



April 29, 2022

Mark Steiner, PE

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Parametrix

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Portland, OR 97232-4110

Re: **2020 Water Master Plan (dated March 2022) (PR#67-2022)**  
**Pacific City Joint Water-Sanitation Authority (PWS ID#00609)**  
**Concurrence with Master Plan**

Dear Mr. Steiner:

This letter is regarding the *2020 Water System Master Plan* (“Master Plan”) dated March 2022 for the Pacific City Joint Water-Sanitation Authority (PCJWSA, PWS ID #4100609) received by our office on April 8, 2022. A plan review fee of \$4,125 was also received on April 8, 2022. We have assigned plan review number 67-2022 ([PR #67-2022](#)) for this review.

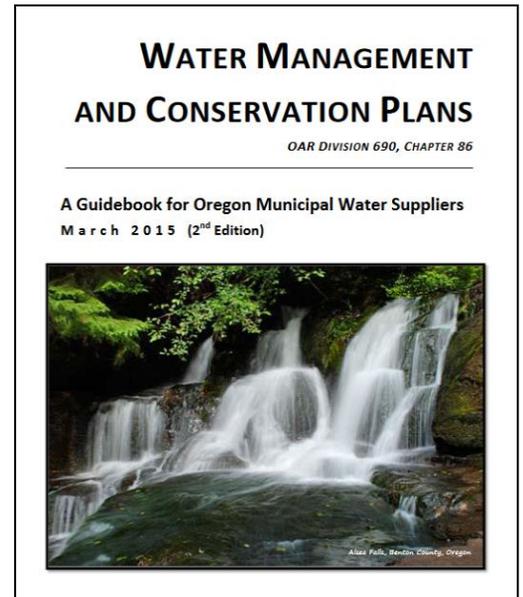
The Master Plan represents a 20-year planning horizon out to the year 2040. Included is a system description, future demand estimates, seismic risk analysis, and CIP project lists with cost estimates and an assessment of financing options. A summary of findings is provided beginning on page 3 of this letter.

**Upon review of the Master Plan, it appears the criteria listed in Oregon Administrative Rules (OAR) 333-061-0060(5) have been met – this concludes my review of the Master Plan.** In general, I found the Master Plan to be comprehensive and well written and only had a couple of comments/recommendations listed as follows:

1. Although future connections and related demands were projected to 2040, there were no actual population projections. Although it is unusual for master plans not to include population projections, this does not appear to affect the demand projections.
2. There may be an alternative to adding a second membrane skid for the sole purpose of demonstrating beneficial use to certify the full water right for Horn Creek discussed in Section 4.3.5 – *Horn Creek Expansion*. It is unclear how feasible or cost-effective it would be to expand the plant capacity without the consumptive demands in place to demonstrate the beneficial use. It may be possible to submit an application requesting a long-term extension of time under

the OAR 690-315 extension rules to complete development of the permit. The period of the extension request depends upon the projections of how long it will take to beneficially use the full quantity of water specified in the permit (e.g., possibly demonstrated through demand projections to the year 2040 outlined in the master plan). See page 17 of the Water Management and Conservation Plan for Municipalities on-line at the link below for more information or contact the local water master office:

[https://www.oregon.gov/OWRD/WRDPublications1/wmcp\\_guidebook.pdf](https://www.oregon.gov/OWRD/WRDPublications1/wmcp_guidebook.pdf)



3. Since the Horn Creek treatment plant is located in the Tsunami inundation zone for a Cascadia Subduction Zone (CSZ) seismic event, it may be worth looking into moving critical records and backup/redundant computer systems/files/controls to an off-site location away from Tsunami and other seismic hazards.

Thank you for your efforts in developing the Master Plan and if you have any questions, please feel free to call me at (971) 200-0288 or e-mail me at [evan.e.hofeld@dhsosha.state.or.us](mailto:evan.e.hofeld@dhsosha.state.or.us).

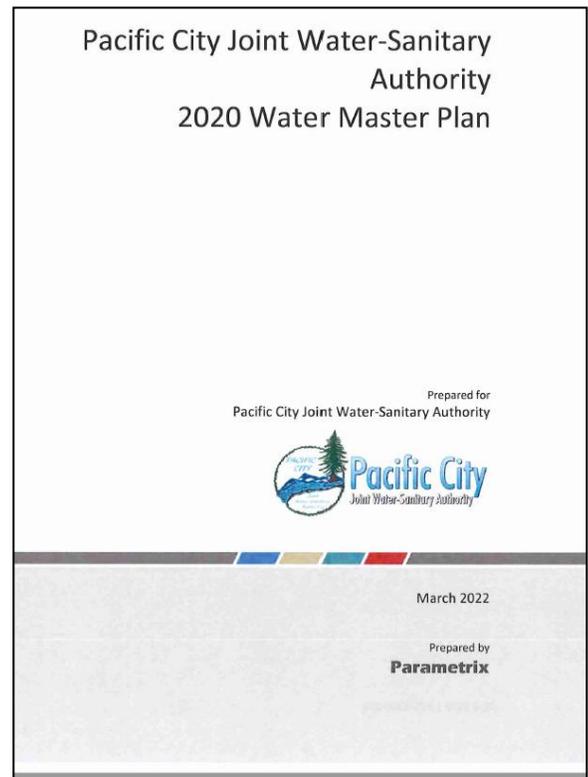
Sincerely,

Evan Hofeld, PE  
Regional Engineer  
Drinking Water Services

cc: John Wesely, Authority Manager, Pacific City Joint Water-Sanitation Authority  
[jwesely@pcjwsa.com](mailto:jwesely@pcjwsa.com)  
Jaime Craig, Environmental Health Program Manager, Tillamook County  
[Jcraig@co.tillamook.or.us](mailto:Jcraig@co.tillamook.or.us)

### Master Plan Overview:

The 2020 Water Master Plan (“Master Plan”) dated March 2022 and completed by Parametrix covers a 20-year planning horizon to the year 2040, including for seismic planning. The Master Plan includes a system description, condition assessment, demand estimates, *Innovyze InfoWater* hydraulic model results, and a seismic risk assessment (and related Geotechnical Memorandum dated February 5, 2021 completed by Shannon & Wilson included in Appendix D of the Master Plan). The Master Plan also identifies improvements and a prioritized list of capital improvement plan (CIP) projects (as indicated by PCJWSA staff) to address deficiencies and meet specified levels of service, asset management, and seismic mitigation goals. Planning-level total project cost estimates are also provided in “2020 dollars” but are not indexed to facilitate future cost updates (e.g., costs indexed to Engineering News Record (ENR) Construction Cost Index (CCI)). Estimated project costs include construction cost, surveying, engineering, a 10% to cover project management, coordination, administrative, and legal review costs. Costs for property purchase or easements are not include. An analysis of existing revenue streams and potential funding options are provided in Section 7.



### Water System Overview:

The Pacific City Joint Water-Sanitation Authority (PCJWSA) is a coastal community with highly variable seasonal demands that is a publicly owned water and sewer district located in Pacific City in southern Tillamook County, adjacent to the confluence of the Nestucca River with the Pacific Ocean. PCJWSA (PWS ID #41-00609) serves approximately 1,430 connections in the unincorporated communities of Pacific City and Woods. The PCJWSA water system includes an 864,000 gpd surface water (SW) membrane plant on Horn Creek and 6 groundwater (GW) wells (all with sodium hypochlorite treatment for residual maintenance). The wells yield approximately 144,000 gpd each for a total SW and GW capacity of 1.7 MGD. The remaining system consists of three reservoirs, 25 miles of 2” – 12” diameter piping, and two pump stations located adjacent to the 0.1 MG and the 0.3 MG reservoirs. Water system demands/capacity are summarized in Table 1 (page 4) and major water facilities are shown in figure 2-1 (page 5) and summarized in Table 2 (page 6)

#### 2.8 Control

Control of the water system is by float switches in the three reservoirs.

There are three main control loops:

1. When the water level in the 100K reservoir drops to a preset level, probes in the tank cause the control valve to open and water from the system flows to refill the reservoir. When the level in the 100K reservoir reaches the upper probe, it causes the control valve to close.
2. When the water level in the 300K reservoir drops to its setpoint, the continuity probe signals the Horn Creek WTP or Dune Wells, followed by the Spit Wells, to come on. Water is pumped from the WTP or wells to the reservoirs until the upper level is reached, commanding the well pumps to turn off.
3. When the water level in the 600K reservoir drops below the setpoint, a signal calls for water from the 300K reservoir. Water is then pumped by the 300K reservoir booster pumps until the upper level is reached, commanding the booster pumps to turn off.

**Table 1. Water System Demands and Capacity.**

Connections/Demand	Year 2020	Year 2040	Peaking Factor/Growth Rate	2040 Deficit?
# of Connections	1,430	1,677	0.8% growth rate	N/A
Population Served	Not Available	Not Available	0.6% growth for Tillamook County (2017 estimate from PSU Population Research Center)	N/A
Average Day Demand (ADD)	255,089 gpd (177 gpm)	299,159 gpd (208 gpm)	1	N/A
Maximum Day Demand (MDD)	586,704 gpd (407 gpm)	688,065 gpd (478 gpm)	MDD = 2.3 x ADD	N/A
Peak Hour Demand (PHD)	892,811 gpd (620 gpm)	1,047,056 gpd (727 gpm)	PHD = 3.5 x ADD	N/A
Source Capacity (SW/GW)	600 gpm (1 of 2 RW Pump)/600 gpm	600 gpm (1 of 2 RW Pumps)/600 gpm	N/A	No, although water rights need to be perfected.
Treatment Capacity (SW/GW)	600 gpm (1-skid) /600 gpm	1,200 gpm (2-skids)/600 gpm	N/A	1.7 MGD
Storage Capacity	880,461	1,048,729	N/A	Yes, 33,757-gallon deficit mitigated with the recommended construction of a 150,000-gallon reservoir in place of the 100,000-gallon reservoir

**Table 4-2. Reservoir Storage Summary**

Storage	2020 (gallons)	2040 (gallons)
Operational	144,433	144,433
Equalization	3,001	19,068
Fire	120,000	120,000
Emergency	510,177	598,318
Dead	32,399	32,399
Total Required Storage	934,554	1,048,729
Total Available Storage <sup>1</sup>	880,461	880,461
Excess Storage	70,451	(33,757)

<sup>1</sup> = See Section 2.5.1.

Pacific City Joint Water-Sanitary Authority  
 2020 Water Master Plan  
 Pacific City Joint Water-Sanitary Authority

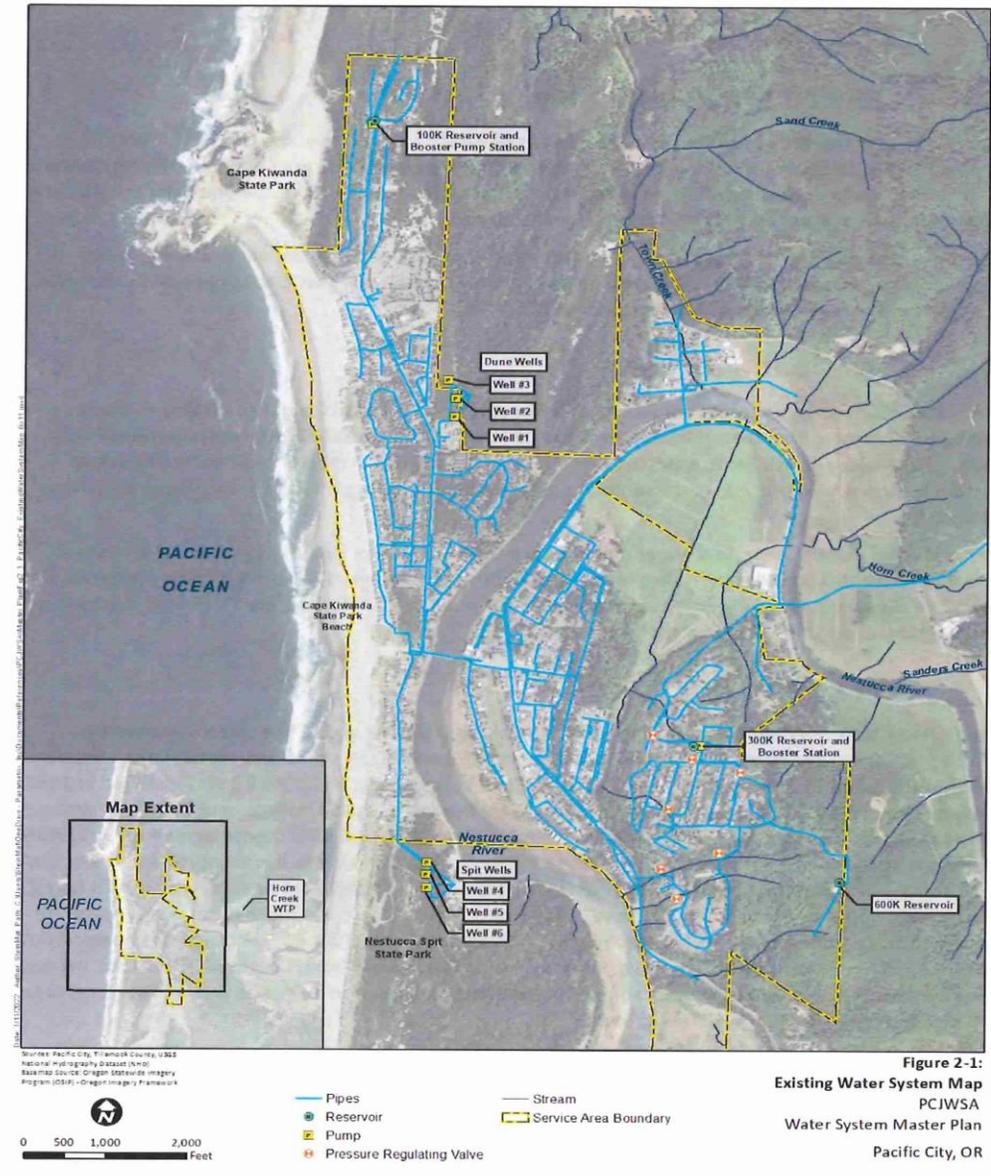


Figure 2-1. Existing Water System Map

**Table 2. Summary of Major Water Facilities.**

Facility	Year Constructed/Developed	Capacity	Description
Dune Well #1	1980	100 gpm	All 3 Dune wells are located on BLM land leased to PCJWSA (the 1996 well replaced the old well #3)
Dune Well #2	1984	100 gpm	
Dune Well #3	1996	100 gpm	
Spit Well #1	1988	100 gpm	All 3 Spit wells are located in Bob Straub State Park
Spit Well #2	1988	100 gpm	
Spit Well #3	1988	100 gpm	
Horn Creek	2010	600+ gpm	Approx. 90% of watershed is in Siuslaw National Forest and the remaining 10% is owned by Stimson Timber Co and other private entities.
Horn Creek WTP	2010	600 gpm	Two finished water pumps (600 gpm each) pump out of an 83,000-gallon baffled clearwell at the clearwell to the 300k reservoir.
100k Reservoir	1972	100,000 gallons	The 100 k reservoir is kept full with water pressure from the 300k reservoir.
300k Reservoir	1972	300,000 gallons	
600k Reservoir	1999	600,000 gallons	The 600k reservoir is kept full based on a float switch setting which allows the 300k booster station to fill it.
100k Res Pump Station		Two 85-gpm pumps	The 100k Res booster station is needed because the 100k reservoir is not high enough above the surrounding area. The pump station and pressure tank pressurizes water for distribution to Ridge Rd, Pine Rd, Terrace View, and North Cape Kiwanda Dr.
300k Res Pump Station	1999	Two 150-gpm pumps	The 300k res (base elev. = 190.88-ft) booster station pumps water to the 600k reservoir, which has a base elev. of 504-ft.
Water Rights	Wells #4, 5, & 6 - G-10798 (Cert #80489) Wells #1 & 3 - G-9388 (Cert #93770) Well #2 - G-10392 (Cert #80488) Horn Cr. Diversion @ WTP - S-54783 (Certs 91174 – 0.19 cfs & 91175 – 0.49 cfs). Upper Diversion #1 (not used) – Cert 86807 (0.01 cfs) – Upper Diversion #1 was developed in 1959. Upper Diversion #2 (not used) – Cert 86808 (0.01 cfs) - Upper Diversion #2 was developed in 1965.		

**Major Water Facility Findings/Recommendations:**

*(Identified as an independent reviewer and not necessarily inclusive of all recommendations in the Master Plan)*

**Seismic Risk:**

PCJWSA is located near the Cascadia Subduction Zone (CSZ) and could potentially sustain a magnitude 9 earthquake and related tsunamis. In its current condition, the backbone system will likely experience severe damage from a CSZ seismic event, resulting in a prolonged loss of service. Recommendations to increase resiliency within the backbone system are listed in Section 5.4 and include seismic upgrades to the Horne Creek

Water Treatment Plant: 100k, 300k, and 600k reservoirs; and the 300k booster pump station.

Recommendations are also included for the replacement of most of the backbone pipeline with earthquake resistant pipe and fittings as roughly 2 miles is highly susceptible to liquefaction (along with the 100k reservoir) and lateral spreading along portions of the backbone pipeline in liquefiable soils, especially along Nestucca River. The Horn Creek treatment plant and the west crossing of the backbone pipeline located on the Pacific Ave Bridge are located in the Tsunami inundation zone for a CSZ-XL- and XXL-level event (see map on page 10 of this letter). Seismic mitigation recommendations are included in Section 5.4 (page 5-19) and shown in figure 6.2 of the Capital Improvement Plan addressed in Section 6 (page 6-1).

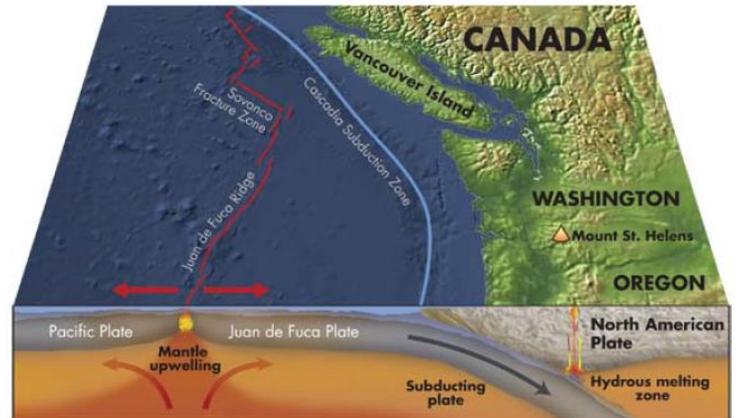


Figure 1-1. Cascadia Subduction Zone (CSZ)

**Water Quality/Regulatory Compliance:**

Since 2005, there have been 11 exceedances of [haloacetic acids \(HAA5\)](#), [lead](#), and [total coliform](#) [the system is in compliance and past exceedances have been addressed.

**Note:** *Turbidity monitoring listed in Table 2-4 is abbreviated as the requirements for continuous individual filter effluent turbidity have several regulatory levels to consider (e.g., 0.15 NTU should trigger the filter to go off-line for a direct integrity test, an exceedance of 1 NTU requires a public notice within 30 days, and an exceedance of 5 NTU may require a boil water notice).*

**Water Supply Wells and Potential for Saltwater Intrusion:**

The PCJWSA water system currently has six groundwater wells. The three Dune Wells (Wells 1, 2, and 3) are located to the immediate north of the PCJWSA office just east of Cape Kiwanda Drive. The Dune wells (Wells 4, 5, and 6) are located on Bureau of Land management (BLM) land currently leased to PCJWSA through a Recreation and Public lease agreement. Well information is summarized in Table C-1 in Appendix C of the Master Plan (see page 10 of this letter).

Of concern regarding water quality is the potential for saltwater intrusion into the wells caused by continuous drawdown or additional drawdown from the wells. According to the previous master plan, water samples have indicated elevated levels in total dissolved solids (TDS) and chloride and should be monitored.

Another concern is the elevated corrosion potential with respect to lead and copper due to low pH and buffering capacity and overall soft water in the Dune wells as well as in Horn Creek (6.8 pH and 44 mg/l alkalinity in the Dune Wells. 6.87 pH and 17 mg/l alkalinity in Horn Creek per Table 2-5 on page 2-21 of the master plan).

**Horn Creek WTP/Source:**

PCJWSA will need to certify the permit for the Horn Creek WTP diversion (Permit # S-54783) by October 1, 2025 or file an extension. It is recommended that PCJWSA expand the capacity at Horn Creek WTP to demonstrate beneficial use and certify its water right.



Photograph 2-2. Horn Creek Intake

**Horn Creek Water Treatment Plant:**

The Horn Creek Water Treatment Plant (WTP) uses a PALL microfiltration plant to treat water from Horn Creek with a current capacity of 600 gpm through a single skid, expandable to 1,200 gpm with a second skid. Two chemical feed systems are available: Sodium hypochlorite for disinfection and soda ash for pH control. Backwash and microfilter residuals are treated for surface water discharge in below-grade neutralization and settling tanks. Finished water is chlorinated and stored for required disinfection contact in a baffled 83,000-gallon below-grade concrete tank. High-pressure vertical turbine pumps deliver water at 600 gpm each through a transmission pipeline to the 300k reservoir.



Photograph 2-5. Horn Creek Finished Water Pumps

**Standby Power:**

To provide improved resiliency during a power outage, the 300k booster pump station and the Spit Wells should each have a generator, muffler, and an automatic transfer switch. This will allow these two facilities to switch over to standby power automatically when it is needed.

**300k Booster Station:**

Filling the 600k reservoir is limited by the two 150 gpm booster pumps located at the 300k reservoir booster station. It is recommended to replace the 150 gpm pumps with two 300 gpm pumps.



Photograph 2-4. Horn Creek Microfiltration System

**100k Booster Station:**

There are two pumps, each rated at 85 gpm and 140-ft of total head. This booster pump station does not have the capacity to adequately provide fire flow and pressure needs. There are also low-pressure issues at higher elevations along Ridge Road in the pump station's service area.

**Distribution piping:**

Over 30% of the distribution piping is 2-inch diameter, which severely reduces available pressure and restricts fire flows. There are also areas of the distribution system that are not looped which is needed to maintain disinfectant concentrations. Portions of the system do not have hydrants and are thus not protected in the event of a fire. Asbestos-cement pipe ranging from 4" – 10" diameter is still in service and comprises about 10.7% of the distribution system (13,535 LF).

**Water Meters:**

Water production is metered at the Horn Creek plant and the wells, however, the sum of the metered service connections results in total flows that are 24-30% lower than the production meter totals. New radio-read service meters is recommended to better assess unaccounted for water.

**Storage:**

To accommodate the 20-year projected demands, over 30,000 gallons of storage will be needed. It was decided that the 100k reservoir should be replaced with a 150k reservoir to achieve the added storage and replace the aging 100k reservoir at the same time. It is recommended to site the new reservoir on land owned by BLM east of Cape Kiwanda Drive and at an elevation such that the high-water level would be equal to that of the 300k reservoir without creating additional pressure zones. This would also provide the necessary fire flows and storage needed for the north end of the service area. The existing 100k reservoir booster station and pressure tank would remain in service (presently, the 100k reservoir booster station does not have sufficient fire flow capacity or pressure).

**Table 2-2. Reservoir Data**

Reservoir Name	Capacity (gallons)	Diameter (feet)	Max Water Surface (feet)	Height (feet)	Base Elevation (feet)	Top Elevation (feet)	Material
100K	95,867	38	11.3	12	155.8	167.8	Concrete
300K	271,918	55	15.3	16	190.88	206.88	Concrete
600K	512,676	81	13.3	14	504	518	Bolted Steel



Photograph 2-8. 300K Reservoir



Photograph 2-9. 600K Reservoir



Photograph 2-7. 100K Reservoir

Water Supply Well Summary Data =>

Tsunami Inundation Zone Map  
 For a CSZ event ↓

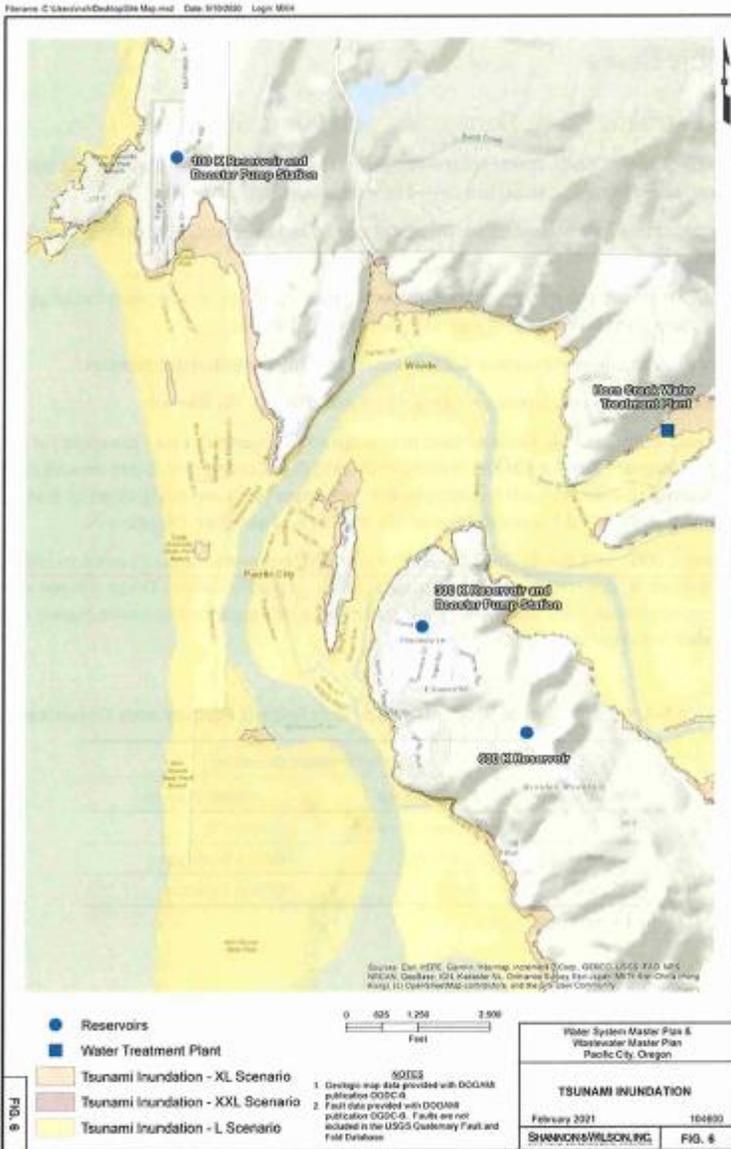


Table C-1  
 Water Supply Well Summary Data  
 Pacific City Joint Water-Sanitary Authority

Water Resource Dept		Water Supply Well Information		Water Supply Well Information		Water Supply Well Information		Water Supply Well Information		Water Supply Well Information		Water Supply Well Information		Water Supply Well Information	
County	Well ID	Owner	Current Well Identification	Well Identification Remarks	General Well Location	Well Type	Well Type Remarks	Production Rate (gpm)	Standard Demand	Peak Demand	Construction Dates	Total Depth (feet bgs)	First Water Depth (feet bgs)	Static Water Level (feet bgs)	
TILL	115	Pacific City Joint Water-Sanitary Authority	# 1	always called #1	southern dune well	production	operating	< 100	< 100	not exceeding 100	12/4/1980	125	20	7	
TILL	907	Pacific City Joint Water-Sanitary Authority	# 2	originally called #3 before 1984	middle dune well	production	operating	< 100	< 100	not exceeding 100	2/15/1984	80	45	7	
TILL	908	Pacific City Joint Water-Sanitary Authority	old well #3	originally called #2 before 1984	northern dune well area	abandoned (see TILL 501505)	exists as capped well	0	0	0	1/6/1981	75	45	5	
TILL	909	Pacific City Joint Water-Sanitary Authority	# 2	first attempt abandoned due to sand intrusion	northern dune well area	abandoned	no record. Actual location not known.	0	0	0	12/17/1980	85	n/a	n/a	
TILL	50105	Pacific City Joint Water-Sanitary Authority	old well #3	well TILL 908	northern dune well area	abandonment	exists as capped well.	< 100	< 100	0	8/1/1996	n/a	n/a	n/a	
TILL	50092	Pacific City Joint Water-Sanitary Authority	new well #3	replaced TILL 908	northern dune well area	production	operating	< 100	< 100	not exceeding 100	7/17/1986	75	2	3.2	
TILL	937	Pacific City Joint Water-Sanitary Authority	# 4	always called #4	northern spit well area	production	operating	< 100	< 100	not exceeding 100	7/6/1988	47	16	8	
TILL	936	Pacific City Joint Water-Sanitary Authority	# 5	always called #5	middle spit well area	production	operating	< 100	< 100	not exceeding 100	7/26/1988	51	16	8	
TILL	934	Pacific City Joint Water-Sanitary Authority	# 6	always called #6	southern spit well	production	operating	< 100	< 100	not exceeding 100	8/9/1988	48	32	8	

Figure 5-5. Tsunami Inundation Zone