
| | Total Growth EDU's | 4,700 |
| | **Maximum Reimbusement Water SDC (A/B)** | **$71.50** |

## 8.4.4 Improvement SDC Calculation

Improvement SDCs are assessed for projects on the CIP that have not yet been undertaken but include capacity to account for the impact of growth on the system.

The improvement SDC calculation for the Newport Water System is provided below in Tables 8.4.4.

**Table 8.4.4 – Improvement SDC Summary – Newport Water System**

| Project No. | Project Description | SDC Eligible Cost |
|---|---|---|
| D2 | 12" Redundant Bay Crossing, East Option | $583,390 |
| T2 | Siletz River Pump Station - Pump Replacement | $276,086 |
| D3 | Highway 101 NE 36th to NE 40th Waterline | $114,390 |
| D5 | NE 40th and Golf Course Drive Waterline Replacement | $97,418 |
| D12 | Idaho Point Waterline Replacement and Looping | $143,579 |
| D13 | East Newport Waterline Extensions | $2,096,510 |
| D4 | Highway 101 NE 40th to Circle Way Waterline Replacement | $254,610 |
| S2 | Agate Beach Upper Storage Tank - 1.0 MG GFS | $870,235 |
| S4 | King Ridge Storage Tank - 1.0 MG GFS | $2,533,740 |
| D14 | Water Meter Replacement - Conversion to Touch Read Meters | $365,310 |
| | | |
| | | |
| | Total Improvement Eligible Costs (A) | $7,335,267.15 |
| | Total Growth EDU's | 4,700 |
| | **Maximum Improvement Water SDC (A/B)** | **$1,560.70** |

## 8.4.5 SDC Credits

When considering SDC assessments, it is important to review as to whether certain SDC credits would be appropriate. SDC credits may be appropriate when a developer undertakes a project or a portion of a project that is part of the SDC methodology. For example, if a developer installs a waterline that is on the City's CIP and part of the SDC methodology, the developer could receive a credit for the work completed to an amount up to the value of what their assessment would have been for properties they are developing.

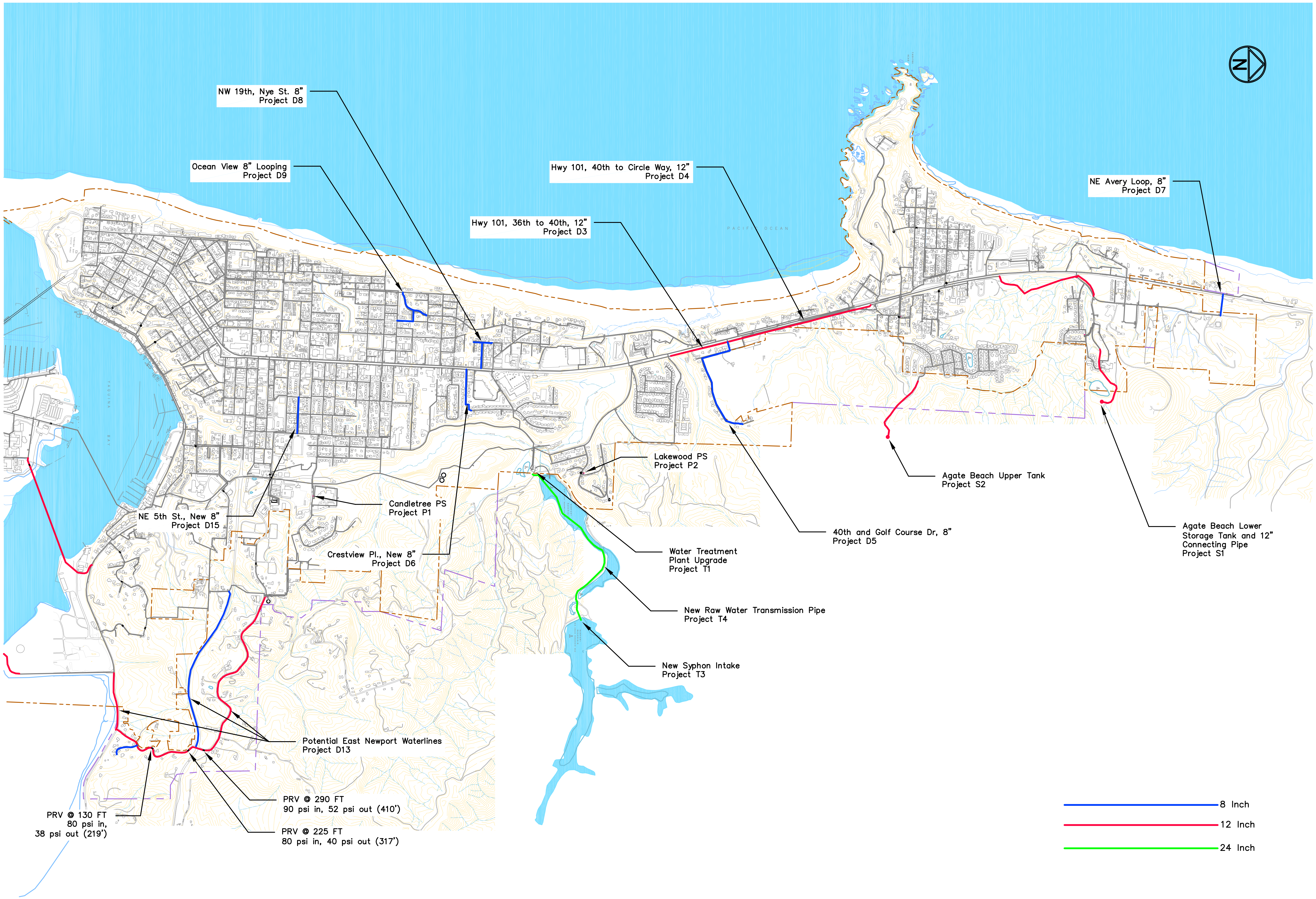
There are other opportunities for credits and these issues should be discussed on a case-by-case basis.

### 8.4.6 Water System SDC Summary

Table 8.4.6 below summarizes the recommended SDC assessment for the water system in Newport based upon the updated planning information contained within this master plan. The City should adopt an update to the water system SDC based upon this update to the methodology. The new recommended SDC assessment is approximately $1,632 per EDU.

**Table 8.4.6 – Water System SDC Summary**

| SDC Component | SDC Amount |
|---|---|
| **Improvement Fee** | $1,560.70 |
| **Reimbursement Fee** | $71.50 |
| **Subtotal of Water SDC Fees** | **$1,632.19** |




Civil West Engineering Services, Inc.

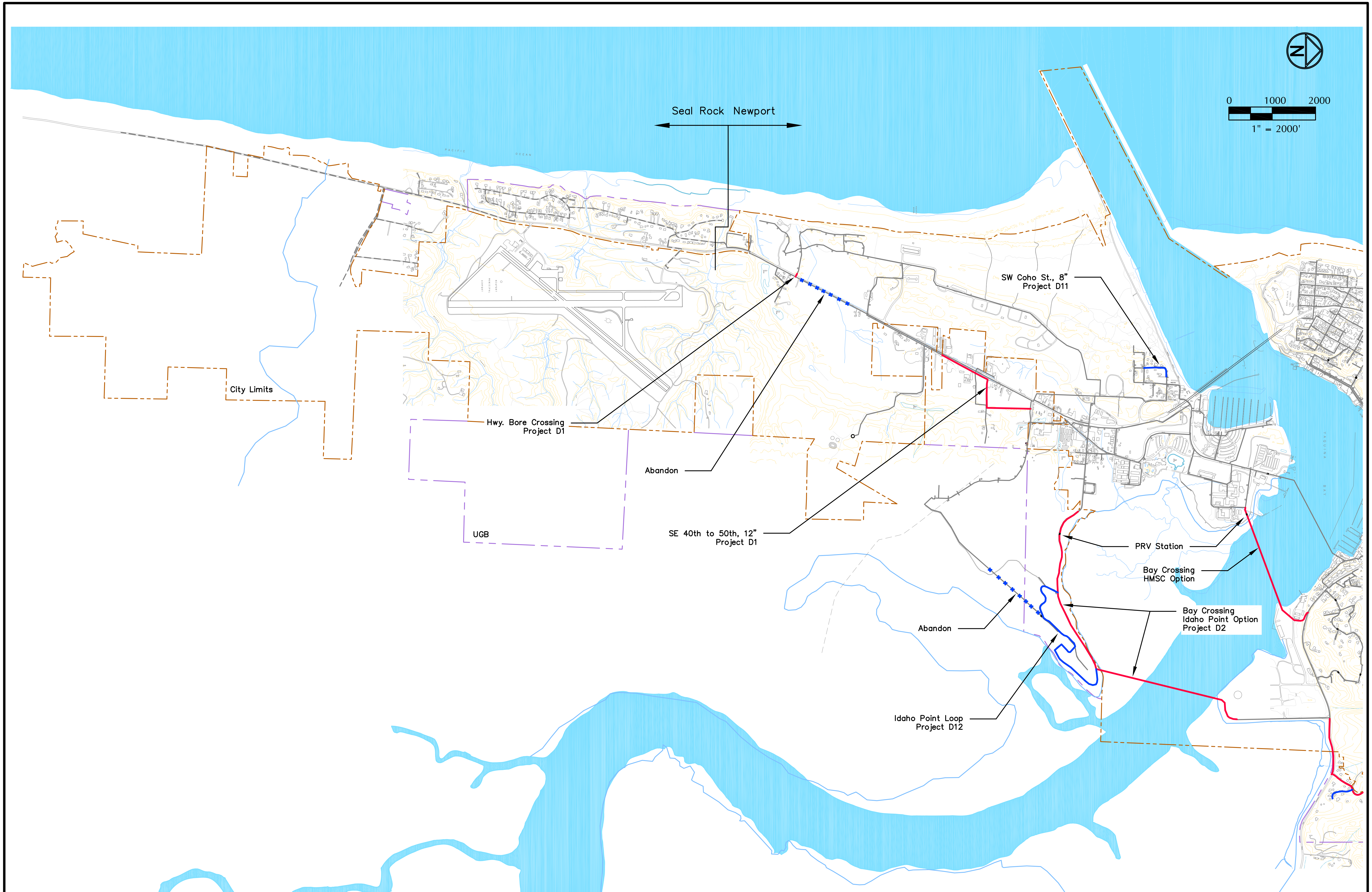
City of Newport
Lincoln County, Oregon

# Proposed Water System Improvements

1" = 2000'

Drawn by: REB
Date: Jan. 30 2009

FIG.
8.1



Seal Rock
Newport
0
1000
2000
1" = 2000'
SW Coho St., 8"
Project D11
City Limits
Hwy. Bore Crossing
Project D1
Abandon
SE 40th to 50th, 12"
Project D1
UGB
PRV Station
Bay Crossing
HMSC Option
Bay Crossing
Idaho Point Option
Project D2
Abandon
Idaho Point Loop
Project D12

# Water Management & Conservation Plan

Section 9

## 9.1 Water Management & Conservation Plan

### 9.1.1 Introduction

Water management consists of the prudent oversight by a water supplier to responsibly provide water resources for the benefit of users within its defined service area. Water conservation consists of any appropriate efforts toward a reduction in water losses, waste, or consumption. As water suppliers face growing demands upon their available resources, careful conservation planning is playing an increasingly important role in their management practices. In effect, conserved water increases the available supply without a commensurate increase in cost and effort to obtain that water.

Conservation measures also can have the effect of enabling water suppliers to reduce, postpone, or even avoid water system expansion projects. Costs for operations and maintenance as well as improvements may be substantially reduced as well by diligently applying conservation practices within a water system. Further benefits for the environment within and surrounding the service area include restoring stream flows in order to support aquatic life, sustaining recreational opportunities, and preserving the natural beauty of water-based landscapes.

A *water management and conservation plan* (WMCP) is a schema prepared by a particular water supplier to document and describe its current and projected utilization, management, and conservation of water resources. Oregon Administrative Rules (OAR) 690-086 govern the requirements for the development of a WMCP. Portions of OAR 690-315 (Permit Extensions) also affect the content of a WMCP. The Oregon Water Resources Department (OWRD) is the state agency entrusted with the responsibility of ensuring that the requirements of OAR 690-086 and 690-315 are met.

In many instances approval of an application for (or an extension of) a water right permit is contingent upon the submission and acceptance of an up-to-date WMCP. The rules in OAR 690-086 and 690-315 provide a process to promote efficient use of the water resources and to facilitate water supply planning. A WMCP is the tool which the State utilizes to require water suppliers to implement water conservation measures and to plan for future demands. A WMCP also assists the WRD and other interested parties to evaluate the efforts of a water supplier to properly manage water resources.

A WMCP generally involves a more comprehensive evaluation of water supply alternatives, including water conservation programs, than does a water system master plan (WSMP), which is required by the Department of Human Services (DHS) of Oregon. A WSMP is generally oriented more toward facilities and processes (especially, as they relate to satisfying regulations associated with the Safe Water Drinking Act). However, both a WMCP and a WSMP are tools utilized to assist water suppliers in systematically planning for the future. In this regard, Division 86 of the OAR allows the substitution of a WSMP for a WMCP if the WSMP substantially satisfies the requirements of a WMCP. Due to overlap of the plans, water suppliers should consider updating an outdated WSMP while creating a WMCP and wrapping the WMCP within the WSMP. This approach has been adopted for the report of this water system study.

It is important to point out that there is a difference between what the OWRD expects the City to submit as a WMCP and this section of this study. This section should be viewed as a resource that includes recommendations for what a WMCP should include. The City must actually put a plan together and put it into action before the OWRD considers it to be a "plan".

The OWRD is more interested in what the City is actually doing and what successes they are having with conservation efforts and are less interested in a consultants opinions or recommendations about what activities are recommended to be undertaken. Therefore, the City should utilize the information provided in this section and begin taking action, track and report results, and review and repeat their efforts in order to truly enter into a water management and conservation planning effort.

### 9.1.2 Proposed Submittal of Plan Updates

The City of Newport anticipates submitting the next update of its WSMP, with the included WMCP, in ten years time, corresponding to the year 2018. As required by OAR 690-086-0125(6), a progress report will be submitted in five years time, corresponding to the year 2013.

### 9.1.3 Required Elements of Plan

As outlined in OAR 690-086-0125(1)–(4), a water management and conservation plan shall include the following elements:

- A municipal water supplier description, as described under OAR 690-086-0140;
- A municipal water conservation element, as described under OAR 690-086-0150;
- A municipal water curtailment element, as described under OAR 690-086-0160;
- A municipal water supply element, as described under OAR 690-086-0170.

Among its other purposes, Section 9 summarizes much of the information contained elsewhere in the report of this water system study, and it includes data to support each of the elements listed above. Throughout this section, previous sections of the study are referenced for more detailed descriptions of certain topics. If further information is needed beyond the summary presented in this section, please consult the appropriate reference provided.

## 9.2 Water Supplier Description (OAR 690-086-0140)

### 9.2.1 Service Area, Population, and System Overview

The City of Newport is located in Lincoln County Oregon, approximately in the center of the county coastline at the mouth of the Yaquina River. The city limits extend to both the north and south sides of Yaquina Bay in Townships 10, 11, and 12 South, Range 11 West. Development within the city extends north from the bayfront along the beach (which runs parallel to U.S. Route 101) to include Agate Beach, Yaquina Head, and Schooner Point, ending just south of Moolack Creek. South of the bay, it extends along the beach to include South Beach, the Newport Municipal Airport, and the lower drainage area of Thiel Creek. As of 2007, the city limits encompassed 6,619 acres or 10.3 square miles.

The service population consists of approximately 10,455 full-time residents (as of 2007). City services include water treatment and supply, sewage treatment and disposal, and other typical public works and maintenance services. A planning area map, which indicates the city limits along with the urban growth boundary (UGB) and other identified relevant features, is provided in Figure 2.1.1-1 in Section 2 of this study.

The existing water system includes intake, treatment, transmission, distribution, and storage elements. A brief description of each of these elements is provided in the discussion that follows. For a more detailed description of these elements, see Section 5 of this study. A system layout schematic is depicted in Figure 5.5-1 in Section 5 of this study.

### 9.2.2 Raw Water Supply and Storage

The City of Newport holds seven water diversion rights from various sources which are summarized below. Only three of the sources (Blattner Cr., Big Cr., and Siletz River) are currently utilized.

**Table 9.2.2-1 – City of Newport Water Diversion Rights**

| Source Type | Applic. No. | Permit No. | Certif. No. | Max. Flow Rate (cfs) | Priority Date | Currently in Use |
|---|---|---|---|---|---|---|
| Surface (Blattner Cr.) | S-00072 | S-00020 | 01012 | 0.54 | 05/10/1909 | * |
| Surface (Nye Creek) | S-08970 | S-05882 | 08603 | 1.50 | 05/14/1923 | |
| Surface (Nye Creek) | S-09224 | S-06197 | 09113 | 0.70 | 10/15/1923 | |
| Surface (Hurbert Cr.) | S-09221 | S-06194 | 09112 | 0.10 | 10/15/1923 | |
| Surface (Big Creek) | S-11156 | S-07722 | 09127 | 10.00 | 10/27/1926 | * |
| Surface (Siletz River) | S-39121 | S-29213 | Not Issued | 6.00 | 09/24/1963 | * |
| Surface (Jeffries Cr.) | S-44381 | S-33151 | 57650 | 0.40 | 01/09/1968 | |

Source: Oregon Water Resources Department – Ground and Surface Water Rights Records

Figure 5.1.1 (in Section 5 of this study) indicates the approximate locations of the points of diversion for the various water rights held by the City.

Storage rights are held for two earthen reservoirs situated on Big Creek upstream from the location of the water treatment plant. These rights are listed below.

**Table 9.2.2-2 – City of Newport Water Storage Rights**

| Storage Type | Applic. No. | Permit No. | Certif. No. | Total Storage (acre-feet) | Priority Date |
|---|---|---|---|---|---|
| Big Cr. Reservoir #1 | S-26388 | S-20703 | 21357 | 200 | 08/31/1951 |
| Big Cr. Reservoir #2 | S-43413 | S-33127 | 48628 | 310 | 03/24/1967 |
| Big Cr. Reservoir #2 | S-43413 | S-33127 | 48628 | 345 | 06/05/1968 |
| Big Cr. Reservoir #2 | S-52204 | S-38220 | Not Issued | 970 | 07/19/1974 |

Source: Oregon Water Resources Department – Storage Water Rights Records

The City of Newport owns and operates an intake structure on the Siletz River (see Figure 5.1.1). This intake was constructed in 1993-94 in order to acquire water from the Siletz River and subsequently pump it into the Big Creek drainage basin above the upper Big Creek reservoir (#2). During winter months when precipitation continually resupplies the reservoirs the Siletz River pumps are not operated and the City relies entirely upon water within the Big Creek basin to supply system. This situation is advantageous in that electrical costs to power the pumps are avoided and the raw water quality of the reservoirs is superior to that available from the Siletz River during this time.

The lower and upper Big Creek reservoirs (#1 and #2) were constructed in 1951 and 1969, respectively. The upper reservoir was expanded in 1976 to create a total storage capacity of 970 acre-feet. Together, these reservoirs yield a total storage capacity of almost 1,200 acre-feet.

The existing pump station on the lower Big Creek reservoir (#1), which functions to supply raw water to the treatment plant, was constructed in 1974 replacing the previous pumping facility. More recently, a variable-frequency drive (VFD) was installed to operate one of the pumps so that the raw water flow rate can be modulated in order to enhance the performance of the clarifiers and to avoid overtopping the filter cells.

### 9.2.3 Water Treatment Plant & Treated Water Storage

The water treatment plant in Newport is a custom-designed facility that has evolved over time. The primary elements of the existing treatment plant include:

- a pre-filtration chemical-injection station (for disinfection and coagulation)
- two clariflocculators, each with distinct flocculation-chamber and upflow-clarifier sections
- tube settlers immersed within the clariflocculators to enhance the sedimentation process
- four gravity driven rapid-sand filters of mixed-media composition
- a post-filtration chemical-injection station (for disinfection and pH adjustment)
- various instrumentation and controls for proper plant operation

The system elements for treated water reserves consists of seven storage tanks located throughout the service area, of which five are of welded-steel construction and two are of concrete construction. The total storage capacity resulting from these tanks is approximately 8.2 MG. The essential functions of these tanks include:

- attenuation of peak-demand effects during periods of high-volume consumption
- maintenance of proper supply pressures within various zones of the service area
- provision of an adequate supply of water for potential fire suppression efforts

The system elements for distribution of treated water include five operational pump stations and one pump station which is scheduled to enter service in the near future (2008). The pump stations facilitate transmission and distribution of water from the treatment plant to the various storage tanks and to areas not able to be served by the tanks. Distribution system piping includes a mixture of ductile iron, polyvinyl chloride (PVC), asbestos cement (AC), polyethylene, and galvanized steel pipes totaling over 90 miles in length.

The Newport service area is separated into nine pressure zones, as necessitated by the local terrain. The dominant pressure zones are the Main zone, the North Bayside zone, and the South Beach zone, each of which has a dedicated storage tank (or tanks). In each of the latter two zones, a portion of the zone is serviced by means of a pressure-reduction station in order to match the hydraulic grade provided by the storage tank (or tanks), and thereby produce reasonable pressures at the service connections.

In addition to these dominant, gravity-based pressure zones (which all stem from the Main storage tanks in the Main pressure zone) the other zones exist to serve higher elevations and are supplied by means of booster-pumps as previously described.

For further details on the description and discussion of the existing water system, see Section 5.

### 9.2.4 Existing Service Population

The U.S. Census data for Newport in 2000 indicates a population of 9,532 with 5,034 housing units, yielding 1.89 persons per household. The Portland State University (PSU) Population Research Center

(PRC) provides certified estimates for 2001 through 2006, and a preliminary estimate for 2007. This data is displayed in Table 9.2.4 below.

**Table 9.2.4 – Newport Population and Housing Units**

| Year | People | Housing Units | Housing Units Added | People per Unit (Average) |
|---|---|---|---|---|
| 2000 | 9,532 | 5,034 | 94 | 1.89 |
| 2001 | 9,660 | 5,128 | 26 | 1.88 |
| 2002 | 9,650 | 5,154 | 12 | 1.87 |
| 2003 | 9,740 | 5,166 | 22 | 1.89 |
| 2004 | 9,760 | 5,188 | 93 | 1.88 |
| 2005 | 9,925 | 5,281 | 95 | 1.88 |
| 2006 | 10,240 | 5,376 | 125 | 1.90 |
| 2007 | 10,455 | 5,501 | — | 1.90 |
| **Average** | | | **66.7** | **1.89** |

Source: U.S. Census Bureau, PSU PRC, City of Newport Records

The average value of 1.89 persons per household is a characteristic parameter for the population analysis and is utilized in projected population estimates for the prediction of future water demand.

As detailed in Section 6, the current residential service population of 10,455 persons corresponds to 11,270 equivalent dwelling units (EDUs) of total water usage. Thus, 1.078 EDU of water usage per person occurs in Newport. This value is based upon current consumptive conditions and patterns and it includes usages from other sectors besides the residential sector. The cited value is utilized to project future water demand based upon anticipated population growth. Also, any new development within the service area which cannot be directly associated with residential population increase must be taken into account by separate individual calculation.

Two areas of new development which are scheduled to be added to the Newport water system include:

- 74 domestic and 25 commercial service connections, formerly served by the Seal Rock Water District
- the new central campus of the Oregon Coast Community College

An assessment of the demands which will be imposed by these new developments has been included within the population, housing units, and EDU-value growth projections and are summarized in Table 2.2.2-1 in Section 2 of this study.

### 9.2.5 Existing Water Demand

The City of Newport provides treated water to residential, commercial, and municipal consumers, as well as a substantial industrial sector. Residential water consumption is proportionately similar to that observed in many coastal communities. Because of the wet conditions and cool temperatures typical of the coastal environment, water usage for outdoor recreation and landscape irrigation is generally less than that for communities in more arid regions.

As revealed in Figure 6.1.3-1 in Section 6 of this study, 53.1% of water usage is due to residential consumers, 14.9 % and 11.7% are due to commercial and industrial consumers, respectively, and the remaining 20.3% is attributed to various other groups related to public facilities and recreation/tourism.

The existing water demand in Newport has been determined from records of treatment plant operation for the years 2004 through 2007. An average annual demand (AAD) of 785 million gallons has occurred over these years. Average values for pertinent daily demand measures over these same years are the maximum monthly demand (MMD) and maximum daily demand (MDD) values, which are 3.51 and 3.93 million gallons, respectively.

### 9.2.6 Unaccounted Water

The difference between the quantity of water diverted from the supply source to the water treatment plant and the quantity of water recorded by usage meters (i.e., water sold) is unaccounted water. This difference is the combined result of leakages, filter backwashing, system flushing, fire fighting, or other non-metered usages (e.g., usage by city offices, parks, schools, libraries, etc.).

OAR 690-086 stipulates that a water supplier should strive to reduce the amount of unaccounted water to 15% of the water delivered to the distribution system. If it is determined that this objective can be readily achieved, then the water supplier should seek to attain an objective of 10% when feasible.

The Newport water system experiences water losses on the order of 16% (see Table 6.1.5-1). Records between 2004-2006 indicate a steady rise in unaccounted water. At the time of this study, the cause of these increases are unclear. The City should review their records and practices, including maintenance, annexation of new pipelines, and other activities that could explain this increase. Efforts should be made to reduce these higher levels of losses.

### 9.2.7 Adequacy and Reliability of Supply Sources

As mentioned above, many of the water rights held by the City of Newport are impractical to exercise and the water right with the largest capacity (Big Creek) cannot be fully utilized during the period of highest demand for a typical year because of seasonal declines in the stream flow associated with this source. Additional supply capacity is available from the Siletz River, but water from this source must be pumped from a distance of over five miles into the drainage basin for the Big Creek reservoirs.

Analysis has revealed that a sufficient water supply is available to the system provided that it is pumped from the Siletz River and stored within the Big Creek reservoirs prior to the period of highest demand. This strategy will be addressed later in subsection 9.11.

Of further concern is the production capacity of the treatment plant itself. During the period of highest demand for a typical year it has been observed over the past several years that the plant must be operated virtually 24 hours per day for nearly a month. Even then, it has been found from inspection of water system records that storage supplies have been continuously depleted, meaning that the plant is not able to meet current maximum daily demand. When properly designed and operated, the plant should be capable of meeting the maximum daily demand while maintaining a full storage system, with only demands due to peak hourly usage or fire suppression efforts causing storage system levels to temporarily drop.

The City of Newport has an intertie with the Seal Rock Water District, which lies immediately south of the Newport service area. Ordinarily water is not exchanged between these two entities and the Seal Rock Water District actually obtains its supply from the City of Toledo (but is currently endeavoring to develop its own water production facilities). As previously mentioned, the City of Newport will be acquiring 74 domestic and 25 commercial service connections served by the Seal Rock Water District within the next few years.

# 9.3 <u>Water Conservation Discussion</u> (OAR 690-086-0150)

## 9.3.1 Introduction

Water suppliers are in the business of producing and selling treated water. The sale of that water allows a supplier to pay for operations and maintenance expenses, retire debts for system development loans, and create an income stream for the financing of future system upgrades and facilities. Consequently, some suppliers may view conservation as an activity that is contrary to the financial survival of their system. However, nearly every water system should be capable of incorporating changes in its operations that would result in reducing "lost water" and thereby lower production costs. A balanced and coordinated conservation effort should also involve educating the public about the benefits of wise usage practices. The following quote by the Environmental Protection Agency (EPA) Office of Water, from its "Statement on Principles of Efficient Water Use" (December 2002), is especially poignant in this regard:

> *In order to meet the needs of existing and future populations and ensure the habitats and ecosystems are protected, the nation's water must be sustainable and renewable. Sound water resource management, which emphasizes careful efficient use of water, is essential in order to achieve these objectives.*
>
> *Efficient water use can have major environmental, public health, and economic benefits by helping to improve water quality, maintain aquatic ecosystems, and protect drinking water resources.*

The following subsections are intended to provide the City of Newport with sufficient information and direction to develop an active and effective water conservation program that will result in lower water demands by consumers and more efficient utilization of water resources.

## 9.3.2 Water Conservation Progress Report

The most recent studies of the Newport water system consisted of a water system master plan update (1988) and a long-range water supply plan (1997). Since the City has not undertaken a comprehensive assessment of its water system (for planning purposes) in over a decade, no previously-approved water conservation plan exists. Therefore, an assessment of the success of conservation measures cannot be performed. However, certain activities associated with the water system which may be regarded as conservation measures are described later in this section.

After a conservation plan has been developed and approved, the City should regularly review and assess the effectiveness of its conservation measures, update these measures as appropriate, and chronicle the results within a progress report, which should be submitted to the Oregon WRD at least every five years.

## 9.3.3 Water Usage Measurement and Reporting Program

In order to understand the approach adopted by the City of Newport for recording and reporting monthly diversions of raw water, it is necessary to review the unique hydrologic characteristics of the sources that supply the Newport water system.

The upper and lower Big Creek reservoirs are actually artificial impoundments on Big Creek. Water in the upper reservoir can flow into the lower reservoir via a spillway over the dam structure that separates them. Additional water passes from the upper reservoir to the lower reservoir through the underdrains in the dam as well as over the fish ladder when it is in operation. Together, the two reservoirs form an open system, into which Blattner Creek and Big Creek flow (as well as runoff from precipitation deposited over the surrounding land). Water can exit the lower reservoir by either flowing into the downstream portion of Big Creek, by evaporation, by flowing over the fish ladder, leaking through the underdrains, or withdrawal (via the intake) to the water treatment plant.

When water is diverted from the Siletz River, it is pumped a distance of approximately six miles from the intake structure to a point where it empties into a culvert and subsequently drains into Blattner Creek above the upper Big Creek dam. Thus, water from all usable sources is diverted into the Big Creek reservoirs.

The water pumped from the lower Big Creek reservoir to the treatment plant represents the total amount of water which is actually extracted from the environment (and obtained from permitted sources). Thus, it is possible to assess whether or not the City is in compliance with limits imposed by the water rights which can be practicably exercised by means of just two measurements in lieu of individual measurements of the diversions from all the usable sources:

- monthly volume diverted from the Siletz River
- monthly volume diverted from the lower Big Creek reservoir

The City has instrumentation to measure the monthly volumes of water diverted from these sources.

The City also maintains a record of plant internal usages, including an estimated volume of water used to operate the filter backwash activities and filter-to-waste operations, along with total finish water transmitted and metered from the plant to the distribution system. The water delivered to all service connections is measured via usage meters. The City utilizes a spreadsheet to perform an overall system audit on a monthly basis. This audit can prove useful for recognition of irregular usage patterns and may serve to identify leaks, malfunctions, or other system problems.

### 9.3.4 Current Water Conservation Practices

The City currently utilizes several conservation measures within its regular operating strategy, including:

- **Source Water Metering** – The City currently meters the amount of water diverted from the Big Creek reservoirs and the Siletz River (the dominant sources within the system).
- **Distribution System Metering** – In order to promote water conservation and to ensure fair billing practices, the existing distribution system to all service connections is fully metered, also enabling the City to perform an overall system audit on a monthly basis.
- **Public Awareness/Education** – In conjunction with other public agencies, the City supports programs aimed at educating community members on the benefits of water conservation. In addition, technical staff of the Lincoln Soil and Water Conservation District, with assistance from the USDA Natural Resources Conservation Service, are available to provide education programs, publications, and one-on-one consultations.

### 9.3.5 Water Conservation Planning Strategy

In the context of this study, a conservation measure is understood to be an action or procedure intended to reduce unnecessary water consumption. A number of specific conservation measures are available to encourage wise utilization of water resources in the Newport water system. Some of these measures are directed at the management efforts of the water supplier, while others are intended to affect the usage habits and tendencies of water consumers. Appropriate conservation measures should be selected on the basis of their potential to achieve a reduction in consumption yet be reasonable to implement without placing undue hardship on the supplier or the consumers.

In their evaluation of various conservation measure alternatives, water system managers should take into consideration the following issues or concerns:

- Program Costs
- Ease of Implementation
- Staff Resources
- Consumer Impacts
- Water Rights Issues
- Cost Effectiveness
- Budgetary Constraints
- Environmental Impacts/Justice
- Socio-Economic Issues
- Legal Issues or Constraints
- Permit Requirements
- Regulatory Approvals
- Timeliness of Savings
- Public Acceptance
- Consistency with Other Programs
- The ability of a program to sustain a conservation effect and whether or not there are lasting impacts from the conservation efforts.

Not all conservation measures are suitable or effective for every water system. In order to assist water system managers in selecting appropriate measures, the EPA has assembled several guidelines, which include varying levels of activity.

The EPA guidelines suggest that water suppliers develop conservation programs whose activities are in proportion to the size of their individual water system. Alternatively stated, the larger the water system, the more measures should be implemented to conserve water resources. The categories and guidelines established by the EPA are presented below.

**Table 9.3.5-1 – System-Size Category and Guideline Classifications**

| System-Size Category (SDWA) | Applicable Guidelines |
|---|---|
| Serves fewer than 3,300 people | Basic Guidelines<br>or<br>Capacity-Development Approach |
| Serves between 3,300 and 10,000 people | Basic Guidelines<br><br>(up to 10,000 people served) |
| Serves more than 10,000 people | Intermediate Guidelines<br>(up to 100,000 people)<br>or<br>Advanced Guidelines<br>(more than 100,000 people) |

Source: U.S. EPA Water Conservation Plan Guidelines (1998)

The Basic Guidelines provide water suppliers with simple tools for gathering information in order to conduct planning efforts. The intention of these guidelines is to avoid burdening suppliers (especially, those with very small or resource-constrained systems) with unnecessary steps or details yet provide a straightforward approach to planning and implementing widely-accepted conservation practices.

The Intermediate and Advanced Guidelines introduce additional evaluative tools and conservation measures to enhance water conservation planning efforts. The Intermediate approach is substantially based upon the Basic approach but introduces more comprehensive planning concepts and conservation measures. The Advanced approach moves further in this direction and implicitly depends upon sufficient resources and support personnel (as are characteristic of much larger water suppliers). The guidelines associated with this approach recognize the need and allow for the development of models and methods which are more appropriate for water suppliers suited for this approach. The conservation measures recommended by the EPA for all three guideline classifications are summarized together in Table 9.3.5-2.

The EPA guidelines are further divided into three levels of activity. Each water supplier, regardless of the size of its water system, should consider the fundamental conservation principles outlined under Level 1. The measures displayed under Levels 2 and 3 are appropriate for systems with greater conservation needs along with the ability to provide sufficient resources and support personnel required in a more vigorous conservation program.

The City of Newport is interested in developing conservation measures in its community and is committed to increasing its efforts toward more efficient utilization of water resources in the future. However, it should be acknowledged that the recommended conservation measures do not explicitly guarantee a reduction in unaccounted water for a system.

The table on the opposite page (Table 9.3.5-2) is an excerpt from the US EPA Water Conservation Plan Guidelines (1998). The table illustrates several potential conservation measures that can be followed depending on the level of commitment and aggressiveness that a community wishes to pursue conservation. The table illustrates:

1. Basic Guidelines – Conservation measures all systems should consider.
2. Intermediate Guidelines – Include more aggressive conservation efforts.
3. Advanced Guidelines – Includes the most aggressive conservation efforts that are focused on communities that have undertaken and found success with intermediate and basic efforts.

Which measures are actually adopted can depend upon a number of issues unique to a particular water system. In most systems, though, prudent conservation begins on the supply side (i.e. efforts made by the City) However, effectual conservation must invariably involve the consumers as well (demand side). Typically, a combination of efforts by the supplier and consumers is required for a successful conservation program.

**Table 9.3.5-2 – EPA Guidelines and Associated Water Conservation Measures**

| Measures | ▼Basic Guidelines▼ | ▼Intermediate Guidelines▼ | ▼Advanced Guidelines▼ |
|---|---|---|---|
| Level 1 Measures | | | |
| Universal Metering | • Source-Water Metering<br>• Service-Connection Metering and Reading<br>• Meter Public-Use Water | • Fixed-Interval Meter Reading<br>• Meter-Accuracy Analysis | • Test, Calibrate, Repair, or Replace Meters |
| Water Accounting and Loss Control | • Account for Water<br>• Repair Known Leaks | • Analyze Unaccounted Water<br>• Water System Audit<br>• Leak Detection and Repair Strategy<br>• Automated Sensors and/or Telemetry | • Loss-Prevention Program |
| Costing and Pricing | • Cost-of-Service Accounting<br>• Consumer Charges<br>• Metered Rates | • Cost Analysis<br>• Non-Promotional Rates | • Advanced Pricing Methods |
| Information and Education | • Understandable Water Bill<br>• Information Availability and/or Accessibility | • Informative Water Bill<br>• Water-Bill Inserts<br>• Public School and Education Programs | • Workshops<br>• Advisory Committee |
| Level 2 Measures | | | |
| Water-Use Audits | | • Audits of Large-Volume Consumers<br>• Large-Landscape Audits | • Selective End-Use Audits |
| Retrofits | | • Retrofit-Kit Availability | • Distribution of Retrofit Kits<br>• Targeted Programs |
| Pressure Management | | • System-Wide Pressure Management | • Selective Use of Pressure-Reducing Valves |
| Landscape Efficiency | | • Promotion of Landscape Efficiency<br>• Selective Irrigation Submetering | • Landscape Planning and Renovation<br>• Irrigation Management |
| Level 3 Measures | | | |
| Replacements and Promotions | | | • Rebates and Incentives (Non-Residential)<br>• Rebates and Incentives (Residential)<br>• Promotion of New Technologies |
| Reuse and Recycling | | | • Industrial Applications<br>• Large-Volume Irrigation Applications<br>• Selective Residential Applications |
| Water-Use Regulation | | | • Water-Use Standards and Regulations<br>• Requirements for New Developments |
| Integrated Resource Management | | | • Supply-Side Technologies<br>• Demand-Side Technologies |

Source: U.S. EPA Water Conservation Plan Guidelines (1998)

# 9.4 Mandatory Conservation Measures (OAR 690-086-0150.4)

## 9.4.1 Introduction

As summarized in subsection 9.03, many different kinds of conservation measures are available for the promotion of efficient utilization of water resources within a water system. Each of these measures will vary in complexity, feasibility, appropriateness, and effectiveness. However, in order to achieve success in water conservation it will be necessary to incorporate some of these measures (and perhaps others not listed) into any responsible conservation plan.

While the water supplier has the freedom to create a conservation plan that fits the unique characteristics of its system, OAR 690-086-0150 does require the supplier to undertake certain mandatory conservation activities. The following subsections provide a description of each such measure, how each measure is currently being implemented, a schedule and budget for each measure, and other details if necessary.

## 9.4.2 Annual Water Audit

The purpose of an annual water audit is to determine the overall input-output accountability of the system, monitor the usage levels of qualitatively different consumers, gauge the effectiveness of conservation measures already being implemented, and gather other system performance data. Also, the OAR requires an assessment of the extent of water loss as systems seek to achieve an efficiency objective of 85 percent or greater. If a system reaches or exceeds the 85-percent goal, then the community should strive to achieve an efficiency objective of 90 percent or greater. The City of Newport has an audit system in place and results are summarized in Section 6.1.5. The 3-year average accounted water is currently 84%.

Monthly water audits are not required but are often conducted to maintain accountability levels. These audits are especially useful for the recognition of irregular usage patterns and may serve to identify leaks, malfunctions, or other system problems. By conducting such audits, the City receives relatively fast feedback concerning the performance of its supply system and is kept apprised of supply issues in a timely manner. These audits also provide the data underlying the annual water audits.

## 9.4.3 System Metering Program

The Newport water system is fully metered for all consumers. It is the intent of the City to replace older water meters as they become inoperable. The meters for the intake on the Siletz River should be calibrated now and replaced or adjusted as necessary to ensure accurate records.

A number of companies that produce water meters offer equipment that is capable of extremely accurate measurement over a long service life. In addition to improved accuracy, newer meters can be supplemented with automatic meter reading (AMR) technology, which improves the efficiency and reliability of acquiring usage data from meters.

A number of communities in Oregon have undertaken complete meter replacement initiatives, installing new meters with AMR technology and updating the billing process system as well. Considering the revenue lost due to the inaccuracies of older meters, many such initiatives realize a payback period that ranges from just a few years to ten years, depending upon the amount of additional revenue captured by means of the newer meters.

### 9.4.4 Meter Testing and Maintenance Program

Older or poor-quality water meters are often found to be inaccurate. Typically, these inaccuracies are on the order of ten to fifty percent of the actual volume of water that flows through the meters. The amount of water that passes undetected through the meter directly contributes to the overall amount of unaccounted water. In a larger water system, inaccurate meters can lead to hundreds of thousands of dollars in lost revenue for that system.

Many meter manufacturers offer programs for the testing and calibration of existing meters. A variety of communities have shown significant benefits by replacing the meters within an entire system with one style/make of meter. The additional revenue generated by more accurate metering and subsequent billing usually will cover the cost of such a replacement endeavor.

Unless it decides to pursue the complete meter-replacement option, the City of Newport should consider implementing a meter testing and maintenance program for the purpose of promoting water conservation as well as capturing potentially lost revenue.

All meters which have not been recently replaced should be scheduled for testing within a five-year period after initiation of the program. However, if it is planned to completely replace all meters within the system, such meters should not require testing for the first five years of their service life. After this time interval has elapsed, a program of testing the entire complement of meters should be initiated by randomly inspecting five meters every monthOf course, faulty meters needing immediate attention would be identified by irregular performance as noticed by the consumer or meter reader.

### 9.4.5 Leak Detection and Repair Program

A leak detection and repair program may include periodic on-site testing by means of computer-assisted leak detection equipment, sonic leak-detection surveys, or other accepted methods for detecting leaks along water transmission and distribution lines (“mains”), valves, connections, and meters. The program should also include occasional inspections of water tanks and supply reservoirs.

Water leakage affects not only the amount of unaccounted water assessed but also impacts costs required to treat, store, and distribute water to consumers; “lost” water generates no revenue for the supplier and wastes an increasingly precious resource. Repairing leaks can result in significant savings of operational costs and creation of additional revenue for the water system. Even when (what could be argued to be) acceptable levels of system leakage are achieved, on-going leak-detection activities are evidence of a vigilant and conscientious approach to water system management.

The initial goal of a system-wide leak detection program should be to reduce the amount of unaccounted water to 15% of the total amount of treated water produced. If the reduction to 15% is determined to be feasible and appropriate, then the water supplier should endeavor to achieve a reduction to 10% or less. It should be understood that system leakage differs from unaccounted water, in that system leakage does not include unmetered or inaccurately metered water. The objective of a leak detection and repair program is to reduce the amount of water that leaves the system conduits and appurtenances via exit points that do not correspond to a designated connection point for the system.

As of 2007, the production efficiency of the Newport water system was about 84 percent. This level of performance suggests that action should be taken to investigate and mitigate sources or causes of unaccounted water — in particular, system leakage. The City possesses equipment and personnel to repair or replace system conduits and appurtenances within the system.

### 9.4.6 Public Education Program

Surprisingly, most consumers have almost no knowledge of their water source, supply capacity and/or availability, and the necessary costs associated with treatment and distribution of water. The diligent efforts that occur behind the scenes are (for the most part) unnoticed and unappreciated by consumers. However, this situation can be changed by an engaging and informative public education program.

The goal of a public education program is to cultivate an awareness of limitations on water resources and to develop a conservation ethic concerning water consumption. Such a program directly influences both usage practices and patterns. An informed community also will be more likely to support changes in the water system rate structure and management policies if they feel included. Public education can occur in the form of mailers/pamphlets, community seminars, school programs, or dedicated webpages.

Public education programs can inform consumers regarding such issues as:

- efficient bathroom, kitchen, and laundry fixtures/appliances
- availability/installation of retrofit kits
- maintenance of bathroom, kitchen, and laundry fixtures/appliances
- consequences of excessive/unattended operation of faucets
- best practices for washing equipment, vehicles, pavement, or other facilities
- efficient landscape design and irrigation practices
- discounts, credits, rebates, or other conservation incentives
- potential curtailment advisories/activities
- reporting suspected or observed system leaks

A significant amount of educational materials concerning water conservation have been developed and are available to water suppliers at little to no cost. Information is available on a variety of topics and materials can be obtained for practically any purpose or demographic group.

The success of public education programs in terms of the extent of conservation realized is difficult to predict. During periods of shortage or drought, when public awareness and participation is typically high, a significant reduction in consumption usually occurs. During periods of adequate supply, such a reduction greatly depends upon how well the program engages and convinces the consumers. Studies have suggested that a reduction in consumption of four to five percent occurs with a comprehensive and informative public education program.

### 9.4.7 Rate Structure Adopted for Water Consumption

As a water supplier, the City of Newport charges its customers for their water consumption based upon a minimum usage charge plus a regressive block rate for further usage. The existing rate structure, which was adopted in July 2008, is summarized below in Tables 9.4.7-1 and 9.4.7-2. Some explanation of the terms utilized in these tables is in order.

As determined by the connection (meter) size, a minimum usage charge is specified for each consumer which covers the cost for any amount of water up to but not exceeding a threshold usage value. When usage exceeds the threshold value, the consumer is additionally charged for the usage beyond that value by means of a two-tier regressive block rate.

The Tier 1 rate covers the usage amount beyond the threshold value but less than or equal to 41,000 gal. The Tier 2 rate covers the usage amount beyond 41,000 gal. Sample calculations are illustrated below, based upon the average monthly water consumption for a typical household as well as a hypothetical water consumption case that involves both tiered rates.

**Table 9.4.7-1 – Rate Structure for Water Service Within City Limits (Monthly Costs)**

| Connection (Meter) Size | Threshold Usage Value | Minimum Usage Charge | Cost Per 1,000 Gallons (Tier 1) |
|---|---|---|---|
| ⅝" × ¾" | 1,000 gal | $12.85 | $2.30 |
| 1" | 3,000 gal | $17.65 | |
| 1¼" × 1½" | 6,000 gal | $25.90 | |
| 2" | 14,000 gal | $44.40 | |
| 3" | 23,000 gal | $66.40 | |
| 4" or over | 41,000 gal | $110.25 | |

Source: City of Newport Resolution No. 3445 (July 2008)

**Table 9.4.7-2 – Rate Structure for Water Service Outside City Limits (Monthly Costs)**

| Connection (Meter) Size | Threshold Usage Value | Minimum Usage Charge | Cost Per 1,000 Gallons (Tier 1) |
|---|---|---|---|
| ⅝" × ¾" | 1,000 gal | $24.45 | $4.40 |
| 1" | 3,000 gal | $33.35 | |
| 1¼" × 1½" | 6,000 gal | $46.40 | |
| 2" | 14,000 gal | $81.80 | |
| 3" | 23,000 gal | $120.80 | |
| 4" or over | 41,000 gal | $200.20 | |

Source: City of Newport Resolution No. 3445 (July 2008)

**Note:** There are actually two sets of rate structures. The set above (Tables 9.4.7-1 and 9.4.7-2) applies to water service for the "City Service Area", which corresponds to the area historically served by the Newport water system. In November 2007, the City of Newport and the Seal Rock Water District entered into an agreement, transferring service territory from the Seal Rock service area to the Newport service area. In city documents, this relatively-small territory is referred to as the "Former Seal Rock Area". The rates for this service area are comparable to the rates for the "City Service Area" but somewhat higher, especially for the larger connection (meter) sizes. These rates have not been included in this study but are available from the Newport records office.

**Sample Calculation #1 (Average Household Water Consumption)**

As presented in Table 6.1.3-2, the average water consumption per dwelling is 7,084 gal per month for single-family households being served based on the average of all signle family dwelling water use between 2004-2006. Thus, the monthly water bill for an average household is calculated as follows:

| Expense Category | Expense Amount | Description |
|---|---|---|
| Minimum Usage Charge | $12.85 | Specified Basic Charge |
| Tier 1 Charge | $13.99 | (7,084 − 1,000) / 1,000 × $2.30 |
| Total Charges | $26.84 | |

**Sample Calculation #2 (Hypothetical Water Consumption Case)**

Consider the following billing scenario (for a one-month period):

- commercial consumer
- outside city limits
- 2-in service connection
- 63,000 gal of water

Thus, the monthly water bill for such a consumer can be calculated as follows:

| Expense Category | Expense Amount | Description |
|---|---|---|
| Minimum Usage Charge | $81.80 | Specified Basic Charge |
| Tier 1 Charge | $215.60 | (63,000 − 14,000) / 1,000 × $4.40 |
| Total Charges | $297.40 | |

Water suppliers should develop a rate structure that supports and encourages water conservation. Often, such a rate structure includes an inverted block rate for further usage (i.e., the price per unit volume of water consumed increases for consumption beyond certain threshold usage values), and it may involve seasonal price differentials. The rates should depend (in part) upon on the quantity of water metered at the service connections.

An effective conservation rate structure should be developed so as to encourage maximum participation in conservation efforts. The most effective means of ensuring this participation is to develop a multi-step rate structure. Each step in the rate structure should be thoughtfully established in order to accomplish the desired conservation effect with the majority of consumers. Other rate considerations may include provisions for large users to allow such businesses to operate competitively.

The City of Newport might consider implementing an inverted block rate for further usage, perhaps in effect for only a portion of the year, in order to promote conservation among its water consumers. However, some water customers may be unfairly penalized with this type of rate structure. For example, a trailer park utilizing a single meter for many homes could be charged a much higher cost, per home, than a neighborhood of individually metered homes using the same amount of water.

### 9.4.8 Water Reuse and Recycling Opportunities

Supply-side water reuse typically includes utilization of process water from community treatment plants. Non-potable water reuse at a wastewater treatment plant can significantly reduce the amount of treated water consumed during operations of the facility.

Reuse of backwash water at the potable water treatment plant can also result in significant water savings. The City of Newport has recycled their backwash water for many years. In general terms, the City's water plant is a "zero discharge" facility. However, this practice is controversial, since particulates and organisms removed during the filtering process can potentially lead to a buildup of these materials within the treatment system from the on-going recycling process.

Demand-side water reuse (for residences) usually involves the reclamation of "gray water" which can consist of any household wastewater not containing human waste such as water from sink, bathtub, shower, or roof drains. The Department of Environmental Quality (DEQ) of Oregon does not currently permit reclamation of gray water for reuse in residential environments. Oregon Administrative Rules (OAR) 340-055 govern the limitations on recycled water use in the State.

Larger commercial or industrial facilities often can benefit from water reuse practices. Depending upon the kind of facilities and the processes involved, a significant savings of water resources can be achieved. One application in which such savings have been realized is in facilities with cooling towers. Ordinarily in the past, evaporated water removed in cooling tower operations has been drained to the sanitary sewer. Today, many of these facilities have found effective ways to further utilize this water for other purposes within their processes.

It is the policy of the Oregon Environmental Quality Commission to encourage the use of recycled water for domestic, agricultural, industrial, recreational, and other beneficial purposes in a manner that protects public health and the environment of the State. The use of recycled water for beneficial purposes will improve water quality by reducing discharge of treated effluent to surface waters, reduce the demand on drinking water sources for uses not requiring potable water, and may conserve stream flows by reducing withdrawal for out-of-stream use.

### 9.4.9 EPA WaterSense® Program

In the early 1990s, the Water Alliances for Voluntary Efficiency (WAVE) program was created by the EPA to promote efficient utilization of water resources and to encourage reduced water consumption. Initially, the program was focused on the lodging (motel/hotel) industry but later included commercial businesses and educational institutions. This program is no longer officially supported by the EPA.

Recently, the EPA has launched the WaterSense® program, a partnership endeavor directed at utilities, state and local governments, and other organizations that desire to share information about the program and the water-efficient products and practices which it endorses. The program also seeks to stimulate innovation in and availability of such products in the marketplace, and it provides resources to water suppliers in order to enhance the overall promotion of water conservation. Furthermore, a number of informative external resources may be found by clicking the "Related Links" tab on the WaterSense® website (http://www.epa.gov/watersense/). These resources include:

- Everyday Water-Saving Tips (Consumer Reports®)
- The Environmentally-Preferable Purchasing Guide
- Water – Use It Wisely® (Conservation Information)

- WaterWiser® – The Water Efficiency Clearinghouse (AWWA)
- GreenScapes® Program for Environmentally-Beneficial Landscaping

The City of Newport should consider becoming a partner in the WaterSense® program in order to assist its efforts toward water conservation and to take advantage of the resources which the program can offer (http://www.epa.gov/watersense/partners/join/index.htm).

## 9.5 Recommended Plan and Schedule (OAR 690-086-0150.4)

It is common for a water supplier to develop a WMCP, submit that plan to the Oregon WRD for review and approval, implement the plan over a certain period of time, evaluate the effectiveness of the plan at the end of this period of time, and then resubmit an updated plan to the Oregon WRD for further review and feedback. Typically, the time period between plan submittals is at least five years.

Optimally, a WMCP should be developed in coordination with city public works officials and council members, along with appropriate input from stakeholders (e.g., residential, commercial, and industrial consumers). Since the supply issues, consumer characteristics, budgetary constraints, and operational practices of each water system are unique, an effective WMCP must be designed especially for that particular system. And because of the assessment approach chosen for this study, this WMCP must be consistent with the objectives and concerns of the WSMP in which it is embedded.

As mentioned above, the City of Newport is already engaged in operational practices that contribute to water conversation efforts, and it should be commended for the careful oversight of its water system. However, further progress can be accomplished to support and promote water conservation within the Newport water system.

The plan and schedule outlined in Table 9.5 below is primarily intended to serve as a repository of ideas and a potential guide for the City of Newport as it continues to develop its water conservation program. From these suggestions, the City will, through its council and community members, need to formulate and adopt a precise plan and schedule for implementation.

Because of the tentative nature of the water conservation plan and schedule recommended in Table 9.5, no effort was given toward estimating either a budget for the conservation measures suggested or the savings which might result from implementation of the measures. Nevertheless, the measures indicated all support specific strategies/requirements mentioned in OAR 690-086-0150. As a result, their implementation should enable the City to achieve compliance with the regulations.

**Table 9.5 – Recommended Water Conservation Plan and Schedule for City of Newport**

| Conservation Measure/Benchmark | Details Below | Implementation Years |
|---|---|---|
| Supply Source Meter Calibration | No | 2010, 2015, 2020, 2025 |
| Customer Meter Testing/Replacement | Yes | every year, through 2030 |
| System Leak Detection/Repair | Yes | every year, through 2030 |
| Annual Water System Audit | No | every year, through 2030 |
| Rate Structure and Billing Practices | Yes | every month, through 2030 |
| Public Education Program | Yes | every year, through 2030 |
| Technical/Financial Assistance | Yes | 2010, 2015, 2020, 2025 |
| Reuse/Recycling Efforts | Yes | when feasible and appropriate, through 2030 |
| WMCP Progress Report | No | 2015, 2020, 2025, 2030 (included in WSMP) |
| WSMP Update | No | 2015, 2020, 2025, 2030 (new study in 2030) |
| | | |

Further details for selected conservation measures/benchmarks are provided below:

**Customer Meter Testing/Replacement**

- Inspect/Test ⅝" × ¾" customer meters at the rate of five meters per month utilizing a random sampling process.
- Inspect/Test all meters of size 3" or larger every year.
- Replace “dead” meters or those with less than 70% accuracy.
- Replace old meters (i.e., those of age 20 years or older).
- Investigate “radio read” (AMR) technology for future meters.

**System Leak Detection/Repair**

- Inspect water mains, valves, connections, and meters for leaks in an on-going effort.
- Utilize non-invasive technology for inspection/identification of suspected leaks.
- Arrange inspections to coincide with roadway or other utility repairs when possible.
- Conduct periodic system-flushing efforts and actuation of system appurtenances.
- Allocate reserve funds via usage charges for rehabilitation of system infrastructure.

**Rate Structure and Billing Practices**

- Employ a usage-based rate structure for all metered service connections.
- Migrate from a regressive-block-rate to an inverted-block-rate structure.
- Provide a record of consumption history on all billing statements.
- Combine AMR technology with billing software for accuracy/efficiency.

**Public Education Program**

- Publish two articles per year on water conservation strategies in the local newspaper.
- Provide a biennial workshop on local water resources, treatment, and conservation.
- Create either a web page or hyperlink dedicated to conservation on the city website.
- Distribute brochures on conservation with billing statements or at public offices/events.
- Join the EPA WaterSense® Program at the level of a promotional (municipal) partner.

**Technical/Financial Assistance**

- Offer leak detection tests free of charge to residential and institutional consumers.
- Provide assistance for retrofit and/or replacement of inefficient fixtures/appliances.
- Distribute conservation kits (flow-restriction or volume-reduction devices, irrigation gauges).
- Create a demonstration garden on city property with low-water-use landscaping.
- Offer subsidies to commercial or industrial consumers for novel conservation efforts.

**Reuse/Recycling Efforts**

- Perform feasibility study for reusing/recycling process water from community treatment plants.
- Offer rebates to commercial or industrial consumers for investigating and/or implementing (in coordination with Oregon DEQ) methods of reusing/recycling water from their operations.
- Explore possible use of gray water for irrigation of landscapes of selected consumers.

## 9.6 Water Curtailment Plan (OAR 690-086-0160)

A water curtailment plan consists of an “interim” mandatory program intended to substantially (or even drastically) reduce water consumption, usually the consequence of a water supply/service emergency or interruption. In accordance with OAR 690-086-0160, each water supplier must develop a curtailment plan with specific event triggers, operating guidelines for various event stages, and measures to reduce consumption which would be enforced under such circumstances.

Most water systems have critical elements that, if damaged or destroyed, would restrict or prevent the delivery of treated water to consumers. In such a situation, the supply/service interruption could last from a few hours to several days. As part of a complete WMCP, a curtailment plan would provide the City of Newport with a "roadmap" for navigating and managing such an event.

The following subsections provide information for the development of a water curtailment plan. The City of Newport was required to complete a Vulnerability Analysis (VA) and Emergency Response Plan (ERP) in 2005. Much of the information contained in these documents is relevant and could be useful in completing a curtailment plan.

### 9.6.1 Historical Deficiencies

A water supplier should be prepared for supply-deficiency events. The formation and adoption of policies, ordinances, and other measures should occur well before an actual reduction or interruption in the water supply. Knowledge of past events, along with information about both the causes and indicators of potential supply crises, will assist the water supplier in providing a consistent and reliable product to its customers.

The City of Newport has experienced some reductions in water supply in the past (most notably the drought of 1992 during which restrictions on water consumption were in effect from late June until early November of that year).

Of further concern is the production capacity of the treatment plant itself. Again, during the period of highest demand for a typical year, it has been observed over the past several years that the plant must be operated virtually 24 hours per day for nearly a month. Even then, it is found from inspection of water system records that treated water supplies are being continually depleted, meaning that the plant is not able to meet total demand. When properly designed and operated, the plant should be capable of meeting the maximum daily demand while maintaining a full storage system, with only demands due to peak hourly usage or fire suppression efforts causing storage system levels to temporarily drop.

### 9.6.2 Source Water Supply Evaluation

From an examination of the projected supply needs for the community over the planning period, it is found that the water supply rights available for diversion are sufficient provided that the primary supply sources (Big Creek and Siletz River) maintain their normal stream flows. Also, as discussed elsewhere in this section, it likely will be necessary to begin diverting water from the Siletz River earlier in the year in order to store it within the Big Creek reservoirs for subsequent withdrawal during the summer months.

However, should another cause of an unexpected supply reduction or interruption occur, a curtailment plan will be an essential tool for the City to properly respond to such an event.

## 9.7 Alert Stages for Water Curtailment

A water curtailment plan should contain at least three stages of alert for potential events associated with a reduction in or an interruption of water service. These stages would range from a mild level of concern to a serious level of concern to a critical level of concern. Each stage involves predetermined indicators that identify when that stage has been reached along with an associated set of actions and measures.

The following alert stages are recommended for the City of Newport water curtailment plan:

**Alert Stage No. 1 – Water System Advisory Status**

- Prudent to inform community of potential water supply or service difficulties.
- Difficulties do not require mandatory conservation but suggest voluntary conservation.
- Prepare community mindset for possible reduction in or interruption of water service.

**Alert Stage No. 2 – Water System Warning Status**

- Necessary to inform community of actual (typically, gradual) water supply or service problem.
- Necessary to impose initial levels of mandatory conservation in a temporary time frame.
- Supplier response would likely involve maintenance/repair activities, construction activities, or preparations to avert a potentially sustained supply or service problem.

**Alert Stage No. 3 – Water System Emergency Status**

- Necessary to inform community of actual (typically, sudden) water supply or service problem.
- Necessary to impose escalated levels of mandatory conservation in a protracted time frame.
- Supplier response would certainly involve maintenance/repair activities, construction activities, or other efforts to avert a potentially-sustained supply or service problem.

**Alert Stage No. 4 – Critical Water-Availability Status**

- Necessary to inform community of threatened or nonexistent water availability.
- Possibility exists to impose periodic or sustained termination of water service.
- Conditions warrant possible water rationing at emergency distribution centers.

## 9.8 Indicators for Alert Stages

As mentioned above, each stage of alert involves predetermined indicators, or event triggers, that identify when that stage has been reached along with an associated set of actions and measures.

### 9.8.1 Planned Maintenance/Repair or Sudden Failure of Components

On occasion, it is likely to be necessary to suspend or shutdown the operation of a water system for such reasons as maintenance, repair, or upgrade. Whenever possible, such activities should be carefully planned and scheduled in order to minimize impact upon water consumers. However, though relatively rare, it is usually unavoidable for a water system to prevent all unplanned events that severely limit or terminate the delivery of water to certain consumers within the service area. A list of possible events that could lead to such conditions and would constitute entering a stage of alert is provided below:

- Indefinite interruption of electric-power supply
- Severe contamination of source-water supply
- Compromise/Destruction of intake structure or system piping
- Failure/Collapse of storage reservoir or tank
- Failure/Breakdown of crucial pumps, valves, or connectors

Typically, these events would be precipitated by natural disasters, environmental catastrophes, or other emergency conditions which are generally beyond the control of water system managers.

### 9.8.2 Reduced Reservoir Levels or Stream Flows

In the Newport water system, water is diverted from two primary sources: the Big Creek reservoirs and the Siletz River. Along with water quality measures, city public works personnel continually monitor the levels and flows associated with these sources, especially during summer months. These levels and flows serve as direct indicators of possible drought conditions that would jeopardize the supply for this water system. Although recent data has not been provided by the water supplier, historical data on these levels and flows could be analyzed to determine threshold values that would trigger certain alert stages.

Figure 9.8.2 shows the various streams and rivers in the nearby drainage basins and illustrates the sensitive fish (anadramous and other) habitat that can be found in the vicinity. Salmon and steelhead spawning streams are located throughout the local drainage basins. These sensitive fish habitats created the need for in-stream water rights and, in turn, make it difficult for municipalities to obtain new water rights on these streams during periods of below-normal flow. When water levels are low, in-stream rights and human water needs must be carefully managed and coordinated.

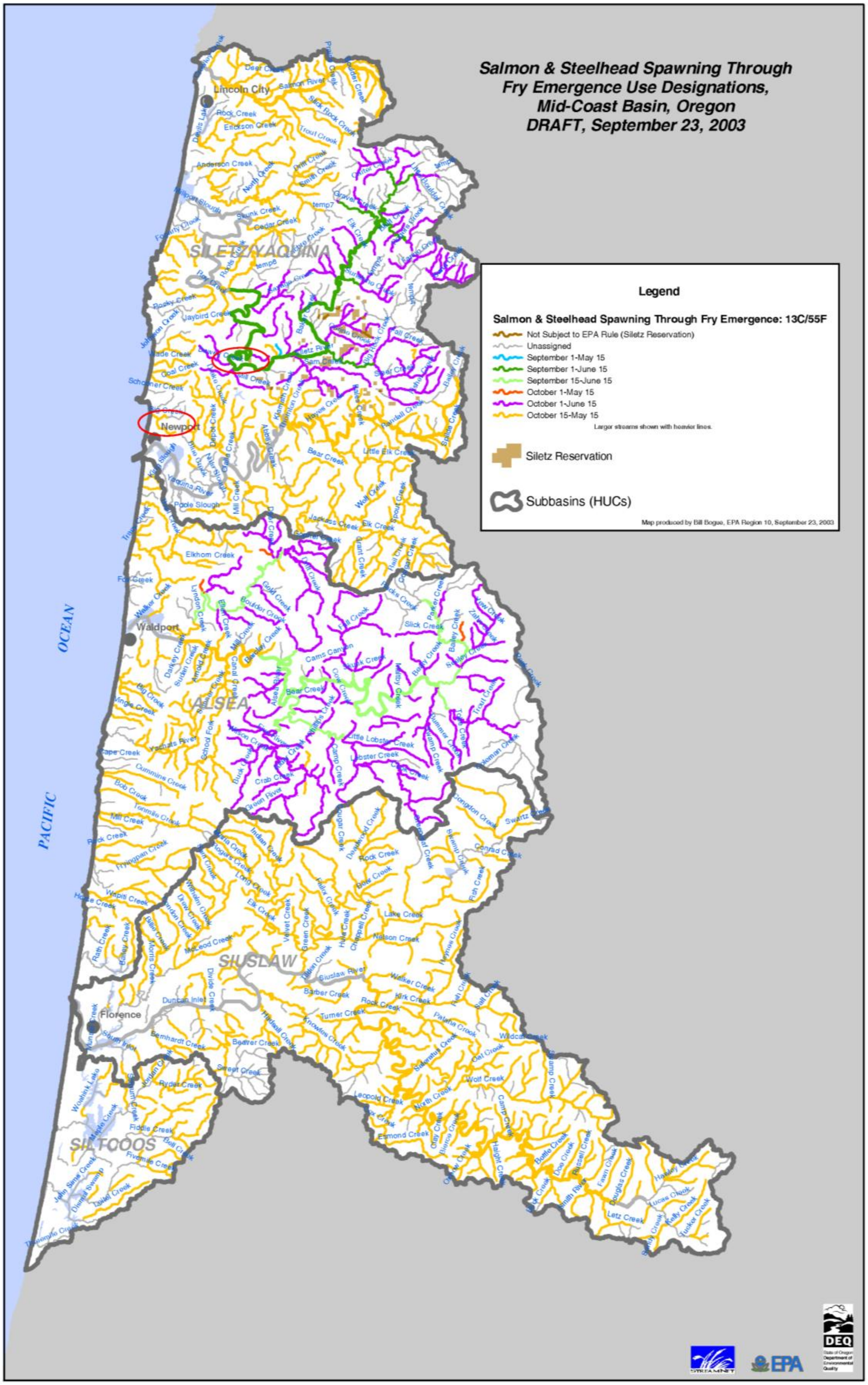



**Figure 9.8.2 – Salmon and Steelhead Spawning through Fry Emergence**

### 9.8.3 Palmer Hydrological Drought Index

The Palmer Hydrological Drought Index (PHDI) is a widely-utilized measure for assessing the extent of drought conditions throughout the continental United States. The PHDI is based upon long-term records of temperature and precipitation, and it is tabulated by the NOAA Satellite and Information Service on a weekly basis. PHDI values are determined for about 350 climate divisions within the continental United States and are available on both the NOAA and National Weather Service websites.

Normal weather is assigned an index value of zero in all seasons in any region of climate; droughts will have negative index values, whereas wet periods will have positive index values. Negative index values occurring over several consecutive weeks can provide initial warning of an impending drought. Long-term negative index values can assist the City in judging the severity of a drought condition.

For the purposes of a water curtailment plan, the City would be interested in the negative PHDI regime, which is already conveniently divided into three drought-indicative intervals: a *moderate drought*, with values from −2 to −3; a *severe drought*, with values from −3 to −4; and an *extreme drought*, with values of −4 or less.

A map of the continental United States superimposed with PHDI values for various regions is displayed in Figure 9.8.3. As may be identified, Newport lies within the white band along the Oregon coast. The index value for this area (as of June 2008) corresponds to a mid-range, indicating neither drought nor wet-period conditions for this area. Eastern (especially, southeastern) portions of Oregon are seen to be experiencing moderate-to-severe drought conditions.

Although not directly supply-specific, the PHDI can serve as a valuable indicator for assessing potential source-water supply issues, and it can be tied to triggers for alert stages within a water curtailment plan. The PHDI format discussed herein is updated monthly and can be accessed at the following website:

> http://lwf.ncdc.noaa.gov/oa/climate/research/prelim/drought/phdiimage.html

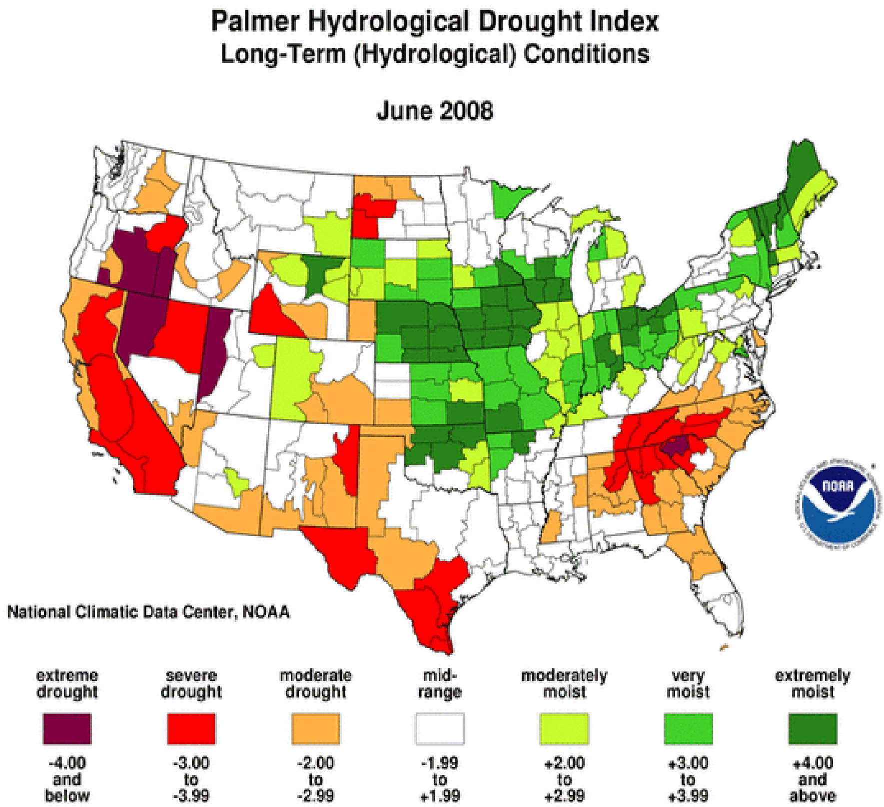



**Figure 9.8.3 – Palmer Hydrological Drought Index, June 2008**

## 9.8.4 Surface Water Supply Index

With similarities to the PHDI, the Surface Water Supply Index (SWSI) is another measure for assessing the extent of drought conditions, but it is directly correlated with availability of water resources within designated regions. Tabulated monthly by the USDA National Resource Conservation Service for the major drainage basins within each state, the SWSI can be utilized to identify which basins possess water supplies that are either above, at, or below normal levels.

A map of the State of Oregon superimposed with SWSI values for the major drainage basins is displayed in Figure 9.8.4-1. Newport lies within the yellow region that corresponds to the North and Mid-Coastal basins. The index value for this region (as of June 1, 2008) is −0.3, signifying an average amount of available surface water supply. The scale for the SWSI is comparable to that for the PHDI in terms of the extent of drought conditions (though the precise meanings of the two indices are different).

Like the PHDI, the SWSI can serve as a valuable indicator for assessing potential source-water supply issues, and it can be tied to triggers for alert stages within a water curtailment plan. The SWSI format discussed herein is updated monthly and can be accessed at the following website:

http://www.or.nrcs.usda.gov/snow/watersupply/swsi.html

In addition to monthly SWSI data, substantial historical data is available from this website to indicate both the frequency and intervals of reoccurrence of various levels of supply which might be expected. Figure 9.8.4-2 summarizes the SWSI data over the past three years. Data extending further back in time is also available from this website.

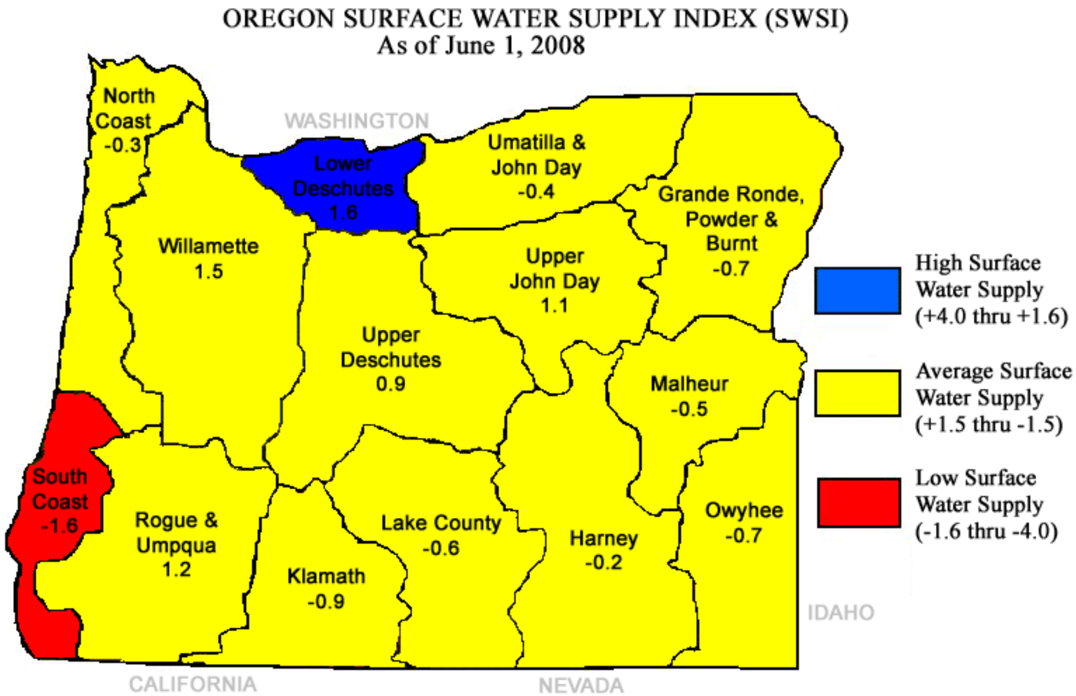



**Figure 9.8.4-1 – Oregon Surface Water Supply Index, June 1, 2008**

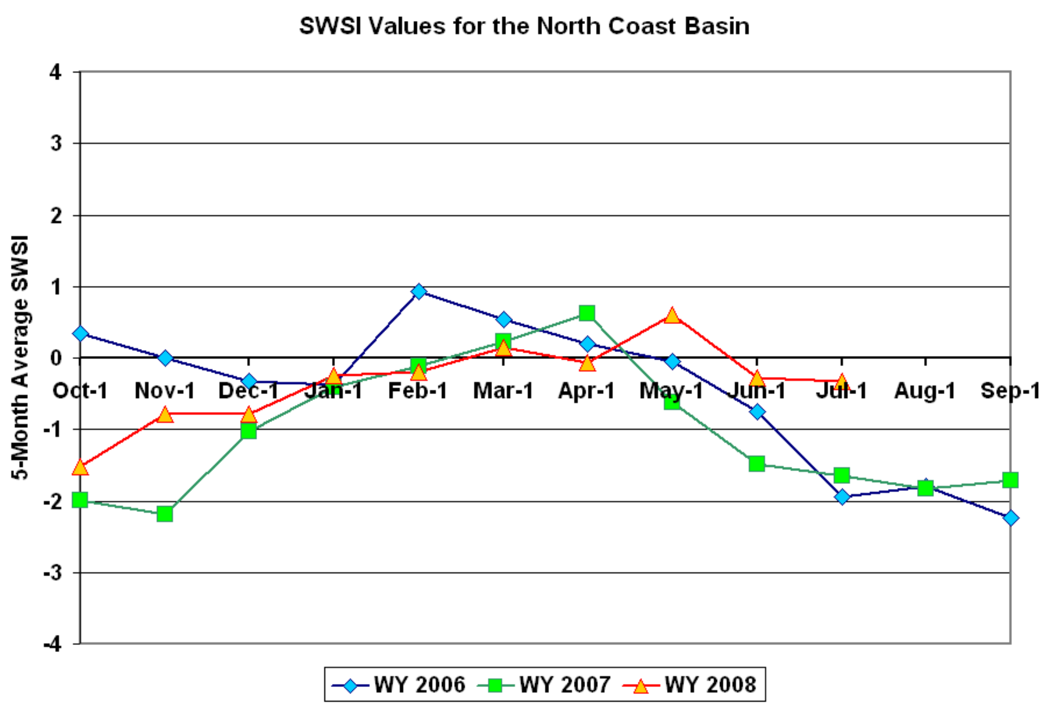



**Figure 9.8.4-2 – SWSI Values for the North Coast Basin, Oct. 2006 – July 2008**

### 9.8.5 Assessment by System Managers

As part of any informed and coordinated water curtailment plan, the participation of system managers will be crucial in order to accurately assess and effectively respond to potential or actual crisis situations that relate to water supply/service. Given their extensive knowledge and experience concerning the conditions and operations of the water system, these managers should have the latitude to invoke, in conjunction with other indicators, appropriate alert stages for water curtailment when deemed necessary. This trigger is especially important for planning the maintenance/repair of critical system components or responding to a sudden deterioration in source water quality.

## 9.9 Recommended Curtailment Triggers, Measures, and Actions

Besides the specific triggers required for their inception, each alert stage should include a description of the conservation measures and other necessary actions that would be appropriate for that stage during a water curtailment event. These measures and actions are provided below and are intended to serve as guidelines for the actual efforts and activities which would be implemented. The City of Newport should draft its own formal water curtailment plan along with appropriate ordinances to legally enforce that plan.

In certain instances of the recommended measures and actions for the various stages of alert, it would be necessary for the City to approve resolutions to support those measures and actions.

### Alert Stage No. 1 – Water System Advisory Status

This alert stage is intended to provide preliminary and precautionary information to the community about potential water supply/service difficulties.

**Objective: 5% Reduction in Overall Consumption**

**Triggers**

- PHDI value in the range of −2 to −3
- SWSI value in the range of −1.50 to −2.50
- Levels/Flows of primary supply sources drop below specified levels (to be assessed)
- Scheduled maintenance/repairs or construction activities that significantly but temporarily affect the treatment plant or storage and distribution system operations
- Water-system-management discretionary decision

**Measures and Actions**

- Inform community via water system status signs, public announcements in communications media, and possibly water billing statements.
- Strongly encourage effective water conservation practices. Possibly distribute conservation kits.
- Request voluntary reduction in water consumption. Possibly restrict irrigation of lawns, gardens, and landscaping to the hours from 9:00 PM to 7:00 AM on each day.
- Discourage outdoor washing of equipment, vehicles, pavement, or other facilities.
- Discourage draining/filling pools and ponds.
- Reduce operation of public-display fountains and waterfalls, and irrigation of public lands.
- Reduce scheduled flushing of water lines and fire-fighting drills involving water consumption.

## Alert Stage No. 2 – Water System Warning Status

This alert stage is intended to provide information to the community about actual water supply or service difficulties which are anticipated to be of a short-term nature.

**Objective: 10% Reduction in Overall Consumption**

**Triggers**

- PHDI value in the range of −3 to −4
- SWSI value in the range of −2.50 to −3.25
- Levels/Flows of primary supply sources drop further below specified levels (to be assessed)
- Unplanned maintenance/repairs or construction activities that significantly affect the treatment plant or storage and distribution system operations in a short-term manner
- Water-system-management discretionary decision

**Measures and Actions**

- Continue dissemination of information to community by means described for Alert Stage No. 1. The elevated level of concern over water availability should be emphasized.
- Provide assistance for retrofit and/or replacement of inefficient fixtures/appliances. Begin a campaign for such modifications, supported by rebates or other incentives (if appropriate). This measure may not be, comparatively, short term in nature.
- Implement (if necessary) water-curtailment usage rates or supply-shortage surcharges as financial incentives for achieving overall consumption objective.
- Report violations of mandatory conservation measures, to result in possible fines.
- Enforce mandatory reduction in water consumption. Restrict irrigation of lawns, gardens, and landscaping to selected hours on specified days (e.g., evening hours on even/odd days).
- Prohibit outdoor washing of equipment, vehicles, pavement, or other facilities (unless required for public health or safety).
- Prohibit draining/filling pools and ponds (except when aquatic life will be critically affected).
- Discontinue operation of public-display fountains and waterfalls, and irrigation of public lands.
- Discontinue scheduled flushing of water lines and fire-fighting drills involving water consumption.
- Require high-volume consumers (e.g., restaurants, hotels/motels, recreation centers) to post notices about mandatory conservation measures; drinking water served to customers only upon request.
- Suspend any planned expansions of water system, including the addition of new connections.

## Alert Stage No. 3 – Water System Emergency Status

This alert stage is intended to provide information to the community about actual water supply or service difficulties which are anticipated to be of a longer-term nature.

**Objective: 20% Reduction in Overall Consumption**

**Triggers**

- PHDI value in the range of −4 or less
- SWSI value in the range of −3.25 to −4.00
- Levels/Flows of primary supply sources drop further below specified levels (to be assessed)
- Unplanned maintenance/repairs or construction activities that significantly affect the treatment plant or storage and distribution system operations in a longer-term manner

- Water-system-management discretionary decision

**Measures and Actions**

- Continue dissemination of information to community by means described for Alert Stage No. 1. The serious level of concern over water availability should be emphasized.
- Continue implementation of all mandatory conservation measures required in previous stages.
- Report violations of mandatory conservation measures, to result in possible disconnection.
- Impose usage limits for residential consumers, possibly based upon number of persons actually residing in household (e.g., 50 gpcd).
- Impose usage limits for commercial and industrial consumers, possibly based upon month of minimum usage (e.g., February) from the previous year.
- Prohibit water usage for all outdoor purposes (unless gray water is utilized).

### Alert Stage No. 4 – Critical Water-Availability Status

This exceedingly-rare alert stage is intended to inform the community of threatened or nonexistent water availability via the normal delivery means. It would coincide with the most dire circumstances, usually associated with natural disasters, environmental catastrophes, or other extreme-emergency conditions.

**Objective: Meet Consumption Needs of Community for Life Sustenance**

**Triggers**

- Shutdown of treatment plant and/or inability to deliver water to storage and distribution system
- Delivery disruption anticipated to exceed a three-day duration, while storage reserves constitute a supply for less than three days of typical consumption
- Supply disruption/compromise of primary sources of raw water
- Water-system-management discretionary decision

**Measures and Actions**

- Continue dissemination of information to community by means described for Alert Stage No. 1. The critical level of concern over water availability should be emphasized.
- Continue implementation of all mandatory conservation measures required in previous stages.
- Eliminate all non-essential consumption of water until further notice.
- If available and deliverable, treated water may be rationed to consumers by periodic operation of the distribution system during designated hours on specified days.
- Otherwise, another supply of treated water would be arranged, most likely requiring water to be shipped to the community by vehicles and made available at emergency distribution centers.
- Seek immediate state and/or federal assistance for a rapid restoration of the normal water supply and delivery system for the community.

## 9.10 Water Curtailment Ordinance

At present, the City of Newport has neither a water curtailment ordinance nor plan. It is presumed that the development of this plan will be largely based upon the results of this study.

A summary of the recommended curtailment plan is provided in subsection 9.09.

# 9.11 <u>Long-Range Water Supply Plan</u> (OAR 690-086-0170)

## 9.11.1 Introduction

The service area for the Newport water system is encompassed by the current urban growth boundary (UGB). While an expanded UGB may be under consideration for the future, the anticipated potential growth within the system for the planning period will occur within the existing UGB. As previously mentioned, the largest additions to the system will be the "Former Seal Rock Area" and the new central campus of the Oregon Coast Community College.

As part of any water system master plan, it is necessary to establish that the available sources of water (diversions from which are allowed by existing water rights) for a community supply system can adequately meet the demands anticipated over the planning period.

## 9.11.2 Long-Range Water Demand

The capacity and sizing of a water supply system are based upon the levels of water demand predicted to be realized over the planning period. Water demand is the actual amount of water transferred from the supply source and delivered into the distribution system over a designated interval of time (e.g., hourly, daily, monthly). Projections of future water demand are utilized to judge the adequacy of the existing facilities and to determine the capabilities necessary for the proposed improvements. These projections are also utilized to evaluate the sufficiency of existing water rights and the capability and reliability of sources that supply those rights.

The existing water demand in Newport was reported (by several measures) in subsection 9.02.

Similar to the projections for population and EDU-values presented in Section 2 of this study (see Table 2.2.2-1), the water demand measures are projected in Table 6.2.2-1 and are based upon the selected design values appearing in Table 6.2.1-1. The objective of projecting demands into the future is not to necessarily construct larger facilities to support excessive water consumption, but rather to:

- Assess existing facility capabilities
- Identify any immediate deficiencies
- Recommend performance improvements
- "Size" new or upgraded facilities for anticipated (but reasonable) future water demands

The design values for the normalized water demand measures (gpcd and gpd/EDU) are reasonable in comparison to the values indicated for per capita water usage in Oregon, as assessed by the U.S. Department of the Interior and documented in the 2000 U.S. Geological Survey Circular 1268, entitled "Estimated Usage of Water in the United States in 2000". By projecting the residential population, total system EDU-value, and system water demand measures at the same average annual growth rate (AAGR), these normalized water demand measures are preserved.

Assuming a 1.25% AAGR for the planning period, the 2007 population of 10,455 people is estimated to reach 14,092 people by the year 2030. If the proportions of total water usage for the residential and various non-residential consumer groups remain constant over this period of time, then the EDU values will increase at the same growth rate. It is possible that EDU values could grow faster than the population if significant commercial/industrial development occurs. It is also possible that population growth will not maintain a 1.25% AAGR over this time period. For these reasons, the total system EDU value at any time is always the best indicator of water needs at that time.

### 9.11.3 Projected Demand vs. System Capacity

The estimated maximum day demand (MDD) at the end of the planning period is 5.81 MGD. This value of the MDD is equivalent to 8.99 cfs (4,035 gpm).

As previously mentioned, many of the water rights held by the City of Newport are impractical to exercise, and the water right with the largest capacity (Big Creek) cannot be exercised during the period of highest demand for a typical year because of seasonal declines in the stream flow associated with this source. However, additional supply capacity is available from the Siletz River, but water from this source must be pumped from a distance of over six miles into the drainage basin for the Big Creek reservoirs.

As revealed from the water diversion rights in Table 9.2.2-1 for the primary supply sources (Big Creek and Siletz River), the legally available raw water flow rate into the Newport water system is 16.00 cfs. While it appears that the City has an ample supply of raw water to meet its needs, the hydrologically-available raw water flow rate at certain times of the year may be sharply less than what is needed. However, if it is assumed that efforts are made during the off-peak-demand season to adequately fill the Big Creek reservoir system with a sufficient supply of water, then the needs of the City should be satisfied. A discussion of the proposed means by which this supply strategy can be accomplished is provided in Section 8 (Capital Improvement Plan) of this study.

### 9.11.4 Development of New Sources – Long Term Planning

Although the Newport water rights seem adequate to supply the projected MDD over the planning period, it will be necessary to develop the Big Creek reservoir system in order to ensure availability of necessary water, especially during the drier periods of the year when stream flows are diminished. Preliminary analysis has shown that, with water being pumped from the Siletz River into the drainage basin for the Big Creek reservoirs, it should be possible to adequately supply the Newport water system during the drier periods of the year and still nearly maintain the Big Creek reservoir levels. However, this ability to maintain these levels may deteriorate toward the end of the planning period. But given the enormity of the capacity of these reservoirs (65 and 316 MG for the lower and upper reservoirs, respectively, which overshadow even the consumption for an entire month; see the MMD), it seems that an adequate supply of raw water is fairly assured for the current planning period.

Thus, assuming that consumer demand remains bounded by the projections determined in this study, it should not be necessary to acquire new sources over the current 20-year planning period.

However, long-range planning beyond the current planning period will require the City to develop new water reserves. The current master plan considered various alternatives including:

1. Development of the Rocky Creek dam and reservoir
2. Increasing the storage volume (raising the dam) in the Big Creek basin
3. Development of desalination and utilizing estuary or ocean water for potable water treatment

Of these alternatives, the planning effort suggests that the Rocky Creek dam and reservoir have the lowest likely cost. This alternative, however, requires cooperation from several water providers in the region to join together in developing and sharing the Rocky Creek water supply.

Several studies were undertaken in the past decade to investigate the feasibility of the Rocky Creek system. A watershed council was established that included in its membership several of the water suppliers in the region. While the watershed council has been inactive for several years, recent interests in planning for long-term water reserves has increased the importance of this issue for the affected water systems in the region. Some meetings and discussion of the watershed council have once again started.

Recommendations within this master plan include the following points with regard to water resource planning:

1. Carefully manage the current water reserves and maximize existing storage reservoir volumes in order to ensure adequate water suppliers through much of the current planning period.
2. Immediately begin working toward planning and development of additional reserves for water needs beyond the current planning period. This may include planning to develop the Rocky Creek facilities or expanding the Big Creek facilities.
3. Develop and maintain an active conservation plan that will seek to help the City make the most effective use of the water they have.

# Financing and Rate Analysis

Section 10

## 10.1 Financial Impacts

Public facilities improvements are often expensive and have a significant financial impact on a community. The impact varies depending on the size of the project to be undertaken, the size of the community, the funding scenario, the amount of existing debt that a community is carrying, and other factors.

Most communities are unable to finance major infrastructure improvements without some form of financial assistance. This assistance often comes from governmental funding agencies, lending institutions, or other means.

This section will provide some background and information on financial issues related to funding a project in Newport. Each project or group of projects will require its own funding approach. As such, it would be impossible to develop a funding strategy for the entire CIP at this time. Therefore, this section will seek to provide more general information to support the planning in the master plan and provide the City with information about the City's financing and potential funding sources for future reference.

## 10.2 Existing Water Rate Structure

The City's existing rate structure includes a base rate and consumption rate for various meter sizes. Rates vary based on meter size, water used, and the location of the water customer (inside or outside the City Limits). This section shall provide a summary of the existing user rates and charges in the City of Newport at the time this study was completed. The information may be required for various funding applications and reviews by funding agencies.

### 10.2.1 Connection Fees

The City of Newport charges various connection fees to defray some of the costs associated with connecting new customers to the system. The following connection fees applied to new customers as of November 2008.

**Table 10.2.1 – Connection Fee Summary**

| Size of Service | Connection Fee |
|---|---|
| 5/8" x ¾" | $1,420 |
| 1" | $1,575 |
| Larger than 1" | Actual cost plus 10% |

In addition to the above fees, a fee of $1,540 for cutting and repairing asphalt streets is charged where applicable.

Additional charges for System Development Charges are typically added for new water service connections at the time the building permit is issued. However, it is important to understand that SDCs are not connection fees and are related to compensation for reserved capacity in the system. A discussion on SDCs in Newport is provided in Section 8 of this Plan.

### 10.2.2 Water User Rates – General Rates

General rates apply to Newport water customers, located within the City Limits. Table 10.2.2 summarizes the water rates for the general Newport water customers.

**Table 10.2.2 – General Water Use Rates**

| Connection (Meter) Size | Threshold Usage Value | Minimum Usage Charge | Cost Per 1,000 Gallons (Tier 1) |
|---|---|---|---|
| ⅝" × ¾" | 1,000 gal | $12.85 | $2.30 |
| 1" | 3,000 gal | $17.65 | |
| 1¼" × 1½" | 6,000 gal | $25.90 | |
| 2" | 14,000 gal | $44.40 | |
| 3" | 23,000 gal | $66.40 | |
| 4" or over | 41,000 gal | $110.25 | |

Based on these rates, the average (based on 7,500 gallon average water use in Oregon per funding agency guidelines) user rate in Newport, for a typical (5/8" x ¾") residential meter is $27.80. This average rate is lower than the statewide average that is used by funding agencies to determine if a community qualifies for specific funding programs. Based on the actual system average of 4,600 gallons per month (see Section 6.1.4) the average monthly residential bill is around $21.13.

### 10.2.3 Rates For Outside Customers

The City of Newport provides water to a number of customers located outside their current water service boundary and some outside the City Limits. The City recently reached an agreement with the Seal Rock Water District to take over service responsibility to a number of customers in the southern portion of the system. Some of the new customers are within the City Limits; others are outside the City Limits.

As property taxes (via GO Bonds) and other funding mechanisms have been used in the past to fund projects in Newport, the location of a customer can affect the amount of money the customer contributes to the water fund based on their property taxes. Therefore, the City has special rates for customers outside of the "general" service area. The table below summarizes the rates for these customers.

**Table 10.2.3 – Outside Customer Water Use Rates**

| Connection (Meter) Size | Threshold Usage Value | Minimum Usage Charge | Cost Per 1,000 Gallons (Tier 1) |
|---|---|---|---|
| ⅝" × ¾" | 1,000 gal | $24.45 | $4.40 |
| 1" | 3,000 gal | $33.35 | |
| 1¼" × 1½" | 6,000 gal | $46.40 | |
| 2" | 14,000 gal | $81.80 | |
| 3" | 23,000 gal | $120.80 | |
| 4" or over | 41,000 gal | $200.20 | |

As shown in Table 10.2.3, customers located outside the City Limits of Newport are charged a higher rate than customers located within the City.

## 10.3 Water System Budget and Financial Summary

The City of Newport has operated a water system for over 60 years. They have proven to be capable of maintaining and effectively managing the physical facilities of system as well as the water fund and financial operations of the system.

The purpose of this section is to provide a brief summary of the current picture for the City of Newport water system. Detailed information on the budget can be obtained from the City's finance department.

**Table 10.3.1 – City of Newport Water Fund Budget Summary**

| Description | Actual 2005-06 | Actual 2006-07 | Actual 2007-08 | 2008-09 Budget |
|---|---|---|---|---|
| Beginning Balance* | $ 107,190 | $ 93,565 | $ 121,122 | $ 475,217 |
| Total Revenues (+) | $ 1,239,765 | $ 1,693,483 | $ 2,008,899 | $ 2,102,790 |
| Total Expenditures (-) | ($ 1,325,053) | ( $ 1,599,908) | ($ 1,918,917) | ($ 2,578,007) |
| Ending Balance | $ 75,902 | $ 187,140 | $ 211,104 | $ 475,217 (est) |

*****Note: Beginning balance adjusted through the regular audit process to account for various factors through generally accepted accounting principles.

Table 10.3.1 illustrates that the City's water system is operating in the "black" and is financially healthy.

## 10.4 Potential Funding Sources

There are a number of potential funding sources for which the City could look to for funding assistance and support when undertaking public water system improvements. These sources include local, state, federal, private and public alternatives. This section will seek to provide as brief description of some of the potential funding sources that may be of use to the City of Newport. This section should not be considered as a comprehensive resource for all potential funding sources.

### 10.4.1 Local Funding Sources

Local funding sources include all funding sources that utilize the local community as "the bank" or fund provider. A brief summary of various potential funding sources is provided below.

**General Obligation Bonds.** General obligation or GO bonds are municipal bonds that are "backed" by the full faith and credit of the issuer. GO bonds are generally repaid through an increase in property taxes. For a community such as Newport, the GO bonds can be an attractive option as the property tax payments are tax deductible, are not based on water use, and are collected whether a customer occupies the home full or part time. GO bonds guarantee a stable and consistent stream of revenue. As they are considered a lower risk investment, the interest rates on GO bond issues is generally lower than other alternatives. GO bonds require voter approval for issuance.

**Revenue Bonds.** Revenue bonds differ from GO bonds in that they are repaid through a municipality's revenue stream or by user rates. The full faith of the issuer is not behind revenue bonds; therefore, the interest rate on revenue bonds is generally higher than GO bonds. One advantage of revenue bonds is that they do not require voter approval.

**System Development Charges.** SDCs are charged to new customers to retire investments required to provide capacity for new customers to join the system. The City of Newport currently utilizes an SDC program to collect revenues from new customers to aid in upsizing facilities for growth. The disadvantage of using SDCs for infrastructure investment include that the revenue stream from SDCs varies with the economy and with the development market. As such, it is not reliable. Also, projects often have to be funded through other means as SDCs are often not collected until after an improvement is constructed. This requires interim or bridge funding that can often not be retired by SDCs in a timely manner. It is also important to understand that financial institutions, including public funding agencies, do not loan against SDCs.

**Local Improvement Districts.** LIDs are appropriate funding mechanisms for projects that benefit a limited and defined area. LIDs work well when the required improvements benefit a limited number of users and do not provide a system wide benefit or a benefit to a larger group of customers. Under an LID, improvement costs are distributed to customers based on a defendable methodology.

**Local Loan Centers.** Some agencies have found that they can obtain reasonable loans in a timely manner from local banking institutions for which the community has a relationship. The banks often require less administration and paperwork than public funding programs and often offer competitive interest rates.

### 10.4.2 State Funding Programs

The State of Oregon offers various programs for funding public water system projects. The various programs offer grants, loans, and combinations of the two. A brief summary of the state programs complete with information about where more information can be obtained for each program is provided below.

The most efficient way to obtain feedback from the state funding agencies and determine funding availability, terms, and requirements is to schedule a "one-stop" meeting with the funding agencies. The agencies will attend this "round table" style meeting and discuss the City's project needs and be able to make offers as to the funding that may be available though their individual programs.

**Safe Drinking Water Revolving Loan Fund (Department of Human Services, DWP)**

The Oregon Department of Human Services, Drinking Water Program offers a funding program that is funded through grants from the EPA. The grants are used to fund a revolving loan fund that offers low interest loans to water providers. Interest rates vary depending on the circumstances in the community but can be as low as 1% for low income communities. In some cases, the program offers a "principal forgiveness" element that resembles a grant of up to $250,000. Information on the SDWRLF program can be found at http://www.oregon.gov/DHS/ph/dwp/srlf.shtml or by calling 971-673-0422.

**Oregon Community Development Block Grant (CDBG)**

The Oregon Economic and Community Development Department administers a grant program for public water systems with funding originating from the US Department of Housing and Urban Development. Funding through this grant program is generally in the forms of grants of $1-million and under and is focused on communities meeting specific low income standards. Grants can be used for planning, design, and construction of new facilities. Information on the CDBG program can be found at http://econ.oregon.gov/ECDD/CD/index.shtml or by calling OECDD at 503-986-0123. Based on typical qualification requirements, it is unlikely that the City of Newport will qualify for a CDBG. However, this can be confirmed through a one-stop meeting or by calling OECDD.

### Water/Wastewater Fund

OECDD has another resource for funding water and wastewater improvement projects simply known as the water and wastewater fund. The program offers grants and loans and combination awards. Being in a non-compliance status is required to qualify for this program. As the City of Newport is not currently out of compliance or not likely to be in the near future, they will not likely qualify for this program. Additional information on this funding program can be found at http://www.oregon.gov/ECDD/CD/program/wtrww.shtml or by calling 503-986-0123.

### Oregon Water Resources Department Water Development Loan Fund

The Oregon Department of Water Resources offers the Water Development Loan Fun that can be used by to develop water resources, implement fish protection measures, and other water related projects. The program issues bonds for the loans. This fund may be a resource for Newport as they seek to solve their long-term water supply issues. Additional information on the loan fund can be found at http://www.wrd.state.or.us/OWRD/mgmt_wdlp.shtml or by calling 503-986-0900.

## 10.4.3 Federal Funding Programs

The federal government provides support to state and local agencies in many forms. Some of the state programs discussed above receive their funding from federal resources. Other programs are available directly through federal agencies. A brief description of these federal resources is provided below.

### Rural Development (USDA)

Rural Development

The USDA Rural Development (RD) offers a variety of grant and loan programs to aid water and wastewater systems as they upgrade and implement infrastructure improvements. Grants, loans, and other support are available through RD. The amount of assistance available and terms varies on a case by case basis. The most effective means of determining if RD funding is appropriate for a community is to schedule a 1-stop meeting through OECDD. An RD representative will attend and will provide details on their programs. Several programs are available through RD including the following:

- Water and Waste Disposal Loans and Grants
- Technical Assistance and Training Grants (TAT)
- Solid Waste Management Grants
- Emergency Community Water Assistance Grants
- Circuit Rider Assistance

Additional information on the funding programs available through RD can be found at http://www.usda.gov/rus/water/program.htm#rural%20water or by calling (503) 414-3303.

# 10.5 Funding Plan

As the end of this planning effort neared, the City began to formulate a funding plan to fund the Priority 1 Projects which are considered to be the most critical projects on the CIP. This section shall provide a brief description of the funding plan for the highest priority projects and for the other priority project groups in the CIP.

## 10.5.1 Priority 1 Projects Funding Plan

After some discussion with the Water System Task Force, the preference for funding the Priority 1 projects was through a GO bond. The City has had good experiences with GO bond funding and felt that it would be a good alternative for this group of projects.

With planning scheduled for completion in 2008, timing allowed the City to file papers and put a measure on the November 2008 general election ballot (Measure 21-124). The nearly $16-million measure would fund the majority of the Priority 1 projects and be repaid through property taxes.

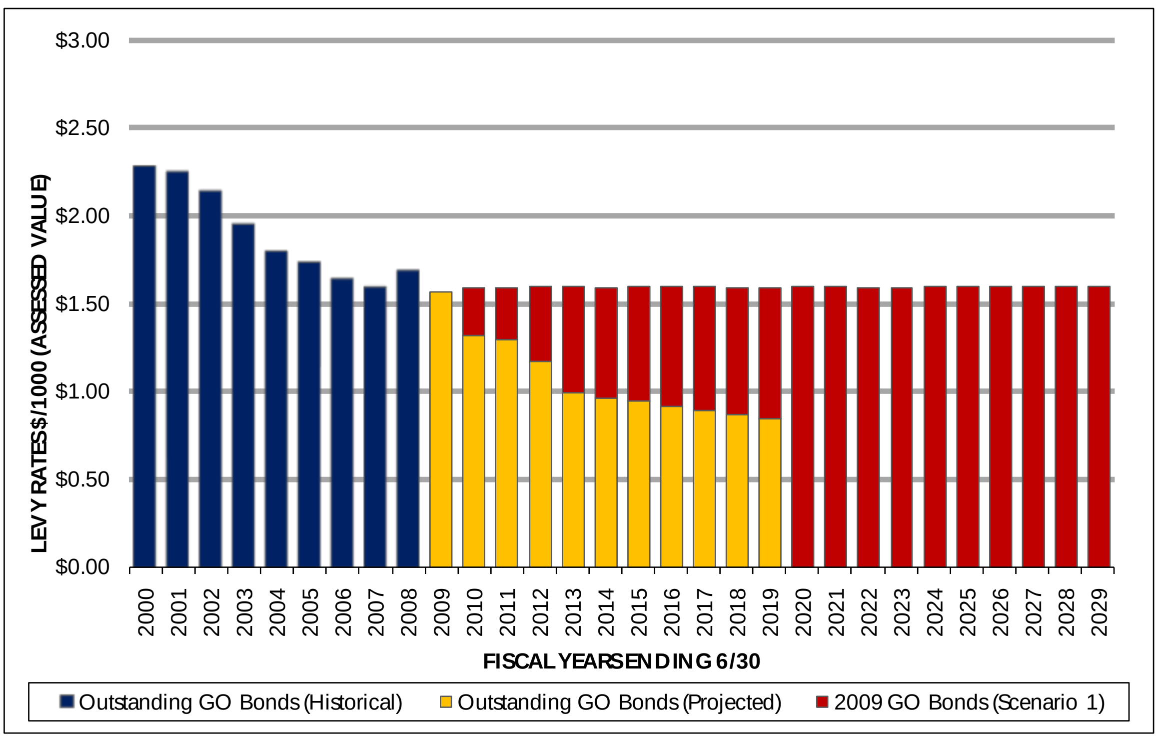
The major selling points of utilizing a GO bond to fund the Priority 1 Projects in Newport include:

1. The funding applied to property taxes is IRS tax deductible.

2. The City has a good credit rating and a favorable debt to income ratio making them a good candidate for selling municipal bonds.

3. In the next few years, the City will retire some old infrastructure bonds. This will allow new bonds to be sold without increasing property taxes. This will allow the work to be completed without a noticeable impact to customers over existing tax rates. Figure 10.5.1 below illustrates the existing and proposed bonds and their impact on tax payers.

**Figure 10.5.1 – Bond Projections for the City of Newport**



The planned funding scenario will allow the City to complete a significant amount of work and improve several critical infrastructure elements while having no significant impact on rate or tax payers in the system.

### 10.5.2 Funding for Additional Projects and Priorities

Priority 2 and 3 projects will be undertaken as funding availability and need dictates. Funding alternatives for later projects will vary and should be determined on a case-by-case basis. Combinations of loans, grants, SDCs and LIDs along with capital improvement projects using water revenues will certainly be part of the funding scheme for future projects.

As the City prepares to undertake other projects and project priorities in the future, planning and costs should be updated for inflation and market changes and a one-stop meeting should be scheduled to determine what funding programs are available, the availability of grants, and other funding assistance.