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

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

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.

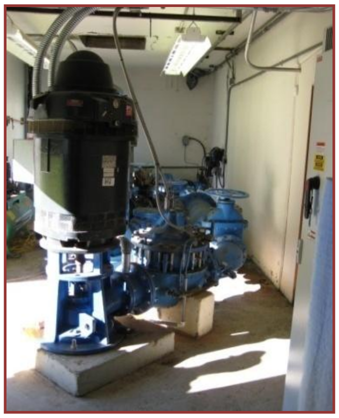
Water quality instrumentation is typical to water treatment plants anywhere. Raw and finished water turbidimeters monitor the turbidity of water passing through the treatment process.

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.

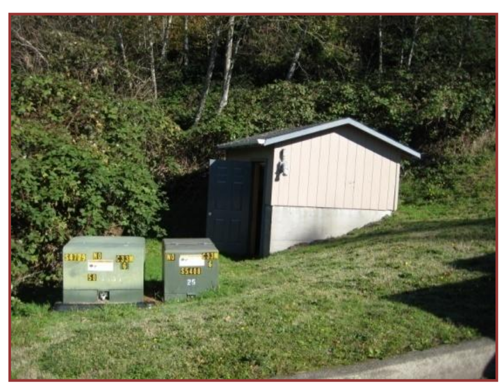
5.4.3 Yaquina Heights Booster Pump Station

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.