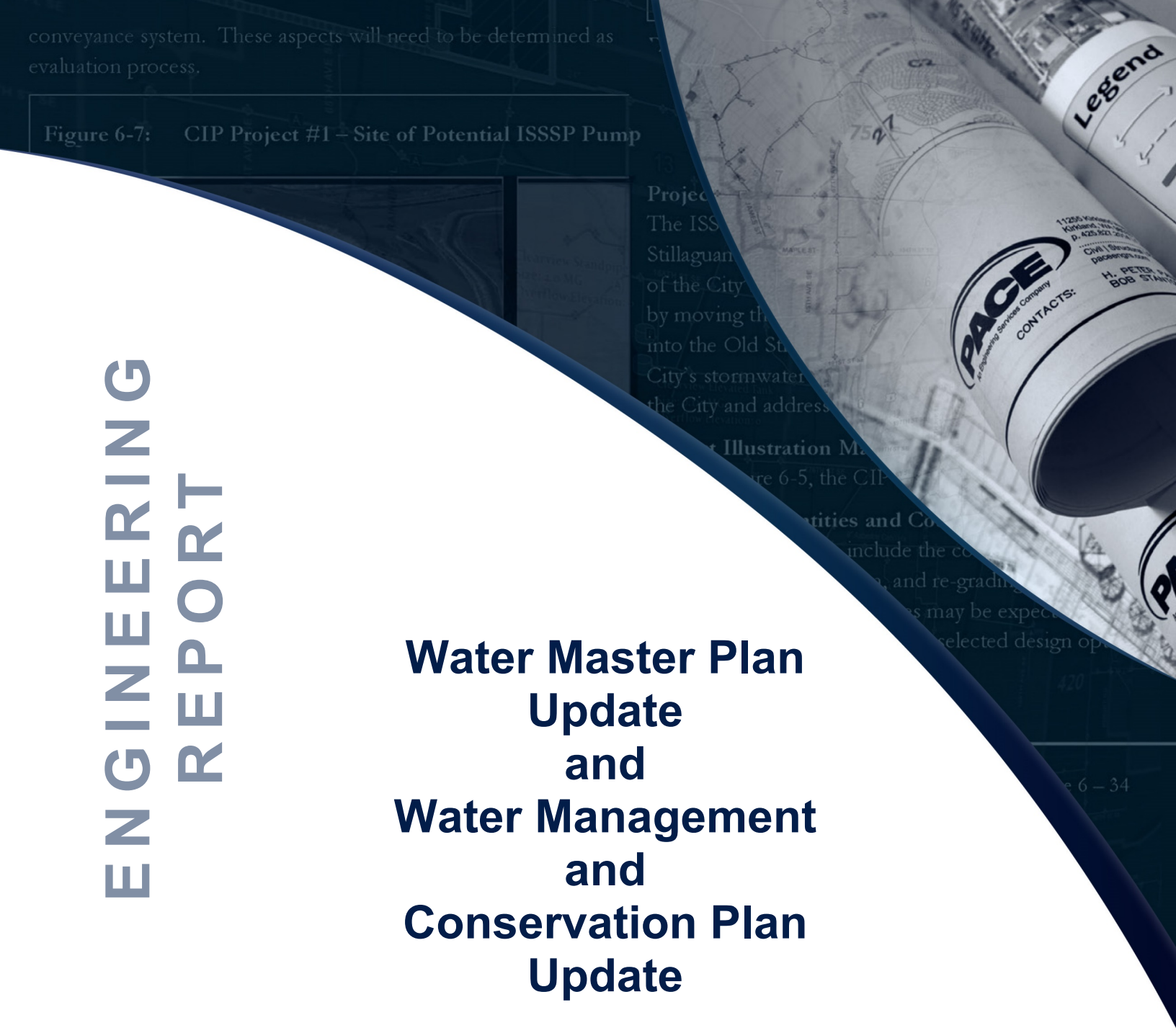

ENGINEERING REPORT

Water Master Plan Update and Water Management and Conservation Plan Update

Prepared For:

Neah-Kah-Nie Water District
9155 Nehalem Road
Nehalem, Oregon 97131

February 2021

PACE
An Engineering Services Company

Water Master Plan Update
and
Water Management and Conservation Plan Update

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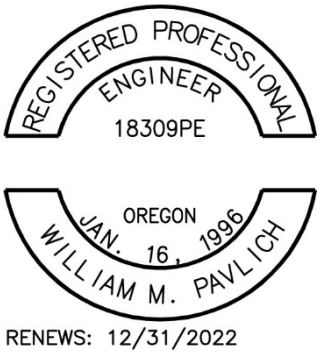
PROJECT CERTIFICATION

This report has been prepared by, or under the direction of, the following registered professional engineers, licensed in accordance with the laws of the State of Oregon to practice in the State of Oregon:



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EXECUTIVE SUMMARY

BACKGROUND AND NEED

Neah-Kah-Nie Beach is a coastal community located in Tillamook County approximately 27 miles north of the City of Tillamook. Neah-Kah-Nie Water District owns and operates a municipal water system that provides water to the community. Currently there are 384 active residential service connections.

The District's last state-approved Water Master Plan received Oregon Health Authority (OHA) approval on October 2, 2015 (*Neah-Kah-Nie Water District Water Master Plan*, PACE Engineers, Inc., September 2015). Currently, the District is in compliance with OAR 33-061-0060(5) which requires community water systems with 300 or more service connections to maintain a current state-approved water system master plan, however, since completion of the 2015 Master Plan, the District has experienced several issues that suggest an update to the current plan is warranted. These include:

- A proposed large development that may have significant impacts on the water system.
- Demographic changes with increased presence of short-term rentals.
- Increased availability of water for the District from Pirate Spring.
- A need to update the Water Management and Conservation Plan (WMCP) to allow a request for more Greenlight Water to enable the District to perfect or partially perfect its water rights.
- A desire to reconsider some of the proposed capital improvements in light of recent developments.
- An increased awareness, on a statewide level, in recent years of the importance of system reliability and resiliency.

The Master Plan Update needs to meet Oregon Health Authority (OHA) requirements for a current master plan as well as provide a current evaluation of the District's needs. OHA requirements include a new provision that requires the District to include an element addressing seismic reliability. The Master Plan Update will also include an update of the Water Management and Conservation Plan.

PLANNING PERIOD

This Plan uses a 20-year planning period (through the year 2040) for most plan elements; a 50-year planning period is used for elements related to seismic reliability.

GROWTH PROJECTIONS

Growth projections in terms of equivalent dwelling units (EDUs) for Neah-Kah-Nie are shown in Table E1. Population in 2019 was 200 person; however, 72.3% of housing stock is associated with vacancy or vacation use. Peak population, including part-time residents, is estimated at 600-800 persons.

AUTHORIZATION AND FUNDING

Neah-Kah-Nie Water District authorized PACE Engineers, Inc., to prepare this Water System Master Plan on August 26, 2019. This project has been funded entirely by the Neah-Kah-Nie Water District.

Table E1: Neah-Kah-Nie Water District Population Projections

Year	EDUs[1]	Percent Increase over 2020
2020	387	—
2025	415	7.2
2030	445	15.0
2035	477	23.3
2040	511	32.0
2066	733	89.4

[1]Equivalent Dwelling Units

LEVEL OF SERVICE GOALS

"Level of Service" ultimately refers to the quality of the water service provided to the customer, but the phrase also has implications for the District staff who are responsible for operating, maintaining, and administering the utility, and for District officials who are ultimately responsible for the support and political will to champion the mission and needs of the utility. The provision of clean, healthy drinking water is one of the most important services provided in a community and, consistent with this importance, the Neah-Kah-Nie Water District should endeavor to provide a relatively high level of service.

One of the primary objectives for a water system is the protection of public health and welfare. For utilizing and expanding a water system, it is also important to minimize adverse environmental impacts. Various agencies have promulgated rules that ultimately support these objectives and, at a minimum, every water system must comply with these rules and requirements.

GENERAL GOALS AND REQUIREMENTS

General level of service goals and requirements applicable to the water system include:

- Conveyance and delivery (goal): Adequate, consistent, and reliable delivery of water under all anticipated service conditions; capacity for system to deliver maximum day demand (MDD) plus fire flow (FF)
- Pressurization (requirement): A minimum of 20 psi system pressure must always be maintained (OAR 333-061-0025). The 20-psi minimum system pressure requirement extends to the customer water meter.
- Water quality (requirements): Comply with all Oregon Health Authority (OHA) requirements. Water quality also includes aesthetic considerations that may or may not be related to specific regulatory concerns. Efforts to maintain or improve the aesthetic

quality of the water provided is a goal consistent with the provision of a high level of service.

- Reliability (goal and requirements): Reliability as a goal is the ability of the water system and City staff to avoid or circumvent problems that adversely impact system performance. Reliability is enhanced by routine and timely maintenance and replacement, good design and construction, providing adequate water supply, providing alternate or backup facilities or equipment, and having a contingency plan for efficiently handling specific problems. OHA recently added a new master planning provision (OAR 333-061-0060(5)(J)) that requires the District to include an element addressing seismic reliability.

GENERAL AND PROJECTED WATER SYSTEM DEMANDS

Projected water demands for the Neah-Kah-Nie Water system are show in Table E2.

Table E2: Projected Water Demand (in gallons per day)

Year	2020	2025	2030	2035	2040	2066
EDUs[1]	387	415	445	477	511	733
ADD (gpd)	59,000	63,000	68,000	73,000	78,000	112,000
MDD (gpd)	140,000	150,000	161,000	172,000	185,000	265,000

[1]Equivalent Dwelling Units

METERED CUSTOMER USAGE AND UNACCOUNTED FOR WATER

Metered customer water usage for the period January 2016 to December 2018 is summarized in Table E3. Table E3 also includes recent estimates of unaccounted-for water (approximately 36 – 40%. Annual leak detection is recommended

Table E3: Unaccounted for Water

Year	Production (gallons)	Customer Usage (gallons)	Unaccounted for Water	
			(gallons)	(%)
2018	20,670,071	12,559,660	8,110,411	39.2
2017	18,238,852	10,866,710	7,372,142	40.4
2016	16,518,703	10,611,198	5,907,505	35.8

WATER CONSERVATION

An updated Water Conservation Management Plan is included in Appendix I. The document provides information on conservation policies.

For general planning purposes, no additional reductions in water demand or unaccounted-for water are incorporated into the projections for future water demand. Continued reductions, however, will reduce the District's impact on the available water supply capacity associated with the spring sources and will defer or reduce the need to utilize the emergency intertie with the City of Manzanita's water system. The system has a demonstrated high potential for water loss

associated with leaks; consequently, the District should plan on conducting leak detection surveys annually.

WATER QUALITY AND TREATMENT

In general, both source and distribution water quality in Neah-Kah-Nie is excellent. There are no specific recommendations other than diligence in meeting all applicable regulatory requirements.

WATER SOURCE AND WATER RIGHTS

The District currently has 0.34 cfs in certificated water rights for Springs #1, #2, and #3. In the year 2066, ultimate buildout (UBO) maximum day demand is projected to be 0.41 cfs – less than the total permitted (1.11 cfs) rights. The District has permits for an additional 0.77 cfs. There is no current or future anticipated need for additional water rights unless there are opportunities for an additional source that could provide enhanced system reliability, especially during the summer/fall low spring flow period.

RESERVOIR STORAGE

Total reservoir storage is 292,000 gallons and capacity is adequate through the planning period. There is an operational issue with Reservoir Park's water surface elevation being ten feet lower than Hillcrest's. Since they are connected to the same pressure zone, a PRV is needed to reduce pressure from Hillcrest to use all the Hillcrest storage capacity and to match the hydraulic grade line at Reservoir Park. The District would like to eventually eliminate the PRV. This could best be accomplished by constructing a new reservoir at Reservoir Park to replace the existing reservoir. The existing concrete reservoir was constructed in 1989. The District is concerned with the reliability of its older reservoirs and in addressing the operational issues between Reservoir Park and Hillcrest. Construction of a new 100,000-gallon reservoir at Hillcrest and a new 50,000-gallon reservoir at Reservoir Park are recommended.

DISTRIBUTION

As assessment of Neah-Kah-Nie's distribution system and the resulting improvement recommendations were based on map review, review of previous plan recommendations and implemented projects, fire flow needs, modelling, and information from staff on problem areas. Recommendations are included in the capital improvement plan. In general, the District has completed all main improvements recommended in previous plans. Current recommendations are limited to adding two new hydrants.

SCADA AND TELEMETRY

SCADA and telemetry upgrades ere recently completed; however, the District would like to expand the data collection capabilities. Recommended upgrades are presented in the capital improvements plan.

WATER RATES

Neah-Kah-Ne last raised water rates in 2006. Rates are based on a base monthly service charge of $25.00. To the base charge is added water usage rate of $0.00275 per gallon (zero –

20,000 gallons) and $0.0035 per gallon for usage beyond 20,000 gallons (per billing period). Neah-Kah-Nie is a residential community and the rate structure does not include consideration of other customer classes. Billings also include System Enhancement Fee of $20.00 per month which is added to the base and usage charges. The District is currently implementing a $15.00 per month per connection fee for Watershed Protection.

Funding agencies often evaluate a community's rates based on a monthly single-family residential billing associated with 7,500 gallons of usage; for Neah-Kah-Nie, this billing would be $104.74 ($45.63 for base rate plus usage, $20.00 for System Enhancement Fee, $15.00 for Watershed Protection Fee, and an average of $24.11 for property taxes).

For the fiscal year ending June 30, 2019 major sources of revenue included: $146,951 (rates), $90,984 (System Enhancement Fees), $125,945 (property taxes).

The General Fund budgets appear healthy with substantial reserves and significant allocations for capital improvements. There does not appear to be an immediate need to raise rates even though rates have not been adjusted in the last nine years. The Districts is in the process of retaining a consultant to complete a Rate Study. Budget $15,000 for planning purposes.

CURRENT SYSTEM DEVELOPMENT CHARGE (SDC)

The District's current Water SDC is $6,429 for a new service. SDCs were last updated on . July 1, 2006. SDCs utilize an approved capital improvements plan as the basis for the SDC cost computation. As SDCs are based in part on anticipated project costs, the District should consider revising the SDC after the Water Master Plan has been adopted. Estimated cost for a water SDC update is $15,000.

CAPITAL IMPROVEMENT FINANCE AND RATE IMPACTS

Capital improvements can be implemented over the planning period according to the nature of the projects, the relative prioritization of the project, and other financial and practical considerations that the District may have. Because of the relatively high costs, funding agency participation may be needed or desired. If the District decides to pursue agency assistance, then once the District has determined which projects to include, the District should contact IFA to set up a One-Stop Meeting in Salem to discuss potential project funding. Representatives of potential funding agencies attend the meeting and can assist in developing an optimal funding approach. The Water Master Plan does include a discussion of funding alternatives and sources as well as a means of estimating rate impacts associated with loan financing.

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Table 7.1: Neah-Kah-Nie Water District CIP (All costs in current dollars) | **Reference June 2020 ENR CCI:** 11436 | **Current ENR CCI: (June 2020)** 11436 | **Neah-Kah-Nie Water District Master Plan 2020** | **Miscellaneous Improvements**

Constr. Costs June 2020	Total Costs June 2020	Project Priority	Project Name (Description)	Plan Section # Reference	ENR Ratio	Construction Cost ($)	Total Cost ($)	Implementation (% and Total Cost) 2020 (%)	2020 ($)	2021 (%)	2021 ($)	2022 (%)	2022 ($)	2023 (%)	2023 ($)	2024 (%)	2024 ($)	2025-30 (%)	2025-30 ($)	2031-40 (%)	2031-40 ($)	CIP Totals (%)	CIP Totals Cost ($)
	$20,000	H	**COBU Preparation**	**6.7.1**	1.000	$0	$20,000		$0		$0		$0	100	$20,000		$0		$0		$0	100	$20,000
			Prepare claims of beneficial use for Pirate Spring and Springs #1, #2, and #3.																				
157000	$259,000	H	**Pirate Spring Improvements**	**6.7.1**	1.000	$157,000	$259,000		$0		$0	100	$259,000		$0		$0		$0		$0	100	$259,000
			New pump and misc. improvements including new transmission main.																				
	$30,000	H	**Source Protection**	**6.7.1**	1.000	$0	$30,000		$0		$0	100	$30,000		$0		$0		$0		$0	100	$30,000
			Drainage improvements to protect Spring #3.																				
$283,000	$437,000	H	**New Hillcrest Reservoir**	**6.7.2.2**	1.000	$283,000	$437,000		$0		$0	100	$437,000		$0		$0		$0		$0	100	$437,000
			New 100,000 gallon reservoir.																				
$240,000	$373,000	H	**New Reservoir Park Reservoir**	**6.7.2.2**	1.000	$240,000	$373,000		$0		$0	100	$373,000		$0		$0		$0		$0	100	$373,000
			New 50,000 gallon reservoir.																				
	$17,000	H	**New Hydrants**	**6.7.3**	1.000	$0	$17,000		$0		$0	100	$17,000		$0		$0		$0		$0	100	$17,000
			Add two new hydrants to system (see master Plan section 6.7.3 for details).																				
	$5,000	H	**Flowmeter and SCADA/Telemetry Upgrades**	**6.7.5**	1.000	$0	$5,000		$0		$0	100	$5,000		$0		$0		$0		$0	100	$5,000
			Connect magmeters at Spring #1 and Spring #2 to SCADA.																				
	$6,000	H	**Leak Detection**	**6.7.3**	1.000	$0	$6,000		$0	100	$6,000	100	$6,000	100	$6,000	100	$6,000	500	$30,000	1,000	$60,000	1,900	$114,000
			Leak detection for the entire distribution system.																				
	$15,000	H	**Water Rate Study**	**8.2.3**	1.000	$0	$15,000		$0		$0		$0	100	$15,000		$0		$0		$0	100	$15,000
			Prepare a new water rate study. Budget based on recent estimate from a consultant.																				
	$15,000	H	**System Development Charge Study**	**8.3**	1.000	$0	$15,000		$0		$0		$0	100	$15,000		$0		$0		$0	100	$15,000
			Prepare a new water SDC study and methodology.																				
	$50,000	L	**Water Master Plan Update**	**6.8.1**	1.000	$0	$50,000		$0		$0		$0		$0		$0		$0	100	$50,000	100	$50,000
			Periodic update of Plan. Actual budget should be adjusted as needed to reflect theanticipated level of effort required.																				
	$25,000	M	**Water Management and Conservation Plan**	**6.8.1**	1.000	$0	$25,000		$0		$0		$0		$0		$0	100	$25,000	200	$50,000	300	$75,000
			Periodic update of Plan. Actual budget should be adjusted as needed to reflect the anticipated level of effort required. Budget assumes preparation by a consultant.																				
			CIP Total			**$680,000**	**$1,252,000**		**$0**		**$6,000**		**$1,127,000**		**$56,000**		**$6,000**		**$55,000**		**$160,000**		**$1,410,000**

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TABLE OF CONTENTS

APPENDICES

LIST OF TABLES

LIST OF FIGURES

SECTION 1 BACKGROUND

1.1 BACKGROUND AND NEED

Neah-Kah-Nie Beach is a coastal community located in Tillamook County approximately 27 miles north of the City of Tillamook. Neah-Kah-Nie Water District owns and operates a municipal water system that provides water to the community. Currently there are 384 active residential service connections.

The District's last state-approved Water Master Plan received Oregon Health Authority (OHA) approval on October 2, 2015 (*Neah-Kah-Nie Water District Water Master Plan*, PACE Engineers, Inc., September 2015). The prior state-approved plan was completed in 1994 (*Water Master Plan and Rate Study*, Handforth Larson & Barrett, Inc., June 1994) for a 20-year planning period. Updates were completed, but not submitted for state review in 2001 (*Neah-Kah-Nie Water District Water Master Plan*, HLB & Associates, November 2001) and in 2009 (*Neah-Kah-Nie Water District Water Master Plan 2009 Update*, Morgan Civil Engineering, Inc.). Currently, the District is in compliance with OAR 33-061-0060(5) which requires community water systems with 300 or more service connections to maintain a current state-approved water system master plan.

Significant changes occurred during the period between the 2015 Plan and the 1994 Plan. The 1994 Plan projected system growth to 505 service connections in 2015, approximately 40 percent higher than actual growth. Water system improvements were completed in intervening years, with the largest and most comprehensive project completed in 2006. Most of the watermains have been replaced; the last section of asbestos-cement (AC) pipe was decommissioned in 2010. While much of the infrastructure has been replaced or rehabilitated, there were still issues to be addressed to enhance system reliability and the level of service provided.

The 2015 Water Master Plan provided a complete update and a plan for the system's next 20 years. The District had completed a Water Management and Conservation Plan in 2014 and revised the document in July 2015 (*Neah-Kah-Nie Water District Water Management Plan*, Neah-Kah-Nie Water District, 2015). This document was included in the Master Plan's appendices.

Since completion of the 2015 Master Plan, the District has experienced several issues that suggest an update to the current plan is warranted. These include:

- A proposed large development that may have significant impacts on the water system and has raised District concerns regarding the potential for onsite wastewater systems to contaminate the local groundwater in the vicinity of the District's primary water source. (Since completion of this section, Neah-Kah-Nie Water District has initiated a condemnation process on the property).
- Demographic changes with increased presence of short-term rentals and increased water usage.

- Increased availability of water for the District from Pirate Spring based on a clarification of the withdrawal rate associated with a senior water right holder.
- A need to update the Water Management and Conservation Plan (WMCP) to allow a request for more Greenlight Water to enable the District to perfect or partially perfect its water rights. Greenlight Water refers to that undeveloped portion of a water right permit that Oregon Water Resources Department (OWRD) has authorized for development based on concurrence with a need demonstrated in an approved WMCP.
- A desire to reconsider some of the proposed capital improvements in light of recent developments.
- An increased awareness, on a statewide level, in recent years of the importance of system reliability and resiliency – especially along the Oregon Coast.

The Master Plan Update needs to meet Oregon Health Authority (OHA) requirements for a current master plan as well as provide a current evaluation of the District's needs. OHA requirements include a new provision (OAR 333-061-0060(5)(J)) that requires the District to include an element addressing seismic reliability. The Master Plan Update will also include an update of the Water Management and Conservation Plan.

1.2 PURPOSE AND SCOPE

This Water Master Plan is intended to provide the Neah-Kah-Nie Water District with a comprehensive planning document consistent with State requirements (OAR 33-061-0060(5) Water Master Plans and the State's *Guidelines for the Preparation of Planning Documents for Developing Community Water System Projects*). A key objective is addressing issues noted in Section 1.1 (above) and the development of an updated CIP.

The scope of work for this Plan includes all elements required for State approval and includes an update of the District's 2015 Water Management and Conservation Plan consistent with OAR 690-086-0120.

1.3 PLANNING PERIOD

This Plan uses a 20-year planning period (through the year 2040) for most plan elements; a 50-year planning period is used for elements related to seismic reliability.

1.4 AUTHORIZATION AND FUNDING

Neah-Kah-Nie Water District authorized PACE Engineers, Inc., to prepare this Water System Master Plan on August 26, 2019. This project has been funded entirely by the Neah-Kah-Nie Water District.

SECTION 2 AREA CHARACTERISTICS

2.1 PLANNING AREA

Neah-Kah-Nie's water system currently serves the area within the District boundary which is defined as including all of Sections 19 and 20, Township 3 North, Range 10 West of the Willamette meridian (see Figure 2-1 and Figure 2-2 located at the end of Section 2). The area defined by the District's boundary constitutes the planning area. Areas outside the District boundary are included or referenced for planning purposes insofar as they relate to the District's water supply. Relevant portions of the District boundary are also shown in the water system map included in Figure 3-1 and in the map pocket at the back of the Plan. (The map in the map pocket will be added at a later date by the District after completion of the District's upcoming GIS project).

2.2 PHYSICAL CHARACTERISTICS

2.2.1 Climate

Neah-Kah-Nie's climate is moist, marine, and temperate. Summers are cool and winters are mild, largely due to the moderating influence of the Pacific Ocean. Westerly winds from the ocean predominate over the coastal areas and inland into the Coast Range. Western Regional Climate Center data for Tillamook (Station: 358494 Tillamook 1 W), for the period 1948 – 2010, indicate an average annual precipitation total of 89.07 inches with 76 percent occurring in the six month period November through April. Average daytime temperatures are 50.9°F in winter and 66.8°F in summer; average nighttime temperatures are 36.5°F in winter and 48.8°F in summer. Recorded temperature extremes range from 1°F (January 31, 1950) to 102°F (July 11, 1961, and August 9, 1981). Extreme daily precipitation is 5.22 inches (January 23, 1982). The area is subject to severe winter storms that can bring high precipitation totals and high winds, at times exceeding 100 miles per hour.

The following information on climate change that may be applicable to the Neah-Kah-Nie area is derived from Climate Ready Communities, A Strategy for Adapting to Impacts of Climate Change on the Oregon Coast, prepared by the Department of Land Conservation and Development, January 2009. Projections indicate that winter precipitation will increase while summers will be drier with an increase in the duration of the summer "dry" period. Implications for coastal streams are more frequent winter flooding and reduced streamflow during the summer and early fall. By extension, for many spring water sources, we can assume a similar flow reduction in summer and early fall. The dry pattern has been noted in recent years with some of the smaller streams in northwest Tillamook County, that are typically perennial, being reported as dry or nearly dry toward the end of summer.

2.2.2 Land Resources

2.2.2.1 Landscape and Topography

The Neah-Kah-Nie Water District is situated along the Pacific Ocean and on the coastal hillsides that extend upward to the north and east to an elevation of approximately 760 feet (see Figure 2-1).

2.2.2.2 Soil Characteristics

Information for this section is based on the United States Department of Agriculture, Natural Resources Conservation Service (NRCS) Soil Survey for Tillamook County, Oregon.

Soils in the area are generally well drained silt loams with some areas having relatively higher fractions of gravel or clay. Most of the soils in the District are not subject to flooding or ponding (though there are a few wetlands and riparian areas). The high water table is characteristically at depths greater than 72 inches. Soil pH ranges from 3.5 to 5.5. Risk for corrosion of uncoated steel is high; risk for concrete corrosion is moderate to high.

2.2.3 Water Resources

Water resources in the area include the Pacific Ocean and various small creeks and springs.

2.2.4 Natural Hazards

Natural hazards in the area notably include earthquakes, tsunamis, and landslides. Neah-Kah-Nie is located near the Cascadia Subduction Zone and could potentially sustain a magnitude 9 earthquake. Recurrence interval on very large quakes along the Oregon coast is approximately 300 – 800 years. Appendix A shows potential earthquake impacts to the area.

Most of the District lies on hillsides above the Pacific Ocean and is thereby largely protected from tsunami impacts; however, a relatively large proportion of the developed lots are within the tsunami zone.

Oregon Department of Geology and Mineral Industries (DOGAMI) recently updated tsunami maps for the area. Most affected is the area that extends a little east of Treasure Hunters Lane and First Street, and either side of Nehalem Road to just beyond Olive Way. Appendix A shows potential tsunami impacts to the area.

Landslides (including slumps and slow-moving landslides) are not uncommon in the area and are often triggered during periods of high rainfall or storm conditions. Appendix A shows potential landslide impacts to the area.

2.3 SOCIO-ECONOMIC CHARACTERISTICS

2.3.1 Land Use

2.3.1.1 Current Land Use

Land use within most of the District is existing and potential single-family residential development of varying densities. The District has noted an increase in homes being used for short-term vacation rentals. Recreational use is focused on the beach, which is readily accessible by locals and visitors. Areas to the north and east of U.S. Highway 101 are primarily forest with only a few developed lots.

The City of Manzanita, bordering the District's south boundary, provides local goods and services. Forest and recreational uses predominate in other areas nearby.

2.3.1.2 Current Zoning

Zoning Ordinances for the Neah-Kah-Nie Water District service area can be found in the Tillamook County Land Use Ordinance, adopted May 27, 2015. Zoning codes and mapping for the District are included in Appendix B. Zoning is primarily residential and distinguished primarily by minimum lot size:

NK-7.5	7,500 square foot minimum
NK-15	15,000 square foot minimum
NK-30	30,000 square foot minimum
RR-2	Two acre minimum

2.3.1.3 Future Development

Residential development was very active prior to the recession (2007-2009) and started to resume as the recovery progressed. The recent and ongoing COVID-19 pandemic may slow development in the near-term, but long-term impacts are unknown.

The District recently completed a buildable lands inventory (BLI)[1]. The BLI Addendum provides a planning range of 379 to 418 new connections; but notes that this should be reduced to 349 to 388 if the area near Springs #1, #2, and #3 is obtained by the District for protection of the water source. Since this is likely, the lower figures are recommended for planning purposes. The lower number (349) is preferred since it includes allowances for streets, easements, and other constraints consistent with the Tillamook County Code.

A 9- to 13-unit subdivision (Villa al Mare) is moving forward, but at this time it is not clear when it will be developed. A 90-acre development (Neah-Kah-Nie Meadows Phase IV) has been proposed, but the current owner of the land has no plans to develop it any time soon. To date, the owner has subdivided the land into three

[1] Neah-Kah-Nie Buildable Lands Inventory, Two Branches Consulting, LLC, February 2, 2020, and Neah-Kah-Nie Buildable Lands Inventory Addendum, Two Branches Consulting, LLC, June 8, 2020.

parcels and may continue limited subdividing as the rules allow while considering the possibility of selling the land in the future.

Property and home costs are high relative to the local economy; consequently, future development will likely continue to appeal primarily to retirees and second-home buyers from outside the area.

2.3.2 Population and Selected Demographic Characteristics

Neah-Kah-Nie Beach is an unincorporated community, and a Census Designated Place (CDP) that is approximately described as that part of the Water District west of U.S. Highway 101. Population was 187 persons in 2000, 192 persons in 2010, and 200 persons in 2019.

The Oregon Gazetteer (oregon.hometownlocator.com) includes basic demographic data from various sources (Appendix C). Selected data (as of July 1, 2019) is included in Table 2-1 along with Census 2000 and 2010 population data. Population growth has been nominal since 2000. Population statistics are based on full-time residents; since 72.3 percent of the housing stock is associated with either vacancy or vacation use, part-time residents comprise a significant fraction of the overall service population. Full-time residents average 1.9 persons per household (pph). Service population, including part-time as well as full-time residents, typically peaks on major holidays in the summer and again around Christmas. The Oregon Health Authority (OHA Drinking Water Data Online) notes a service population of 600 persons which, presumably, reflects the estimated peak occupancy during the summer holidays.

Table 2-1: Demographic Characteristics (Neah-Kah-Nie Beach CDP)

Characteristic	Census 2000	Census 2010	Gazetteer 2019
Population			
Total	187	192	200
18-64 years old:	96	91	
65 years and over:	78	83	
Housing			
Housing units (total):			370 (100%)
Owner Occupied:			80 (21.1%)
Renter Occupied:			25 (6.6%)
Vacation or Vacant:			265 (72.3%)
Households:			105
Persons per Household (pph):			1.9
Median Household Income (MHI):			$55,357
Median Home Cost:			$499,000

2.3.3 Connections and Equivalent Dwelling Units (EDUs)

Because of the high proportion of non-resident housing units, growth projections in this master plan are developed based on service connections and EDUs rather than population.

2.3.3.1 Current Connections and Accounts

Current connections and accounts are summarized in Table 2-2.

Table 2-2: Recent (Year 2019) Service Connections and Accounts

Description/ Customer Category	Number of Household Connections and Accounts			
	With Meter With Building	With Meter No Building	No Meter No Building	Total
Residential	381	3	5	384
Non-residential	4	-	-	4
Total Accounts	385	3	5	393
Total Meters	385	3	NA	388

Water usage is associated with the 381 active residential accounts plus four non-residential accounts (District office, two wastewater pump stations, and a distribution flush station on James Road), plus three accounts (currently used for irrigation) for a total of 388 active service connections. The other entries are accounts that have been created for various reasons but are not yet capable of providing service. There are three meters in the distribution system that are not connected to buildings. Most service connections have 5/8" x 3/4" meters; two residences, one District-owned flushing station, and three lots have 1" meters. Service to the three lots is for limited irrigation of trees and for future residences.

2.3.3.2 Current EDUs

Funding agencies have generally required water rates to incorporate or reflect consideration of water use based on average metered consumption per dwelling unit for residential customers and per equivalent dwelling unit (EDU) for non-residential customers. "EDU" is typically employed collectively to both residential and non-residential customers. For residential customers the number of EDUs is equal to the number of dwelling units (single-family house, manufactured home, or a single unit of a multi-family building or complex). Average water consumption per EDU is determined by dividing the total metered residential consumption by the number of residential units for a defined period. For non-residential customers, the number of EDUs can be determined by dividing the non-residential customers' water usage by the average water consumption per residential EDU for the same period. Average

water consumption per EDU is typically expressed in gallons per day (gpd) per EDU. EDUs can also be estimated or determined by other methods depending on the intended purpose. "Equivalent Residential Unit" (ERU) is a commonly used synonym for EDU.

Water usage by the District's non-residential connections (two Nehalem Bay Wastewater Agency pump stations, the Water District's office, and a District flushing station) is nominal and not likely to increase, so usage characteristics and EDUs will be based on 384 current, active residential connections. For general planning purposes, there are 384 EDUs.

2.3.3.3 Projected Connections and EDUs (Year 2040)

The 2015 Water Master Plan adopted the planning growth projections utilized in the District's Water Management and Conservation Plan 2015 which identified a year 2034 projection of 471 connections, reflecting an average annual growth rate (AAGR) of approximately 2.1 percent.

The 2009 Plan Update noted that for its most recent six-year period growth (AAGR) averaged 2.9 percent; the 2001 Plan Update noted that for its most recent 6-year period growth averaged 2.25 percent. The 2.1 percent AAGR recently used by the Water District was supported by examples of past growth in the community and by assumptions related to the local market and future development potential for single-family homes largely targeted to retirees and second-home buyers, as well as an anticipation of resumed higher growth as the economic recovery progressed.

New connection growth has been slower in recent years with an AAGR of 1.4 percent between January 2015 and December 2019. Since this was pre-COVID-19 growth, future near-term growth may be substantially lower, while longer term impacts are yet to be determined. The 1.4 percent growth occurred during the tail end of the recent economic recovery and likely reflects optimism on the part of prospective buyers and developers. Actual annual growth figures can vary widely in small communities since a small increase or decrease can appear to be a significant departure from the forecast; consequently, the growth forecast should temper the higher growth rates reflected in the earlier studies with the anticipation of occasional future periods of slower growth. In addition, growth in communities tends to slow down as the community builds out. Neah-Kah-Nie has physical and political constraints that do not allow it to expand to include additional acreage for growth which could otherwise mitigate the tendency for slower growth as buildout is approached. The 1.4 percent AAGR figure reflects recent growth and is likely a better estimate of growth over the next 20 years than the higher growth rates used in previous studies. A 1.4% AAGR represents an increase of 123 connections over the next 20 years (to year 2040).

The projection for year 2040 is 511 connections. This includes the four non-residential connections. Additional non-residential connections – if any – would

likely be similar (wastewater pump stations) with nominal water consumption. For practical and general planning purposes, year 2040 EDUs are based on the residential connections. Active connections and EDUs are summarized in Table 2-3.

Table 2-3: Projected Active Connections and EDUs

Description/	Number of Connections			Number of EDUs	
Customer Category	Current	Year 2040	Year 2070	Current	Year 2040
Residential	384	507[1]	733[1]	384	507
Non-Residential	4	4	4	NA[2]	NA[2]
Total Meters	388	511	774	384	507

1. 1.4 percent average annual growth rate. The year 2070 figure represents ultimate buildout which at 1.4 percent AAGR will occur in year 2066.
2. Nominal non-residential water usage – not included in computation.

2.3.3.4 Ultimate Buildout

The District's 1994 Master Plan noted an estimated ultimate buildout of 700 connections. The figure was also incorporated into Tillamook County's Neah-Kah-Nie Community Plan completed in 1998. The 2015 Master Plan included a more recent estimate by the District of 600 connections.

The current estimate for future connections is 349 units (see Section 2.3.1.3). This, added to the 384 existing residential connections, yields 733 total residential connections at buildout. Based on 1.4 percent AAGR, ultimate buildout will be reached theoretically in year 2066.

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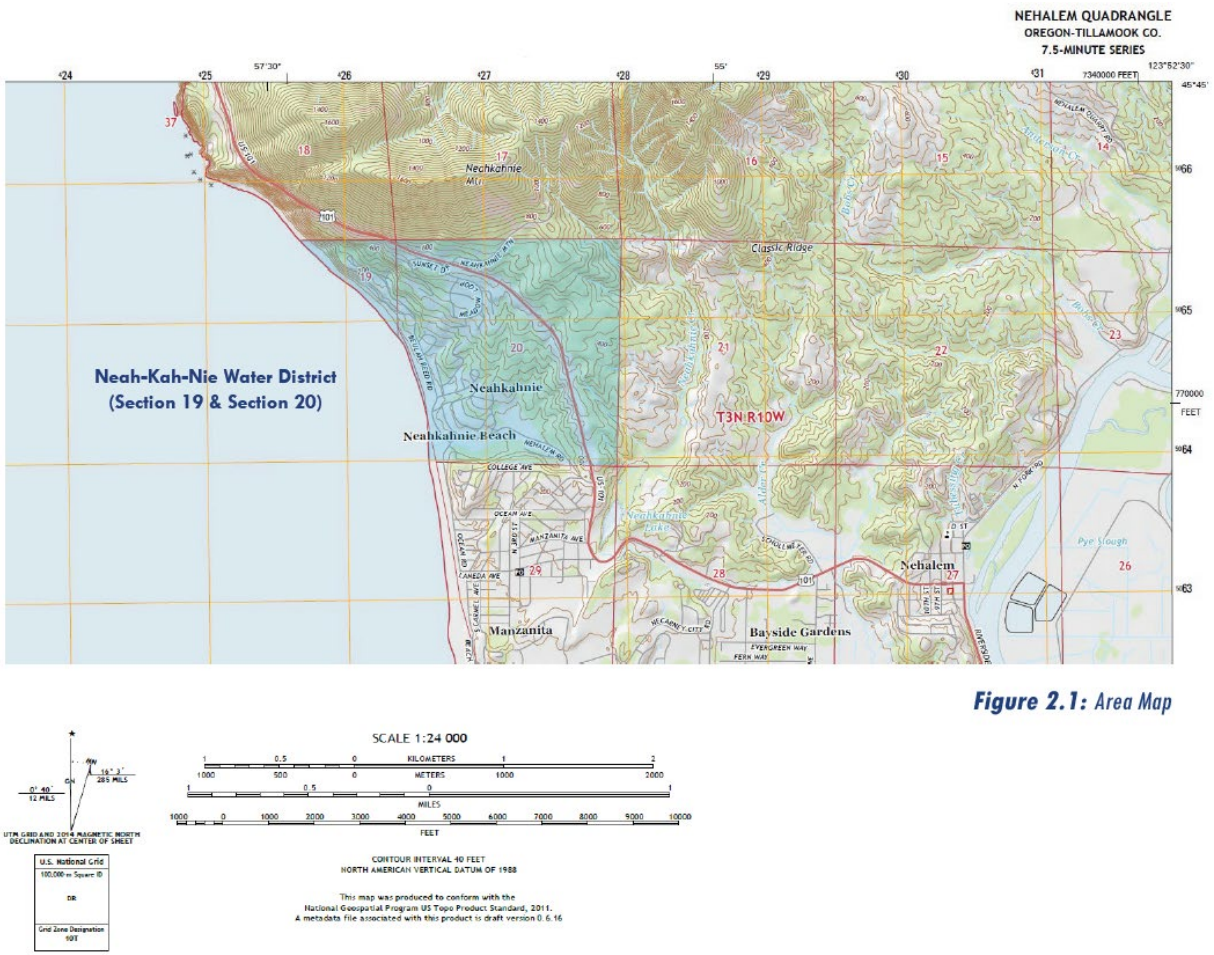

Figure 2.1: *Area Map*

Figure 2-1	***Area Map***	19863 October 2020

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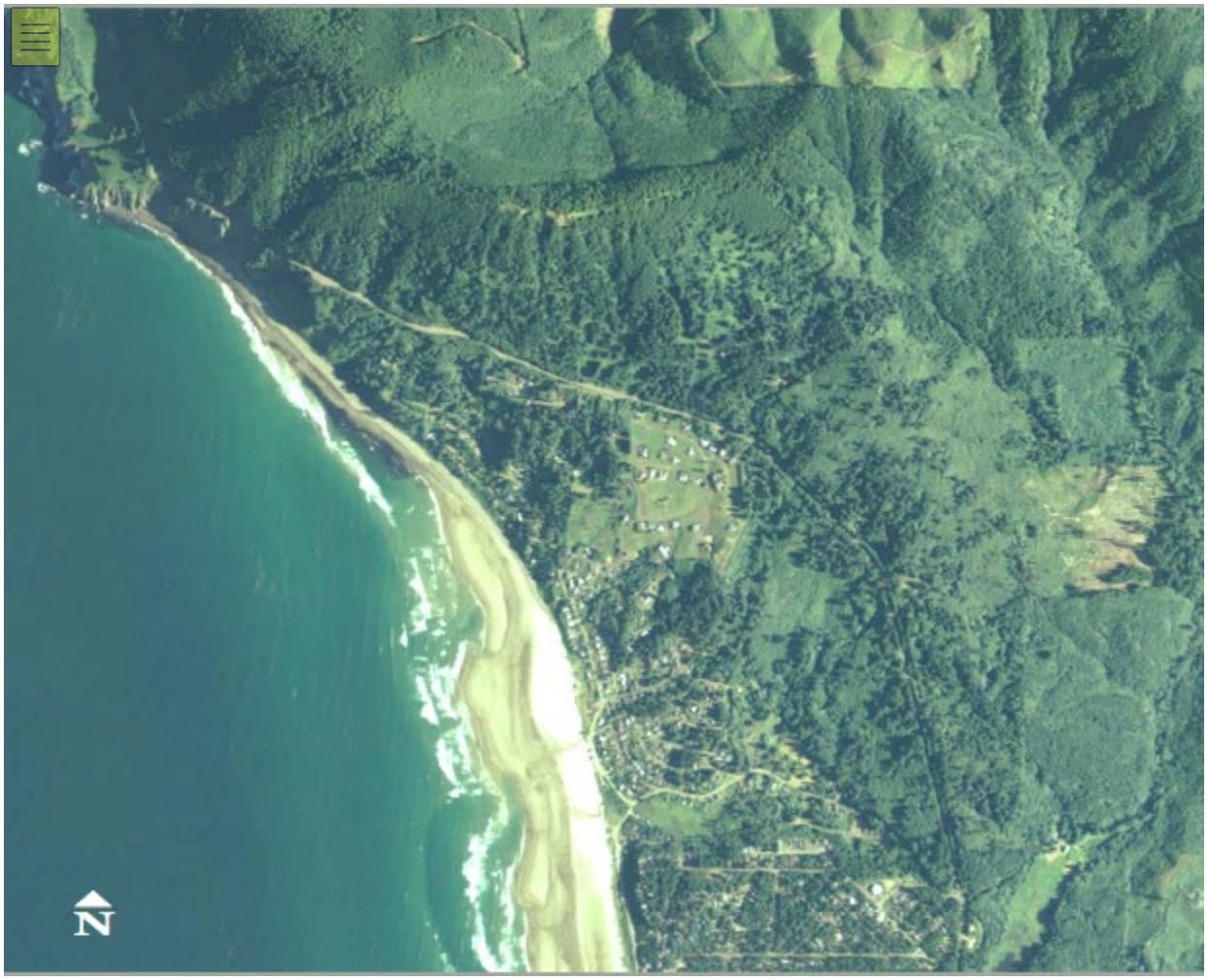

Figure 2-2	*Planning Area*	19863 October 2020

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SECTION 3 EXISTING WATER SYSTEM

3.1 INTRODUCTION AND HISTORY

The Neah-Kah-Nie Water District owns and operates a municipal water system that currently provides service to areas within the District boundaries. In early 2020, there were 388 metered water connections, of which 384 were residential. The District has four spring sources. Treatment is limited to disinfection and corrosion control. The distribution system is divided into three major pressure zones plus two very small isolated zones. There are three storage reservoirs.

The following history of the Neah-Kah-Nie Water District is from the District's website (nknwd.org):

> In 1869 U.S. Grant (President) granted 181 acres to John Crawford. Based on an "Abstract of Title" issued in 1917 and owned by Mrs. John Prentiss it appears that most of the area in Neahkahnie changed ownership 13 times between 1869 and 1912. In 1906 Sam & Beulah Reed purchased the 181 acres for $6,000 at 7*% interest. Reed started to build a home for his family in 1911 and in 1911 he started to build a hotel and several cottages near the ocean. He developed Spring #3 to supply these properties. Both wooden and galvanized pipe brought water to homes as they were built. Reed also ran 1½" galvanized pipe to supply the first four homes on Reed Road about one block north of the present-day Treasure Rocks Road. Reed charged no more than $10.00 a year to supply these houses from Spring #3. After Sam Reed's death, Mrs. Reed sold a large portion of land in 1945 to Barney Lucas. Lucas then developed Springs #1 and #2 and upgraded Spring #3 by digging into the hillside about 20 feet and replacing the wooden pipe with perforated asbestos concrete pipe. The pipe was 6 or 8 feet deep and covered with rock. Tar paper was placed on top of the rock and then covered with dirt. The water from the pipe emptied into a metal settling and collection tub.*
>
> *Barney Lucas formed the Neahkahnie Water Company, an Oregon Corporation. Lucas later sold the water company to Waldo Bennett some time prior to 1956. Bennett put in a large 3-foot deep concrete catchment of approximately 65,000 gallons for Spring #1. This catchment was just west of the 20,000-gallon steel tank reservoir above Highway 101. The steel tank was removed in 2005 and replaced with the existing 155,000-gallon reservoir located nearby. The catchment was used primarily to store water for the old golf course which was located immediately below Highway 101. The old golf course later became a housing development called Neahkahnie Meadows. The catchment did not hold water very well and was abandoned and filled with dirt. Bennett also had a 20,000-gallon concrete reservoir constructed to contain Spring #3. The reservoir was replaced by a 97,000-gallon reservoir which went into service February 1997.*
>
> *The Neahkahnie Water District was formed in 1967 when 25 registered voters signed a notice of incorporation. Bennett then sold the Neahkahnie Water Company to the district for $20,477. This included all the*

land and assets. Charles Stewart and Scott Hickox each loaned the district $4,000 for a down payment on the purchase. Stewart, Hickox, Merrill and Windle were the first elected commissioners who served for staggered terms. In 1967 a water connection cost $50.00 and the monthly residential rate was $2.75 for the first 5,000 gallons, and $0.30 per thousand thereafter. Since there were no residential water meters this rate system remains somewhat of a mystery. Charles Stewart served as a commissioner and also as System Operator until he resigned in 1993.

In May of 1968 the engineering firm of Perely and Associates of Portland was commissioned to do a complete study of the district's water system. Perely reported there were 151 paid water connections at that time and the water rate was $3.50 monthly.

The above information was obtained from documents which are filed in the "NWD History" folder and from the taped report of John Prentiss, an early water commissioner.

The District's most recent state-approved Water Master plan was completed in 2015 (Neah-Kah-Nie Water District Water Master Plan, PACE Engineers, Inc., September 2015). Oregon requires community water systems with 300 or more service connections to have a current state-approved water master plan per OAR 33-061-0060(5). Neah-Kah-Nie was out of compliance; completion of the Plan and state approval of the document (October 2, 2015) satisfied the regulatory requirement. The document was also undertaken in recognition of the significant changes that had occurred since adoption of the 1994 Master Plan. Much of the infrastructure had been upgraded or replaced but there were still issues to address to enhance system reliability and the level of service provided. The Plan included a capital improvement plan with $426,000 in identified improvements. The District also completed its first Water Management and Conservation Plan in 2015 (Neah-Kah-Nie Water Management and Conservation Plan 2015, Neah-Kah-Nie Water District, 2015). The document was approved by Oregon Water Resources Department and included in an appendix to the 2015 Water Master Plan.

Neah-Kah-Nie's prior state-approved water master plan was completed in 1994 (Neah-Kah-Nie Water Master Plan and Rate Study, Handforth Larson and Barrett, Inc., June 1994). The Plan included recommendations for transmission, distribution, and storage improvements that were implemented from 1996 to 2001 with a total cost of $435,400. These improvements were documented in the Neah-Kah-Nie Water District Water Master Plan Update, HLB and Associates, Inc., November 2001.

The 2001 Plan Update also included a more extensive list of proposed source, transmission, distribution, and storage improvements; and most of these projects were implemented. Completed in 2006, the work is locally known as "the big project". The project included: updating Springs #1, #2, and #3 to current standards and adding security fencing, replacing several miles of deficient mains, rehabilitating an old reservoir in the lower zone, and constructing a new concrete reservoir in the upper zone. The project was paid for with approximately $2,000,000 in loans from the Oregon Economic and Community Development Department. The improvements were documented in the Neah-Kah-Nie

Water District Water Master Plan 2009 Update, Morgan Civil Engineering, Inc., November 2009.

The 2009 Plan Update includes much more limited improvement recommendations than the prior plans. These recommendations were reviewed as part of the 2015 master planning effort.

The District installed a new telemetry and SCADA system in 2013. In 2014, the District anticipated difficulty supplying all its water needs with its own sources because of decreasing flows associated with a relatively dry year. An emergency intertie was constructed between Neah-Kah-Nie's water system and the City of Manzanita's water system.

More recent improvements include: refurbishing the Hillcrest reservoir (2016), an expansion of the Pirate Spring pumphouse to facilitate the future addition of a second pump (2017), addition of a pressure reducing valve (PRV) to reduce local system pressure along San Dune Road (2017), Pirate Spring flow restrictor and meter to limit withdrawals by senior water right holder, and leak detection and repairs (2017, 2018).

Section 3 inventories and describes elements of the existing water system. Figure 3-1 is the District's most recent water system map. It was prepared by Morgan Civil Engineering, Inc., and has not been modified here except to reduce it to fit on a standard 11" x 17" page. The map is the same as the map included in the 2015 Plan since only minor changes have occurred (addition of a PRV at San Dune Road and Mariner's Trail). The District is currently undertaking a GIS project that will result in a new, accurate map for the system.

A map pocket has been placed at the back of the plan for insertion of a full-size map when the GIS project is completed. The existing map is included as background for Figure 3-2 which has been annotated to show key facility locations referred to in this plan. Figure 3-3 is a schematic of the water system that shows the major facilities and their relationship within the system. Infrastructure photos are included at the end of Section 3.

3.2 MAPPING AND DOCUMENTATION

Mapping and system documentation for this plan were obtained primarily from the prior water master plans, District provided maps and documents, supplemented with staff interviews and limited site visits. **Elevation data may be from a variety of sources and may not be on the same datum.** Accuracy of the mapping and elevation data is assumed to be sufficient for general planning purposes; however, critical elements and elevations should be verified prior to, or as part of any design work.

3.3 SOURCE

3.3.1 Water Rights

Water rights are regulated by the Oregon Water Resources Department (OWRD). OWRD maintains extensive records; copies of permits and certificates are readily

available through their website (http://www.oregon.gov/owrd/). For convenience, copies are included in Appendix D.

3.3.1.1 Neah-Kah-Nie Water Rights

Water rights for the District are summarized in Table 3-1a. Copies of certificates, permits, and applications are included in Appendix D. All District water rights are for spring sources and for municipal (or domestic) uses. There are three water rights for Springs #1, #2, and #3. Each water right provides a permitted rate for each of the three springs. Table 3-1b shows the totals for each water right and for each spring source.

Table 3-1a: Neah-Kah-Nie Water Rights

Application No.	Certificate No.	Permit No.	Use[1]	Priority Date	Permitted Rate		Spring Source
					(cfs)	(gpm)	
S-12692	21423	S10040	D	04/30/1929	0.01	4.5	#1
S-12693	21423	S10040	D	04/30/1929	0.01	4.5	#2
S-12692	21423	S10040	D	04/30/1929	0.15	67.3	#3
S-45629	–	34032	M	12/09/1968	(0.13)[2] 0.45	(58.4)[2] 202.0	Pirate
S-47767	80934	S35776	M	12/07/1970	0.01	4.5	#1
S-47767	80934	S35776	M	12/07/1970	0.01	4.5	#2
S-47767	80934	S35776	M	12/07/1970	0.15	67.3	#3
S-72306	–	S51578	M	04/07/1992	(0.03)[2] 0.06	(13.47)[2] 26.9	#1
S-72306	–	S51578	M	04/07/1992	(0.03)[2] 0.06	(13.47)[2] 26.9	#2
S-72306	–	S51578	M	04/07/1992	(0.1)[2] 0.20	(94.89)[2] 89.8	#3
	Totals				**(0.63)[2] 1.11**	**(282.8)[2] 498.2**	**All**

[1]Domestic (D), Municipal (M)
[2]2015 allowed rate per "Development Limitations"

Table 3-1b: Neah-Kah-Nie Water Rights Summary

Water Right Totals:	Priority Date	(cfs)	(gpm)
Certificate 21423	04/30/1929	0.17	76.3
Permit 34032	12/09/1968	(0.13)[2] 0.45	(58.4)[2] 202.0
Certificate 80934	12/07/1970	0.17	76.3
Permit 51578	04/07/1992	(0.16)[2].32	(71.8)[2] 143.6
Source Totals			
Spring #1		(0.05)[2] 0.08	(22.4)[2] 35.9
Spring #2		(0.05)[2] 0.08	(22.4)[2] 35.9
Spring #3		(0.40)[2] 0.50	(179.5)[2] 224.4
Pirate Spring		(0.13)[2] 0.45	(58.4)[2] 202.0

On October 17, 2014, the District obtained extensions of time on their permits to complete construction and fully apply water to beneficial use:

- Permit S34032 extended to October 1, 2023
- Permit S51578 extended to October 1, 2023

The permit extensions of time were issued after a fish persistence review was completed by Oregon Fish & Wildlife Department (ODFW) that determined no fish were present in Pirate Spring or in the unnamed spring that includes flows from Springs #1, #2, and #3.

The permit extensions included development limitations of: 0.13 cubic feet per second (cfs) (58.4 gpm) for Permit S34032 (Pirate Spring); and 0.16 cfs (71.8 gpm) for Permit S51578 (Springs #1, #2, and #3). See the extension Final Orders in Appendix D for a detailed discussion of the development limitations. A copy of the 2015 water rights inventory prepared by OWRD is included in Appendix D.

3.3.1.2 Local Instream Water Rights

There are no local instream water rights affected by Neah-Kah-Nie Water District activities.

3.3.2 Historic Sources

Springs #1, #2, and #3 are the original water sources for the District (earliest priority date: April 30, 1929). All historic sources (as evidenced by water rights) are currently still in use.

3.3.3 Current Sources (Springs)

The District's current source consists of four springs: Spring #1, Spring #2, and Spring #3 which feed an unnamed stream tributary to the Pacific Ocean; and Pirate Spring, also tributary to the Pacific Ocean. Locations are shown on Figure 3-2.

Until recently, Pirate Spring has been used primarily as an alternate or supplementary source when Springs #1, #2, and #3 cannot meet system demands due to low flow or service interruptions associated with repair/maintenance or emergency activities. A summary of the sources is provided in Table 3-2. The flow figures are based on documentation provided in previous plans. Pirate Spring has gone dry in the past, hence, the zero for low flows. Historically, Pirate Spring's production (in terms of gpm) maybe in single digits from late August until the fall rains return. The characterization may change with the recent addition of a flow restriction to substantially limit a senior water right holder to their permitted diversion of Pirate Spring.

Table 3-2: Spring Data				
	Spring #1	**Spring #2**	**Spring #3**	**Pirate Spring**
Elevation (feet)	616	537	392	141
Rehab/Reconstruct	1982; 2003	2003	2000	–
Springbox	Concrete	Concrete	Concrete	Concrete
Fenced/Locked	Yes	Yes	Yes	Yes
Screened Overflow	Yes	Yes	Yes	Yes
Operation	Gravity	Gravity	Gravity	Pump
Flow:				
Average (gpd)	28,000	15,000	197,000	129,000
Average (gpm)	19.4	10.4	136.8	89.6
Low (gpd)	5,700	13,000	72,000	0.0
Low (gpm)	4.0	9.0	50.0	0.0

3.3.3.1 Springs #1, #2, and #3

These springs are linked together and deliver raw water to the District's treatment facility at Hillcrest. Spring #1 can provide water to Mountain Tank Reservoir via a connection that is normally closed (see Figure 3-3).

3.3.3.2 Pirate Spring

Pirate Spring is used as an emergency or alternate source, and to help meet District water demands. The source may go dry, or almost dry in late summer.

3.3.4 Alternative Source (Manzanita Intertie)

Very low spring flows in the summer of 2014 prompted the District to work with the City of Manzanita to construct an intertie between the two communities to provide water in the event of an emergency. The intertie was constructed, but has yet to be used (fall rains set in prior to actual need). It does not appear on the District's latest map (Figure 3-1), but a plan sheet showing the project is included in Appendix E. Manzanita's reservoir is lower than Neah-Kah-Nie's; consequently, the City must activate the water treatment plant booster pumps in order to provide water to Neah-Kah-Nie's system.

3.4 TREATMENT

Treatment is limited to disinfection (sodium hypochlorite) and corrosion control (pH adjustment with soda ash). There are three separate locations where treatment may take place. Under typical conditions, the entire District is supplied primarily with water treated at the Hillcrest site. Under emergency or other exceptional conditions, treatment can be provided at the Mountain Tank site. Pirate Spring also has its own treatment facilities. In the event of power outages, the District has a small portable generator that can be brought

to the treatment sites to allow disinfection to continue. The treatment facilities are discussed below.

Hillcrest Site. Treatment facilities are in a small building that is a repurposed octagonal concrete reservoir (referred to as "The Bunker"). Raw water flow through the facility is regulated by a flow control valve that was typically set at 120 gpm when open but has been recently set at 94 gpm. Soda ash is injected for corrosion control followed by sodium hypochlorite for disinfection. Chemical injection is flow-paced. The pH is typically maintained at 7.2 to 7.4 and the chlorine residual at 0.45 to 0.72 mg/l. Treated water then flows by gravity to the Hillcrest Reservoir.

Pirate Spring. Treatment at Pirate Spring includes soda ash and sodium hypochlorite injection. Water is then pumped directly via a 3-inch PVC transmission main to the Reservoir Park Reservoir. Water from Pirate Spring must meet Oregon Health Authority (OHA) requirements for 4.0-log inactivation of viruses (99.99% removal). Documentation provided to OHA dated July 8, 2013, indicates that the system must provide a minimum chlorine residual of 0.20 mg/l at the first user to be in compliance. OHA recommended that the District maintain minimum residual of 0.40 ppm at the first user.

3.5 STORAGE RESERVOIRS

Neah-Kah-Nie has three existing ground-level, treated water reservoirs. These are described individually in the following subsections. All the storage reservoirs were cleaned in 2017. Very little sediment was found in reservoirs, including the Reservoir Park Reservoir which has never been cleaned inside since construction in 1989.

3.5.1 Mountain Tank Reservoir

Location:	Northeast part of District; 38560 Neah-Kah-Nie Mtn. Rd.
Property:	TL300 (Map 3N 10W 20)
Site Acreage	8.4 Acres
Pressure Zone:	Upper
Volume:	155,000 gallons
Construction Date:	Winter 2005-2006
Material:	Concrete
Base elevation(approx.)	583 Feet
Height (to overflow)	30 Feet

3.5.2 Hillcrest Reservoir

Location:	The end of Hillcrest Road (10000 Hillcrest Road)
Property:	TL901 (Map 3N 10W 20)
Site Acreage	1.02 acres
Pressure Zone:	Lower
Volume	97,000 gallons
Construction Date:	1997; refurbished 2008, minor refurbish 2015
Material:	Bolted Steel
Base elevation (approx.):	290
Height (to overflow)	24 feet

Comment: The reservoir was painted in 2008 and touched up more recently.

3.5.3 Reservoir Park Reservoir

Location:	8271 Circle Drive
Property:	TL1190 (Map 3N 10W 19AA)
Site Acreage:	1.78 acres
Pressure Zone:	Lower
Volume:	39,700 gallons
Construction Date:	1989 (date verified by construction photos)
Material:	Concrete
Base elevation (approx.)	293 Feet
Height (to overflow):	11 feet

3.6 PUMP STATIONS

Neah-Kah-Nie has four existing pump stations. Locations are indicated on Figure 3-2 and schematically in Figure 3-3.

Pirate Spring Pump Station. This has a simplex, 58 gpm, Grundfos 5 Hp submersible pump located in a collection box with dimensions estimated by District staff at 10' x 10' by 8' to 10' deep. There is a small building over the collection box that provides access to the pump and houses the chemical storage and feed equipment. It pumps to the Reservoir Park Reservoir via a dedicated 3-inch PVC main. A variable frequency drive (VFD) was added in 2010 to allow operation when source availability falls below 58 gpm. An addition to the pumphouse was constructed in 2017 to accommodate the addition of a soda ash batch tank that would not otherwise have fit into the existing building. This also allowed the chlorine batch tank to be relocated thus freeing up space for the addition of a second pump and providing necessary clearance in front of the electrical panels.

Reservoir Park Pump Station. This has a 7.5 Hp Grundfos simplex pump located in a small building. It pumps via the upper zone to Mountain Tank Reservoir and typically operates when water is taken from Pirate Spring.

Mountain Tank Pump Station. This has a very small, 0.7 Hp Grundfos submersible pump mounted in a horizontal pipe. The pump produces 15 gpm at 205 feet head, and supplies two homes farther up the hillside. It is in the small building associated with the site. Operation is regulated by customer demand from pressure tanks located at each home.

Hillcrest Pump Station. This pump station is in the treatment building at the Hillcrest site. The installation includes two 7.5 Hp Grundfos CR10 pumps with Baldor motors producing 53.27 gpm at 347.4 feet of head (in simplex mode). Pumps alternate in operation. The station pumps via the upper zone to Mountain Tank Reservoir.

3.7 TRANSMISSION AND DISTRIBUTION

Mains in the District range from 2-inch to 8-inch in diameter. The larger mains include both transmission and distribution functions. There is a very short stretch of 8-inch main near the

Highway 101 crossing, otherwise most of the mains are 6-inch and of relatively recent construction. There are 2-inch and 4-inch mains present in several areas, primarily functioning as joint service lines since they cannot provide fire protection. Material is primarily PVC for the 4-inch and larger mains and polyethylene (PE) for the smaller diameter lines. The older system was predominantly asbestos cement (AC) pipe; the last section of AC pipe was removed in 2010. Most of the water system has been constructed or reconstructed during the previous 20-year master planning period in accordance with recommendations in the original plan and updates.

The system is largely looped with some dead-end lines. District data tables for hydrants in the distribution system are included in Appendix F for general reference.

In 2020 there were 388 active water meters, 384 of which were single-family residential meters.

The distribution system is shown in Figure 3-1.

3.8 SERVICE AREAS AND PRESSURE ZONES

Because of the District's varying topography and the magnitude of elevation differences, the water system is divided into six pressure zones/service areas. System pressure in each service area/zone is largely determined by the associated reservoir and/or pressure reducing valve (PRV) settings. District PRV and control valve data is included in Appendix G.

The pressure zone/service areas are discussed below. The number of service connections in each zone is based on data provided by the District. The number of residential service connections listed below totals 388.

Mountain Zone: The mountain zone is fed by a small Grundfos, 15 gpm simplex pump located in the building near Mountain Tank Reservoir. The area currently has two connections.

Upper Zone: The upper zone is pressurized by Mountain Tank Reservoir (elevation 613 feet). It is typically fed via pumps at the Hillcrest Reservoir site or pumps at the Reservoir Park Reservoir site. Under extended power outages, Spring #1 can fill Mountain Tank Reservoir via gravity by adjusting the valve configuration in the nearby Mountain Tuffshed. There are 65 service connections.

Middle Zone: The middle zone is fed via the upper zone and PRVs at the Reservoir Park site. There are 28 service connections.

Lower Zone: The lower zone is pressurized by PRVs near the Hillcrest Reservoir (elevation 314 feet) and the Reservoir Park Reservoir (elevation 304 feet). It has 284 service connections (75% of all the District's connections).

BlackberryZone): The Blackberry zone service area is located off Blackberry Lane and fed via a PRV connection from the upper zone. It is connected to the lower zone via a valve that is normally closed. The area currently has four connections.

San Dune Zone: This zone was created in 2017 with the installation of a PRV connection at the end of Mariner's Trail, just north of San Dune Road. The area currently has five connections.

Pressures in the lower parts of the lower zone exceed 100 pounds per square inch (psi). The highest service pressure was at the hydrant located above the PRV on San Dune Road. Pressure at this location was approximately 180 psi. Because of the high pressures, the District constructed a new pressure reducing facility in 2016 at the end of Mariner's Trail. The vault includes a 2-inch PRV with an inlet pressure set at 143 psi and an outlet pressure of 63 psi, thereby reducing the maximum pressure at the hydrant to 100 psi and creating a new pressure zone (San Dune Zone). The facility also includes a 6-inch PRV set to allow higher flows under fire flow conditions. It is District policy that all homes be fitted with individual PRV's..

The general location of the service areas (pressure zones) is shown in Figure 3-2; key elements, elevations, and connections are shown in Figure 3-3.

3.9 SCADA AND TELEMETRY

Neah-Kah-Nie's Supervisory Control and Data Acquisition (SCADA) and telemetry system was installed in 2013. The installation includes: one central unit and master computer located at the Hillcrest Reservoir site; and four remote units located at: Pirate Spring (RTU 01), Mountain Tank Reservoir (RTU 02), Reservoir Park Reservoir and Pump Station (RTU 03), and Hillcrest Reservoir (RTU 04). The District also collects data from flowmeters located at the Highway 101 crossing, Hillcrest, and the overflows at Spring #3 and Pirate Spring. Hillcrest Reservoir water pH and chlorine residuals are documented by means of a chart recorder. The District is also has continuous monitoring of pH and chlorine residuals at Hydrant #66 (located on Beulah Reed Road opposite Pirate Spring) that are tied into the SCADA system. Spring #1 and Spring #2 have magmeters that are installed and active but not yet connected to the SCADA system. (Currently, Spring #1 and Spring #2 flows are read and recorded monthly, by staff, in the Mountain Tuffshed. The master SCADA computer can be accessed via the internet from any registered computer — such as the two located in the district office.

3.10 WATER USE

Water use and water demands are discussed in detail in Section 5.

3.11 WATER QUALITY AND REGULATORY STATUS

3.11.1 Regulatory Overview

Drinking water quality is regulated at the federal level through the 1974 Safe Drinking Water Act and subsequent amendments. States have the flexibility to develop more stringent requirements in addition to the minimum established by the federal regulations. In Oregon, the Oregon Health Authority (OHA), Drinking Water Program is responsible for administering federal and state regulations of public water systems. Oregon

Administrative Rules (OAR) Chapter 333 Division 61 includes the rules for public water systems. The complete rules and related data and materials are available directly through OHA's website: http://public.health.oregon.gov/HealthyEnvironments/DrinkingWater/Pages/index.asx or through an internet search: "OHA drinking water program."

3.11.2 Water Quality

Water quality discussed in this section is based on recent data from the spring source or as sampled from appropriate locations in the water system. The springs have been classified as groundwater by OHA. Data is from OHA and the Neah-Kah-Nie Water District records.

Water quality is generally excellent, with all chemical concentrations well within regulated maximum contaminant limits (MCLs). Most of the tested-for chemical concentrations result in no detections. Detected constituents in recent years include the following:

Nitrates: For Pirate Spring, for the most recent period reviewed (November 18, 2015 – August 14, 2018), four samples averaged 0.717 mg/l with the highest concentration being 1.25 mg/l (November 18, 2015). For Springs #1, #2, and #3, for the most recent period reviewed (November 18, 2015 – August 14, 2018), four samples averaged 0.65 mg/l with the highest concentration being 0.76 mg/l (November 18, 2015). MCL for Nitrate is 10 mg/l. Samples are from source water. The District's hydrogeologist noted that the presence of nitrate is likely due to the presence of Red Alder near Spring #1, #2 and #3. Red Alder is a nitrogen fixer; dead and decaying Red Alder will release nitrogen into the soil.

Radionuclides: In November 2011, tested samples indicated a Gross Alpha Particle concentration of 2.1 pCi/l in Pirate Spring and 3.1 pCi/l in Springs #1, #2, and #3. MCL for Gross Alpha is 15 pCi/l. A combined radium concentration of 1.3 pCi/l was measured in November 2011 for Pirate Spring. MCL for combined radium is 5 pCi/l. October 2017 results show no detections for Gross Alpha, Radium, or Uranium in water from Pirate Spring or Springs #1, #2, and #3. Samples are from source water.

Disinfection Byproducts: This includes Total Trihalomethanes (TTHM) and Haloacetic Acids (HAA5). TTHM was last detected in the District in 2005 (0.0007 mg/l); there have been no detections of HAA5. MCL for TTHM is 0.080 mg/l. Samples are from the distribution system.

Lead and Copper: Ninetieth percentile summary results for 2017 testing show zero[2] milligrams per liter (mg/l) for lead and 0.0920 mg/l for copper. The action level for Lead

[2] There were some detections in the samples, but the statistical "90th percentile" was 0.0000 mg/l.

is 0.015 mg/l. The action level for Copper is 1.3 mg/l. Samples are from the distribution system.

3.11.3 Regulatory Status

The District is currently in compliance with all water quality-related regulatory requirements.

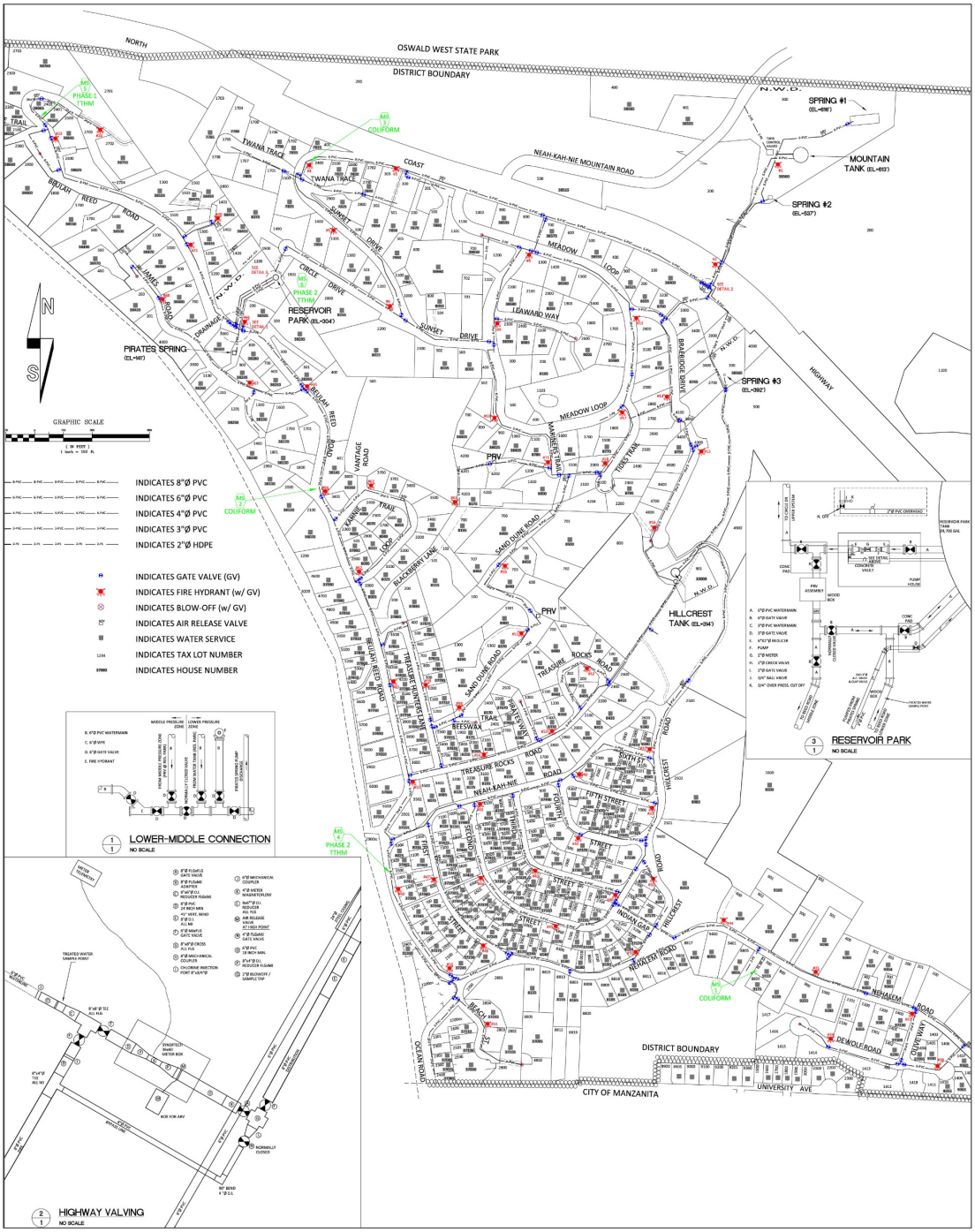

Figure 3-1	***Water System Map***	19863 February 2012

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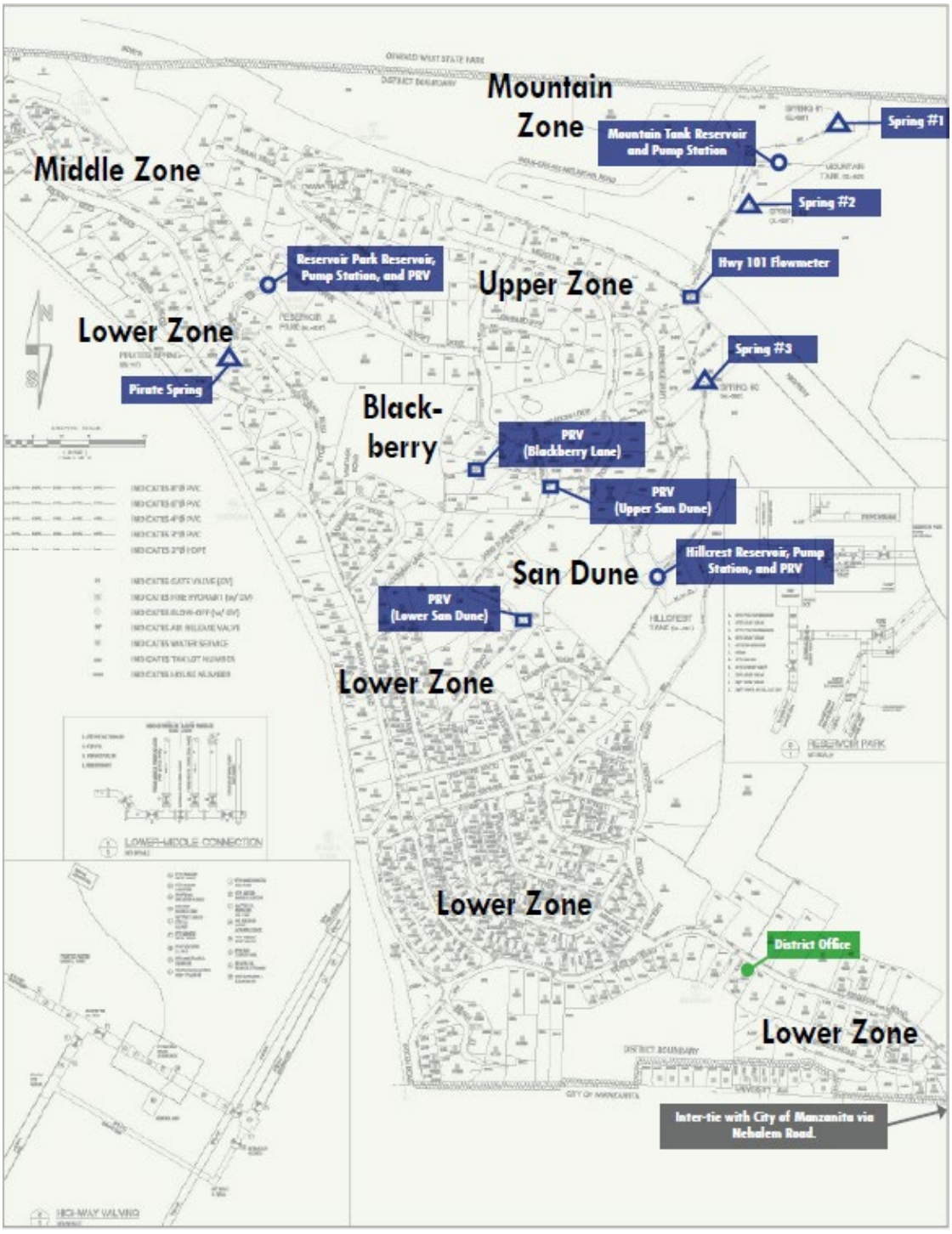

Figure 3-2	Facility Location Map	19863
		February 2012

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FIGURE 3.3
EXISTING NEAH-KAH-NIE
WATER SYSTEM SCHEMATIC

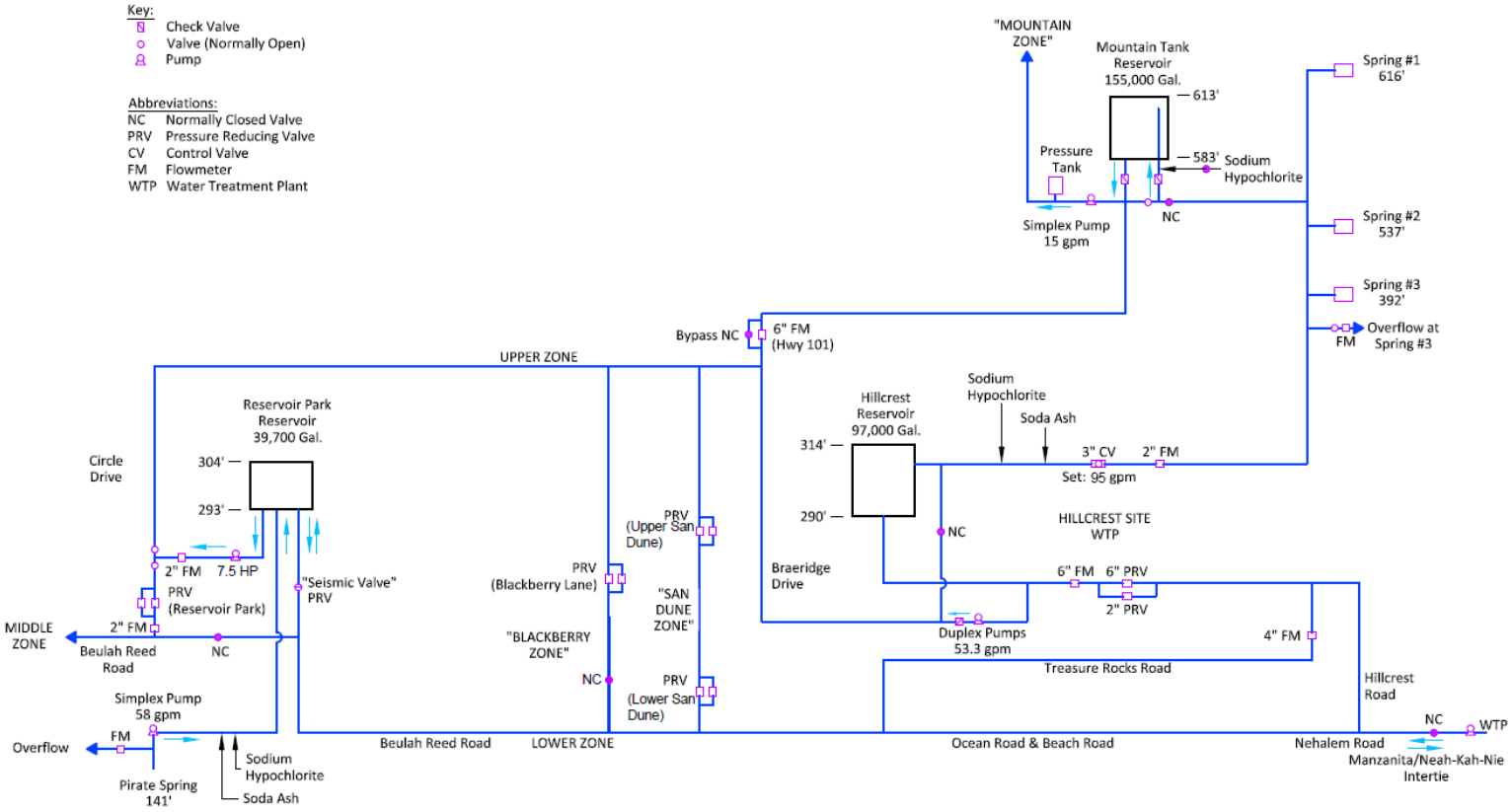

Figure 3-3	*Existing Neah-Kah-Nie Water System Schematic*	19863 February 2021

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HILLCREST SITE

Photo 1: *Hillcrest Site (See Note 1)*

Photo 2: *Treatment Building (right)*

Photo 3: *Reservoir*

Photo 4: *Pumps (to Upper Zone)*

Note 1: *Photo 1 shows from left to right: control building, treatment building, reservoir, and materials storage unit.*

Photo 5: *Chemical Feed*

Photo 6: *Flow Control Valve*

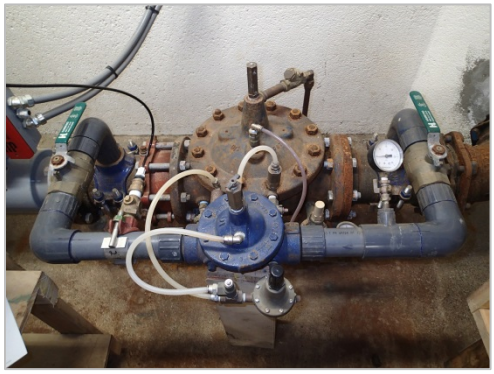

Photo 7: *PRVs (to Lower Zone)*

Photo 8: *Materials Storage Unit*

RESERVOIR PARK SITE

Photo 9: *Reservoir*

Photo 10: *Pump Station*

Photo 11: *Pump Station (interior)*

Photo 12: *PRVs (to Middle Zone)*

MOUNTAIN TANK SITE

Photo 13: *Reservoir*

Photo 14: *Pump and Disinfection Building*

Photo 15: *Flow Routing Assembly*

Photo 16: *Pump (to "Mountain Zone")*

SPRINGS

Photo 17: *Spring 1*

Photo 18: *Spring 2*

Photo 19: *Spring 3*

Photo 20: *Overflow near Spring 3*

Photo 21: *Pirate Spring Pump and Treatment Building*

Photo 22: *Pirate Spring Meter and Overflow*

Photo 23: *Pirate Spring Chemical Feed*

SECTION 4 LEVEL OF SERVICE GOALS

4.1 INTRODUCTION

"Level of Service" ultimately refers to the quality of the water service provided to the customer, but the phrase also has implications for the District staff who are responsible for operating, maintaining, and administering the utility, and for District officials who are ultimately responsible for the support and political will to champion the mission and needs of the utility. The provision of clean, healthy drinking water is one of the most important services provided in a community and, consistent with this importance, the Neah-Kah-Nie Water District should endeavor to provide a relatively high level of service.

One of the primary objectives for a water system is the protection of public health and welfare. For utilizing and expanding a water system, it is also important to minimize adverse environmental impacts. Various agencies have promulgated rules that ultimately support these objectives and, at a minimum, every water system must comply with these rules and requirements.

4.2 GENERAL GOALS AND REQUIREMENTS

General level of service goals and requirements applicable to the water system include:

- Conveyance and delivery (goal): Adequate, consistent, and reliable delivery of water under all anticipated service conditions; capacity for system to deliver maximum day demand (MDD) plus fire flow (FF)
- Pressurization (requirement): A minimum of 20 psi system pressure must always be maintained (OAR 333-061-0025); customer services must have individual pressure reducing valves if system pressures exceed 80 psi. Generally, a goal of a minimum of 40 psi under normal (non-fire flow) conditions is preferable if practicably achievable. The 20-psi minimum system pressure requirement extends to the customer water meter.
- Water quality (requirements): Comply with all Oregon Health Authority (OHA) requirements (see Section 3.11.1 for discussion). Water quality also includes aesthetic considerations that may or may not be related to specific regulatory concerns. Efforts to maintain or improve the aesthetic quality of the water provided is a goal consistent with the provision of a high level of service.
- Fire protection (goal): Provide fire protection consistent with American Water Works Association (AWWA), Insurance Services Office (ISO), Oregon Fire Code, and local fire department requirements, recommendations, and standards.
- Reliability (goal and requirements): Reliability as a goal is the ability of the water system and City staff to avoid or circumvent problems that adversely impact system performance. Reliability is enhanced by routine and timely maintenance and replacement, good design and construction, providing adequate water supply, providing alternate or backup facilities or equipment, and having a contingency plan

for efficiently handling specific problems. OHA recently added a new master planning provision (OAR 333-061-0060(5)(J)) that requires the District to include an element addressing seismic reliability.

4.3 SPECIFIC GOALS

4.3.1 Water Supply

The water supply components (springs, treatment plant, and transmission) should be sized to provide the maximum daily demand (MDD) within a 24-hour period at a minimum and, preferably, within a 20-hour period. Sizing should also incorporate consideration of the planning period, design life, economics, and plans for future utilization and demands.

4.3.2 Treatment

In addition to meeting current regulatory requirements, treatment recommendations should consider and potentially incorporate, or facilitate incorporation in the future, measures to address anticipated regulatory changes (if applicable).

4.3.3 Fire Protection

Fire protection capabilities are typically based on the ability to deliver a minimum specified flow for a minimum specified duration. Recommended fire flows and durations for the Neah-Kah-Nie Water District are provided in Table 4-1.

Table 4-1: Fire Flow Goals

Land Use	Fire Flow Rate (gpm)	Fire Flow Duration (min.)	Equivalent Volume (gal)
Residential Single-Family/Duplex	1,000	60	60,000
Non-residential	1,000	60	60,000

Actual fire flow requirements are building-specific and alternatives may be developed to provide some of the requisite protection. Examples might include an engineered building sprinkler system or an onsite fire pump drawing from a surface water source. In some areas, typically small peripheral service areas, fire protection may not be available via the water system. Fire protection to these areas is typically provided by a fire department equipped with tankers and other equipment for fighting rural fires. Appendix H includes current fire flow requirements for buildings.

From a fire protection perspective, more fire flow capability is always better; however, no specified capability can guarantee protection from all fire-related scenarios.

Fire hydrant spacing for new construction should comply with requirements of the 2019 Oregon Fire Code (Appendix H).

4.3.4 Storage Reservoirs

Oregon has no requirement for the provision of finished water storage (reservoirs), but the state does require (per OAR 333-061-0025) the maintenance of a minimum system pressure of 20 psi at all times. Reservoirs are one of the most practical and economical means of meeting the pressurization requirement. For purposes of this water master plan, reservoir sizing is based on the standard design provision of three times the average daily demand plus fire flow reserve (3xADD+FF). Provision of needed storage capacity is best provided with two or more reservoirs (per service area) in order to facilitate service when one reservoir is offline. Generally, more capacity is better from a reliability standpoint; however, too much capacity can result in lost chlorine residuals and formation of disinfection byproducts.

4.3.5 Pump Stations

Pump stations to service areas with reservoirs should be designed to provide MDD with the largest pump out of service. Pump stations to service areas without reservoirs should provide PHD with the largest pump out of service. High service (fire) pumps may be provided in cases where they are consistent with the fire protection goals and plans in the affected service area. Pump stations serving areas with no reservoirs or with inadequate reservoir capacity should be provided with emergency power generators or designed to facilitate connection to a portable generator. Compromises with the above standards are common in areas provided with domestic service and no fire protection. This is often the case when only a few customers are served by the pump station.

4.3.6 Transmission and Distribution

Transmission and distribution mains should be sized according to anticipated hydraulic requirements that may include the provision of fire flow. Line velocities are generally five (5) feet per second (fps) or less to reduce head loss. Reduction of head loss reduces pumping cost and pressure losses; consequently, proper sizing can reduce system operational costs and improve fire flow capabilities. Systems designed to provide fire protection typically utilize an 8-inch minimum main size except for parts of a grid with lengths of less than 600 feet where 6-inch mains may be acceptable. AWWA does not recognize lines of less than 6-inch-diameter as providing fire protection.

Hydraulics, reliability, and water quality are generally enhanced with a “looped” water main configuration that minimizes the occurrence of single-feed or dead-end lines. Nevertheless, single-feed lines are commonly used for reservoir transmission mains and supply transmission mains. Dead-end mains should be avoided, but may be practicably unavoidable because of topography and existing development.

4.3.7 Telemetry

Telemetry should be provided for each key facility including intake pumps, treatment plant, pump stations, and reservoirs. Telemetry provides alarm notification at a

minimum. Important additional functions may include data acquisition and operational control.

4.4 DESIGN LIFE

Design life (or useful life) refers to the anticipated service life of an item or system component. Typical design life values are expressed in terms of "years of service" and reflect typical design, material, and construction standards associated with municipal water system infrastructure. Actual years of service may vary greatly according to the service demands and conditions – as well as the level of maintenance provided. Typical design lives, selected from "Asset Management: A Handbook for Small Water Systems," September 2003 (EPA 816-R-03-016), are summarized below:

Wells and Springs	25 - 35 years
Intake Structures	35 - 45 years
Treatment and Chlorination Equipment	10 - 15 years
Storage Tanks (Reservoirs)	30 - 60 years
Pumps	10 - 15 years
Buildings	30 - 60 years
Electrical Systems	7 - 10 years
Computers	5 years
Transmission and Distribution Mains	35 - 40 years
Valves	35 - 40 years
Meters	10 - 15 years
Service Laterals	30 - 50 years
Hydrants	40 - 60 years

As a concept, "design life" is primarily used for planning and budgeting for replacement or significant rehabilitation. As such, it is an important consideration in asset management. The values are only a starting point and should be adjusted and refined to reflect local conditions and experience.

4.5 CONFORMANCE AND IMPLEMENTATION

As a general guideline, water systems should be in conformance with the most current requirements and standards. However, as a practical matter many do not, simply because the requirements and guidelines have become more stringent over time. Many requirements, typically those associated with the Safe Drinking Water Act (SDWA) Amendments and Oregon Health Authority (OHA) rules, do require immediate action to correct identified deficiencies. Other deficiencies, such as system configuration, material condition, or hydraulic deficiencies, may not trigger a regulatory mandate, but still reflect a lower level of service because of compromised reliability or performance. The condition of mechanical, electrical, and telemetry components will also not typically trigger a regulatory mandate, but could cause severe problems or hardship to the District if failure occurs.

The promptness with which a community addresses known deficiencies and implements needed improvements is itself a measure of the level of service provided.

SECTION 5 WATER DEMANDS ANALYSIS

5.1 INTRODUCTION

This section focuses on water demands and usage for the Neah-Kah-Nie Water District and includes water demand projections for future growth during the planning period.

Water demand analysis uses certain terms and abbreviations with considerable frequency. These terms are summarized below for convenience.

Average Daily Demand (ADD): total usage or production for the year divided by the number of days in the year.

Maximum Month Demand (MMD): total usage or production for the month with the highest total demand during the year, divided by the number of days in the month.

Maximum Day Demand (MDD): total usage or production for the day with the highest demand during the year. This may also be known or referred to as peak day demand.

Peak Hour Demand (PHD): total usage or production for the one-hour period with the highest demand during the year.

The demand parameters defined above are typically and variously expressed as:

gallons per day (gpd)
millions of gallons per day (mgd)
gallons per capita per day (gpcd)
gallons per minute (gpm)
cubic feet per second (cfs)

5.2 RECENT (CUSTOMER) METERED WATER USAGE

District customer water meters are read and recorded bi-monthly. Non-residential water consumption is nominal (approximately 300 gallons per month for the District office and 400 gallons per month for two Nehalem Bay Wastewater Agency pump stations). Metered water usage for the period January 2012 to December 2019 is summarized in Table 5-1.

Two notable characteristics are evident in Table 5-1: The very low gallons per day per EDU (gpd/EDU) average and the relatively high gallons per capita day (gpcd) based on the full time residential population. For Neah-Kah-Nie, with no commercial development and low irrigation needs, per EDU usage is approximately one-half of what is expected and per capita consumption is approximately double what is expected. This is attributable to the high proportion of vacation and second homes in the District; consequently, a conventional analysis utilizing gpd/EDU or gpcd could be misleading.

Section 2.3.2 notes that 72.3 percent of the housing stock is classified as vacant or vacation use, so when usage (in terms of gpcd) is based on the resident population, the gpcd figures are accordingly high. Based on the gpcd figures, and typical residential only usage of 50-80 gpcd for similar communities, the average monthly population probably varies from 300 persons in winter to 800-1,200 persons in July/August.

Table 5-1: Customer Usage Data					
Bi-Monthly Period	Customer Usage (gal)	Average Customer Usage			Month to Annual Ratio
		(gpd)	(gpd/EDU)	(gpcd)[1]	
Year 2019 (EDUs 384; Population 200)					
Jan – Feb	1,439,710	23,602	61	118	0.45
Mar – Apr	1,338,486	21,942	57	110	0.41
May – Jun	2,097,784	34,390	90	172	0.65
Jul – Aug	6,797,430	109,636	286	548	2.07
Sep – Oct	4,444,016	72,853	190	364	1.37
Nov – Dec		–	–	–	0.00
Jan – Dec	**16,117,426**	**53,018**	**138**	**265**	**1.00**
Year 2018 (EDUs 377; Population 197)					
Jan – Feb	1,350,080	22,132	59	112	0.64
Mar – Apr	1,291,390	21,170	56	107	0.62
May – Jun	2,333,660	38,257	101	194	1.11
Jul – Aug	3,861,388	62,280	165	316	1.81
Sep – Oct	2,287,342	37,497	99	190	1.09
Nov – Dec	1,435,800	23,538	62	119	0.68
Jan – Dec	**12,559,660**	**34,410**	**91**	**175**	**1.00**
Year 2017 (EDUs 372; Population 194)					
Jan – Feb	1,378,769	22,603	61	117	0.76
Mar – Apr	1,231,873	20,195	54	104	0.68
May – Jun	1,638,188	26,856	72	138	0.90
Jul – Aug	3,355,850	54,127	1.46	279	1.82
Sep – Oct	2,175,833	35,669	96	184	1.20
Nov – Dec	1,086,197	17,807	48	92	0.60
Jan – Dec	**10,866,710**	**29,772**	**80**	**153**	**1.00**
Year 2016 (EDUs 366; Population 192)					
Jan – Feb	1,256,278	20,595	56	107	0.71
Mar – Apr	1,172,441	19,220	53	100	0.66
May – Jun	2,060,495	33,779	92	176	1.16
Jul – Aug	3,077,464	49,637	136	259	1.71
Sep – Oct	1,977,968	32,426	89	169	1.12
Nov – Dec	1,066,552	17,484	48	91	0.60
Jan – Dec	**10,611,198**	**29,072**	**79**	**151**	**1.00**

Table 5-1: Customer Usage Data (cont.)					
Bi-Monthly Period	Customer Usage (gal)	Average Customer Usage			Month to Annual Ratio
		(gpd)	(gpd/EDU)	(gpcd)[1]	
Year 2015 (EDUs 363; Population 191)					
Jan – Feb	1,698,970	27,852	77	146	0.79
Mar – Apr	1,513,135	24,805	68	130	0.70
May – Jun	1,754,445	28,761	79	151	0.81
Jul – Aug	4,869,130	78,534	216	411	2.22
Sep – Oct	1,842,440	30,204	83	158	0.85
Nov – Dec	1,218,132	19,969	55	105	0.57
Jan – Dec	**12,896,252**	**35,332**	**97**	**185**	**1.00**
Year 2014 (EDUs 361; Population 189)					
Jan – Dec	**11,329,759**	**31,040**	**86**	**164**	**1.00**
Year 2013 (EDUs 360; Population 190)					
Jan – Dec	**9,920,800**	**27,180**	**76**	**143**	**1.00**
Year 2012 (EDUs 361; Population 189)					
Jan – Dec	**10,686,380**	**29,198**	**81**	**154**	**1.00**

[1] Notes: Based on full time resident population

5.3 RECENT PRODUCTION WATER DEMAND

Neah-Kah-Nie did not use Pirate Spring between January 2012 and May 2015. All water produced for system needs during that period came from Springs #1, #2, and #3. Water from Springs #1, #2, and #3 is metered and treated at the Hillcrest site and then delivered to the water system. Pirate Spring water is metered and treated at the spring. The production water demand for the period of January 2012 through December 2019 includes all water use in the system plus unaccounted-for water. Water production data for both sources is summarized in Table 5-2. Current total water demand averages 58,100 gpd.

Table 5-2: Water Production Data

Period	Production (MG)			Average Production			Month to Annual Ratio
	Hillcrest	Pirate	Combined	(gpd)	(gpd/EDU)	(gpcd)[1]	
Year 2019 (EDUs: 384 ; Population 200)							
January	1.293	0.087	1.380	44,529	116	223	0.77
February	1.217	0.045	1.262	45,059	117	225	0.78
March	1.446	0.053	1.499	48,341	126	242	0.83
April	1.487	0.040	1.527	50,896	133	254	0.88
May	1.729	0.059	1.788	57,680	150	288	0.99
June	1.975	0.066	2.041	68,019	177	340	1.17
July	2.338	0.057	2.395	77,262	201	386	1.33
August	2.391	0.060	2.451	79,077	206	395	1.36
September	1.800	0.029	1.829	60,981	159	305	1.05
October	1.779	0.000	1.779	57,385	149	287	0.99
November	1.654	0.001	1.655	55,162	144	276	0.95
December	1.578	0.025	1.603	51,710	135	259	0.89
Jan – Dec	**20.69**	**.52**	**21.21**	**58,106**	**151**	**291**	**1.00**
Year 2018 (EDUs 377; Population 194)							
January	1.228	0.001	1.229	39,648	105	204	0.68
February	1.085	0.005	1.090	38,930	103	201	0.67
March	1.352	0.000	1.352	43,620	116	225	0.75
April	1.354	0.000	1.354	45,150	120	233	0.78
May	1.772	0.001	1.773	57,190	152	295	0.98
June	2.000	0.035	2.035	67,836	180	350	1.17
July	2.356	0.234	2.590	83,543	222	431	1.44
August	2.357	0.207	2.564	82,703	219	426	1.42
September	1.839	0.051	1.890	62,991	167	325	1.08
October	1.725	0.095	1.820	58,726	156	303	1.01
November	1.526	0.065	1.591	53,025	141	273	0.91
December	1.323	0.059	1.382	44,570	118	230	0.77
Jan – Dec	**19.92**	**0.75**	**20.67**	**56,630**	**147**	**283**	**1.00**

Table 5-2: Water Production Data (cont.)

Year 2017 (EDUs 372; Population 192)							
January	0.782	0.012	0.794	25,629	69	133	0.51
February	1.025	0.100	1.125	40,190	108	209	0.80
March	1.156	0.077	1.233	39,769	107	207	0.80
April	0.976	0.149	1.125	37,497	101	195	0.75
May	1.149	0.207	1.356	43,735	118	228	0.88
June	1.468	0.000	1.468	48,921	132	255	0.98
July	2.350	0.000	2.350	75,806	204	395	1.52
August	2.713	0.007	2.720	87,754	236	457	1.76
September	1.911	0.000	1.911	63,703	171	332	1.27
October	1.530	0.000	1.530	49,363	133	257	0.99
November	1.410	0.003	1.413	47,092	127	245	0.94
December	1.210	0.003	1.213	39,142	105	204	0.78
Jan – Dec	**17.68**	**0.56**	**18.24**	**49,969**	**134**	**260**	**1.00**
Year 2016 (EDUs 366; Population 191)							
Jan – Dec	**16.50**	**0.02**	**16.52**	**45,257**	**124**	**237**	**NA**
Year 2015 (EDUs 366; Population 191)							
Jan – Dec	**15.55**	**1.53**	**17.09**	**46,811**	**129**	**245**	**NA**
Year 2014 (EDUs 361; Population 189)							
Jan – Dec	**14.15**	**0**	**14.15**	**38,767**	**107**	**205**	**NA**
Year 2013 (EDUs 360; Population 190)							
Jan – Dec	**12.36**	**0**	**12.36**	**33,863**	**94**	**178**	**NA**
Year 2012 (EDUs 360; Population 190							
Jan – Dec	**14.19**	**0**	**14.19**	**38,877**	**108**	**205**	**NA**

[1] Based on full-time resident population

5.4 UNACCOUNTED-FOR WATER

Unaccounted-for water is represented as the difference between water produced and water used (metered and sold, metered but not-sold, contractor use, Fire Department use, and estimates of water use or losses associated with Public Works activities). A certain amount of loss is inevitable and depends on many factors such as total pipe length, water usage, and water pressure. OAR 690-086-0150 (4)(e) requires a regularly scheduled and systematic leak detection program if an annual water audit indicates that leakage exceeds 10 percent.

Table 5-3 includes recent estimates of unaccounted-for water. Recent unaccounted-for water is approximately 40 percent (approximately 15 gpm annual average).

The data does not appear to be entirely consistent; anomalies could be attributed to significant leaks, varying customer meter reading dates, undocumented use, or some other

factor. In general, losses should be lowest as percent of production during the summer when customer use is highest.

Until recently, the District did not have a formal meter testing or replacement program, but rather conducted a visual inspection during meter readings. Meters were serviced or replaced according to perceived need. Service meters tend to under-report as they age; consequently, some of the unaccounted-for water may be attributable to meter inaccuracies. At this time, the District has replaced approximately one half of the residential water meters.

Notable anomalies in the Table 5-3 data include: 2019 “July - August” negative figure of 1,950,906 gallons followed by the negative figure of 835,651 gallons in “September-October”; 2012 “March-April” high figure of 1,466,170 gallons followed by the very low figure of 56,880 gallons in “May-June.” The discrepancies suggest some problem with the data. Production data for July–October 2019 is similar (slightly lower) than for the same period in 2018. This suggests some erroneous usage data for the same period in 2019 based on the magnitude of the discrepancy over the four-month period. Unaccounted-for calculations often show considerable month-to-month variations, so annual figures generally provide a more balanced and useful estimate of actual system performance. Reasons for the monthly variations vary, but may reflect the fact that customers’ meters are read on schedules that do not correspond to the actual start and end of the months represented. On an annual basis, year 2017 and 2018 have comparable unaccounted-for water figures; 40 percent and 39 percent respectively. Note that the higher unaccounted-for water figure of 48.65 percent for 2019 is for the period January-June and that this figure is consistent with recent years for these months. Unaccounted-for water has increased significantly since 2013-2014.

The District has replaced much of the distribution system over the past twenty-five years and this has undoubtedly reduced water losses. System pressures in parts of the District are very high (more than 100 psi) and usage is relatively low for the number and density of connections – all of which contribute toward a higher potential lost water. The prevalence of sandy soils in the area also means that leaks may not appear on the surface and are likely to continue unless discovered by leak detection efforts and prompt repair by the District.

The District conducted leak detection in 2017 (finding three leaks totaling 2.75-3.75 gpm) and 2018 (finding four leaks totaling 9.5-12.5 gpm). If the identified leaks in 2018 were not corrected for a year, the total water loss associated with the leaks would represent 60 to 80 percent of the unaccounted for water noted in Table 5-3 for 2018.

Table 5-3: Unaccounted-For Water

Bi-Monthly Period	Production (gal)	Customer Usage (gal)	Unaccounted-for Water		
			Gallons	Percent of Production	Percent of Jan – Dec
Year 2019					
Jan – Feb	2,642,028	1,439,710	1,202,318	45.51	26.02
Mar – Apr	3,025,434	1,338,486	1,686,949	55.76	36.51
May – Jun	3,828,655	2,097,784	1,730,871	45.21	37.46
Jul – Aug	4,846,524	6,797,430	(1,950,906)	(40.25)	(421.23)
Sep – Oct	3,608,365	4,444,016	(835,651)	(23.16)	(18.09)
Nov – Dec	–	–	–	–	–
Jan – Jun	**9,946,118**	**4,875,980**	**4,620,138**	**48.65**	**NA**
Year 2018					
Jan – Feb	2,319,135	1,350,080	969,055	41.79	11.95
Mar – Apr	2,706,705	1,291,390	1,415,315	52.29	17.45
May – Jun	3,807,964	2,333,660	1,474,304	38.72	18.18
Jul – Aug	5,153,615	3,861,388	1,292,227	25.07	15.93
Sep – Oct	3,710,231	2,287,342	1,422,889	38.35	17.54
Nov – Dec	2,972,420	1,435,800	1,536,620	51.70	18.95
Jan – Dec	**20,670,071**	**12,559,660**	**8,110,411**	**39.24**	**100.00**
Year 2017					
Jan – Feb	1,919,806	1,378,769	541,037	28.18	7.37
Mar – Apr	2,357,758	1,231,873	1,125,885	47.75	15.27
May – Jun	2,823,431	1,638,188	1,185,243	41.98	16.08
Jul – Aug	5,070,373	3,355,850	1,714,523	33.81	23.26
Sep – Oct	3,441,333	2,175,833	1,265,500	36.77	17.17
Nov – Dec	2,626,150	1,086,197	1,539,953	58.64	20.89
Jan – Dec	**18,238,852**	**10,866,710**	**7,372,142**	**40.42**	**100.00**
Year 2016					
Jan – Dec	**16,518,703**	**10,611,198**	**5,907,505**	**35.76**	**100.00**
Year 2015					
Jan – Dec	**17,085,843**	**12,896,252**	**4,189,591**	**24.52**	**100.00**
Year 2014					
Jan – Dec	**14,150,000**	**11,329,759**	**2,820,241**	**19.93**	**100.00**
Year 2013					
Jan – Dec	**12,360,000**	**9,920,800**	**2,439,200**	**19.73**	**100.00**
Year 2012					
Jan – Dec	**14,190,000**	**10,686,380**	**3,503,620**	**24.69**	**100.00**

5.5 CURRENT WATER SYSTEM DEMANDS

The current year 2020 water demands are conservatively estimated from recent production data and a 1.4 percent average annual growth rate, primarily to establish a basis for projecting future water demands. Average day demand (ADD) is estimated to be 59,000 gpd. Maximum month demand (MMD) is estimated at 90,000 gpd.

Previous Master Plans and updates used a figure of five percent of the maximum monthly demand to establish the maximum day demand (MDD). This yields a figure of approximately 140,000 gpd and also works out to 2.37 times the average day demand – a reasonable figure for a community such as Neah-Kah-Nie.

Peak hourly demand (PHD) is estimated based on an empirical formula (source: Water System Design Manual, Washington State Department of Health, 2019):

- PHD = (MDD/1440)[(C)(N)+F]+18
- Where: PHD = Peak hourly demand (gpm)
- C = Coefficient associated with ranges of EDUs
- N = Number of EDUs
- F = Factor associated with ranges of EDUs
- MDD = Maximum day demand (gpd/EDU)
- Current EDUs (equivalent dwelling units): 389
- For a range of N (251 – 500): C = 1.8 and F = 125
- For a range of N (> 500): C = 1.6 and F = 225
- MDD = 140,000 gpd/389 EDUs = 360 gpd/EDU
- PHD = (360/1440)[(1.8)(389)+125]+18 = 224.3 gpm = 323,000 gpd

Estimated current (year 2020) water system demands and associated peaking factors are summarized in Table 5-4. The peaking factors are relatively high due to significant seasonal changes in occupancy of vacation and second homes moderated by relatively low summer irrigation use.

Table 5-4: Estimated Current (Year 2020) Water System Demand

Parameter	Demand (gpd)	Demand (gpm)	Peaking Factor
ADD	59,000	41.0	1.0
MMD	90,000	62.5	1.5
MDD	140,000	97.2	2.4
PHD	323,000	224.3	5.5

5.6 WATER CONSERVATION

An updated Water Conservation Management Plan is included in Appendix I. The document provides information on conservation policies.

For general planning purposes, no additional reductions in water demand or unaccounted-for water are incorporated into the projections for future water demand. Continued reductions, however, will reduce the District's impact on the available water supply capacity associated with the spring sources and will defer or reduce the need to utilize the emergency intertie with the City of Manzanita's water system. The system has a demonstrated high potential for water loss associated with leaks; consequently, the District should plan on conducting leak detection surveys annually.

5.7 PROJECTED WATER SYSTEM GROWTH

Projected water system growth is anticipated to approximately match that of projected system connection growth. A 1.4 percent average annual growth rate (AAGR) is used throughout.

5.8 PROJECTED WATER SYSTEM DEMAND

Projected water system demands for Neah-Kah-Nie are shown in Table 5-5. All parameters noted, except PHD, increase by 1.4 percent per year for general planning purposes and represent an average over the planning period. Actual system growth may be much more rapid, or slower, at times and as such may impact timing of improvements. PHD is calculated according to the equation included in Section 5.5.

Table 5-5: Projected Water System Demands

Year	2020	2025	2030	2035	2040	2066
EDUs	387	415	445	477	511	733
ADD (gpd)	59,000	63,000	68,000	73,000	78,000	112,000
MDD (gpdl)	140,000	150,000	161,000	172,000	185,000	265,000
PHD (gal)	323,000	341,000	361,000	382,000	404,000	549,000
ADD (gpm)	41	44	47	50	54	78
MDD (gpm)	97	104	112	120	128	184
PHD (gpm)	224	237	251	265	281	381
ADD (cfs)	0.09	0.10	0.10	0.11	0.12	0.17
MDD (cfs)	0.22	0.23	0.25	0.27	.29	.41

[1] All figures are rounded.

SECTION 6 WATER SYSTEM ANALYSIS

6.1 INTRODUCTION

This section of the Water Master Plan assumes the reader is familiar with the previous sections. Focus of this section is on evaluations and analyses of the water utility with a goal of developing an understanding of current and future needs and developing strategies and improvements to address those needs and level of service goals. Costs, insofar as discussed, generally reflect considerations discussed in Section 7.2.

6.2 WATER DEMANDS

Water usage and demands are discussed in detail in Section 5. Current and projected water demands for design purposes are summarized in Table 5-5.

The resulting water demand projections are conservative based on the projected 1.4 percent average annual growth rate (AAGR) and the assumption, for planning purposes, that conservation considerations will not be used to reduce projected water demands. Metered customer demand is reasonable, but unaccounted-for water losses are relatively high (40 percent). Continued efforts at documenting unmetered usage, and annual leak detection and correction are needed. District staff note that many of the water meters in the District are old. Old meters tend to under-report; consequently, some of the “losses” in the system may be attributable to the old meters. The District should develop a meter maintenance and replacement program. Water losses tend to increase over time; therefore, some level of effort is required just to maintain the current levels.

6.3 SOURCE AND WATER RIGHTS – RECOMMENDATIONS

6.3.1 Spring Flow and Utilization

Recent spring flow availability data is included in Table 6-1 based on overflow metering which measures and records at 10-minute intervals. The availability data represents the Spring flow minus the production flow that has been diverted. Lowest flows occur in late summer/early fall until the fall rains return (mid-October in typical years). Highest customer usage historically occurs during July and August; thus, there is significant potential for the highest customer demands to occur during periods of relatively low and diminishing flow availability.

Table 6-1: Recent Spring Flow Availability – Pirate Spring

Month	Average Spring Flow (gpm)				
	Year 2015	Year 2016	Year 2017	Year 2018	Year 2019
December	292	106	230	167	NA
November	180	141	123	53	110
October	0	63	32	NA	75
September	0	2	19	NA	51
August	0	4	19	28	54
July	3	4	45	45	112
June	15	12	95	68	120
May	32	63	192	172	141
April	131	245	175	249	148
March	167	260	135	293	171
February	352	275	147	206	195
January	292	319	170	193	214
Jan – Dec	**124**	**124**	**115**	**101**	**106**

Table 6-2: Recent Spring Flow Availability – Spring #1, #2, and #3

Month	Average Spring Flow (gpm)				
	Year 2015	Year 2016	Year 2017	Year 2018	Year 2019
December	635	431	403	254	NA
November	502	611	282	NA	112
October	24	276	67	29	95
September	27	11	31	24	36
August	24	19	45	26	28
July	38	35	119	44	45
June	70	63	222	83	75
May	166	101	400	196	119
April	246	233	364	528	214
March	255	473	610	326	199
February	365	637	465	506	292
January	567	319	383	502	343
Jan – Dec	**248**	**265**	**282**	**191**	**118**

Data that is either missing or incomplete in Tables 6-1 and 6-2 is noted as "NA." Pirate Spring data for 2015-2017 is under-reported. A senior water rights holder was diverting

substantially more than the terms of the water right allowed. Theoretical capacity of withdrawal based on their 2-inch line was 45 gpm; actual usage was not determined. Based on the Watermaster's review in August 2018, the maximum allowable flow is 5 gpm. District staff installed a flow restrictor and water meter in early 2019.

Lower flow availability in Springs #1, #2, and #3 in 2018 and 2019 is due in part to the high unaccounted-for water associated with those years.

Table 6-3 shows average spring flows for 2018 and 2019. The totals reflect a combination of metered spring overflow and metered water production.

Table 6-3: Average Spring Flow and Utilization

Period	Water Production (gpm)			Spring Overflow (gpm)			Spring flow (gpm)		
	Spr 1,2,3	Pirate	Combined	Spr 1,2,3	Pirate	Combined	Spr 1,2,3	Pirate	Combined
Year 2019									
Jan	29	2	31	343	214	557	372	216	588
Feb	30	1	31	292	195	487	322	196	518
Mar	32	1	34	199	171	370	231	172	404
Apr	34	1	35	214	148	362	248	149	397
May	39	1	40	119	141	260	158	142	300
Jun	46	2	47	75	120	195	121	122	242
Jul	52	1	54	45	112	157	97	113	211
Aug	54	1	55	28	54	82	82	55	137
Sep	42	1	42	36	51	87	78	52	129
Oct	40	0	40	95	75	170	135	75	210
Nov	38	0	38	112	110	222	150	110	260
Dec	35	1	36	NA	NA	NA	NA	NA	NA
Jan-Dec	**39**	**1**	**40**	**118**	**106**	**224**	**157**	**107**	**264**
Year 2018									
Jan	28	0	28	502	193	695	530	193	723
Feb	27	0	27	506	206	712	533	206	739
Mar	30	0	30	326	293	619	356	293	649
Apr	31	0	31	528	249	777	559	249	808
May	40	0	40	196	172	368	236	172	408
Jun	46	1	47	83	68	151	129	69	198
Jul	53	5	58	44	45	89	97	50	147
Aug	53	5	57	26	28	54	79	33	111
Sep	43	1	44	24	NA	NA	67	NA	NA
Oct	39	2	41	29	NA	NA	68	NA	NA
Nov	35	2	37	NA	53	NA	NA	55	NA
Dec	30	1	31	254	167	NA	NA	NA	NA
Jan-Dec	**38**	**1**	**39**	**191**	**101**	**292**	**229**	**102**	**331**

Generally, the springs have adequate combined production capability to meet average demand for the full planning horizon (98 gpm for ultimate buildout in 2066). Though climate change and variability in weather could result in months, typically August, where average demand exceeds spring availability. However, an adequate source water supply should provide for the maximum day demand rather than the average. Locally the maximum day demand is on and around the Fourth of July holiday. Maximum day demand for year 2040 is 128 gpm; and this is likely to be available during most years in early July. August is more problematic given the increased presence of short-term rentals and the recent trend toward drier summers resulting in higher potential demand and lower potential availability. Water reservoirs (tanks) do provide some equalization capability, but this is typically used to moderate the effects of peak diurnal demands of relatively short duration (hours).

Constructing additional reservoir capacity to address multiday equalization needs during periods of peak demand is prohibitively expensive and can also have adverse water quality impacts. It is likely that the District will need to rely on water from the intertie with Manzanita during drier years and periods of high demand or implement conservation measures (see Appendix I).

Pirate Spring was utilized as a backup supply primarily to provide water if the Hillcrest system is offline. This was done in May 2015 when the Hillcrest Reservoir was taken offline for painting. The Hillcrest system cannot provide adequate contact time for disinfection if the reservoir is offline, hence the need for utilizing Pirate Spring. Pirate Spring's importance diminished somewhat with the construction of the emergency intertie with Manzanita; nevertheless, it is a distinct benefit from a reliability standpoint to have multiple source alternatives. Utilizing Pirate Spring to the extent practicable also reduces the need and cost associated with obtaining water from Manzanita. Pirate Spring is also used to help keep water refreshed in the northwest part of the Lower Zone system that at times has lower use than other areas. Pirate Spring is also used at times to refill Mountain Tank Reservoir following a high peak demand.

6.3.2 Water Rights

The District currently has 0.34 cfs in certificated water rights for Springs #1, #2, and #3. In the year 2066, ultimate buildout (UBO) maximum day demand is projected to be 0.41 cfs – less than the total permitted (1.11 cfs) rights. The District has permits for an additional 0.77 cfs. There is no current or future anticipated need for additional water rights unless there are opportunities for an additional source that could provide enhanced system reliability, especially during the summer/fall low spring flow period.

The State has determined that no fish are present in the streams associated with the District's springs. The lack of fish reduces the potential for mandatory restrictions on utilization of the springs to meet fish persistence criteria.

Laws and rules related to water rights are constantly evolving so there is a likely benefit to further developing and certificating the District's water rights before possible additional

limitations or hurdles are implemented. Permit 34032 (Pirate Spring) and Permit 51578 (Springs #1, #2, and #3) have received extensions of time for completion of construction. The new completion date for both is October 21, 2023. The status of the permits will need to be reviewed prior to that date and a determination made as to how best to proceed. The permit renewal process may add additional requirements or limitations and it allows the public to review and provide comment that may also affect the renewed permit.

6.3.3 Manzanita Intertie

The intertie was constructed in 2014 and has not been used. A test of the intertie should be scheduled with Manzanita to verify that it can provide the needed supply. An intergovernmental agreement has been developed to provide for use under emergency conditions.

6.4 WATER QUALITY AND TREATMENT

In general, both source and distribution system water quality in Neah-Kah-Nie is excellent. (See Section 3.11 for discussion). There are no specific recommendations other than diligence in meeting all applicable regulatory requirements.

The District had expressed an interest in improving the chemical feed at Mountain Tank, which currently consists of a small day tank and chemical feed pump. This system serves more of an emergency supply role rather than regularly used supply source. Under these circumstances the simplicity of the current system has a reliability advantage over more complex feed systems. A small portable generator is available for powering the chemical feed unit.

Water quality testing in the District indicates no problem with lead; therefore, no changes are recommended. The Reduction in Lead Drinking Water Act does not require changes to the existing system, but it does require that new pipe and appurtenances meet the new lead-free standard.

6.5 CAPACITY

6.5.1 General

In general, capacity of Neah-Kah-Nie's water system infrastructure is adequate for the planning period under typical operating conditions. Capacity, as it pertains to specific elements (supply, distribution, pumping, and storage), is discussed in Section 6.7.

6.5.2 Hydraulic Model

A hydraulic model of the water system was developed primarily to check general capacity and capabilities of the water system. The model was created using EPANET software. Both the software and the manual are available for free on the EPA website (http://www.epa.gov/nmrl/wswrd/dw/epanet.html).

The model includes 88 pipes, 70 nodes, and 6 pressure-reducing valves (PRVs). Main lengths and node elevations were determined or estimated based on District records and mapping. Modelling results are discussed in Section 6.7.3.

6.6 VULNERABILITIES

This section focuses on major vulnerabilities of the water system as a whole; specific deficiencies and consequent, or associated, vulnerabilities are discussed elsewhere as applicable.

6.6.1 Climate Change

Climate change forecasts call for increased winter rains and storms, and hotter, drier summers. In addition, sea level increases of six inches to several feet are forecasted to occur over the next 50 years. Sources vary considerably on the projections based on the models and assumptions utilized. Increased duration and intensity of winter precipitation could result in increased flooding in affected areas and increased slide potential that could impact water system facilities and infrastructure. As a hillside community, Neah-Kah-Nie is largely protected from sea level increases, but some homes near the ocean could be directly affected or affected by enhanced erosion associated with the higher wave action. Of greater concern is the potential for lower spring flows associated with hotter, drier summers.

6.6.2 Slides

Slides and slumps are not uncommon in the area. Avoidance of known problem areas is the obvious solution, but may not be possible based on local service requirements, limited alternatives for infrastructure location, and limited knowledge of the slide potential in any given area. Most of the District's service area is overlain with 50 to 100 feet of landslide deposits; consequently, this is of concern for any critical facilities such as reservoirs. Engineered solutions may be possible, but will require geotechnical evaluations of the sites in question. Slides often occur on a geological timescale; consequently, problems may not occur until well into the constructed life of the infrastructure.

6.6.3 Seismic Risk

As noted in Section 2.2.4, the area could be subject to the full force of a Cascadia subduction zone earthquake. Effects of such a quake were examined in the "Oregon Resilience Plan" prepared by the Oregon Safety Policy Advisory Committee, February 2013. General findings for the Oregon Coast suggest that under current conditions, it

will take three to six months to restore electrical service and one to three years to restore drinking water service. More recent studies in Washington County (near Portland) suggest extensive damage (breaks) would occur in the distribution system and that earthquake mitigation efforts should focus on the water supply.

Heightened awareness, and appreciation of the risks to Oregon water systems, has resulted in Oregon Health Authority (OHA) adding a requirement, OAR 333-061-0060(5)(J), requiring the inclusion of a seismic risk assessment and mitigation plan in new Water Master Plans for communities with over 300 connections, and meeting the rule's location requirements. A Seismic Risk Assessment and Mitigation Plan is included in Appendix J.

Critical facilities are designed to meet seismic code requirements, but no amount of engineering or expense can guarantee service after a large magnitude earthquake.

The District's reservoirs are all older, and with the possible exception of Mountain Tank Reservoir, likely do not meet the current seismic code. As mentioned above, the District's reservoirs are located on top of landslide deposits and may be vulnerable to slides associated with large seismic events.

The District does have a "seismic valve" on the inlet/outlet of the Reservoir Park Reservoir. This is actually a pressure-reducing valve that does not work as originally intended and is not likely to preserve some water in the event of a significant earthquake. In addition, there are three pipe penetrations of the reservoir that could result in losses if shearing or other damage occurs during a severe seismic event.

Tsunami inundation is a concern in the lower elevations in the District. This area currently includes the District's office.

6.6.4 Infrastructure Deficiencies

This is a very broad category with most of the specifics more appropriately discussed elsewhere (Section 6.7). Some general comments are warranted here. Older systems often have elements that are functional, but of an obsolete design and utilized well beyond the intended design life. These elements can be problematic and costly to maintain and may harbor undetectable material deficiencies that could result in unforeseen and catastrophic failures. For Neah-Kah-Nie, this is not a significant concern under typical operating conditions since most of the system has been updated or replaced in the last 20 years. Nevertheless, there are some electrical components (associated with the Reservoir Parkland Pirate Spring facilities) that are corroded and in need of replacement. These are included in the upgrade projects associated with both facilities.

6.6.5 Security

All water systems have susceptibilities to security issues, and these issues are typically addressed in a vulnerability assessment and emergency response plan. System

security has not been evaluated as part of this master plan; the District should review its emergency response plan and update it as appropriate. Proposed new water system facilities typically include basic security elements (fencing, lighting, locks, and alarms). Additional elements can be developed as warranted during the preliminary design phase of project development.

6.6.6 Reliability

Neah-Kah-Nie has significant redundancies and design features that enhance overall system reliability. There are three potential sources: Springs #1, #2, and #3; Pirate Spring; and the emergency intertie with Manzanita). Water can be directed from the lower zone to the upper zone via the pump stations at Hillcrest and Reservoir Park, and water can flow from the upper zone to the lower and middle zones via pressure-reducing valves (PRVs). Additional provisions include directing flow from Spring #1 to Mountain Tank Reservoir, the ability to disinfect at three locations (Hillcrest, Pirate Spring, and Mountain Tank), and the ability to redistribute stored water throughout the system if necessary.

The District is concerned with potential adverse impacts to its spring water quality from potential new development or a potential hazardous material spill on or along Highway 101 – especially in the vicinity of Spring #3, the largest and most important source of water used by the District. Two studies were recently completed that considered these impacts on District water sources.[3] The studies include detailed analyses of the springs and catchments and potential threats. Overall risks were determined by considering the potential severity and probability of occurrence for each threat.

The 2018 study focused on Springs #1, #2, and #3. Recommended mitigation measures included:

1. Expand residential exclusion zones to reduce development impacts within the springs' catchment.
2. Utilize onsite wastewater systems that produce higher quality effluent in areas that cannot connect to the public sewer system. (Note: The analysis and recommendation did not consider potential impacts from contaminants that are likely to be on EPA's list of emerging contaminants such as pharmaceuticals and personal care products).
3. Utilize best management practices (BMPs) and low-impact development (LID) for new development.

[3] Neahkahnie Water District Drinking Water Quality Protection Feasibility Study CwM-H20, LLC, February 2018, and Neahkahnie Water District Drinking Water Quality Protection Feasibility Study: Pirate Spring Addendum, CwM-h20, LLC February 2020.

4. Improve drainage along Highway 101 upstream of Spring #3 to redirect runoff and reduce potential impacts from a hazardous material spill.
5. Provide a storage container nearby to house hazardous materials spill response items for responding to a large spill to be accessed by emergency responders.

The 2020 study focused on Pirate Spring. Recommended mitigation measures included:

1. Public education to remind the community about the susceptibility to contamination and what they can do to help preserve water quality.
2. Host an annual hazardous waste collection day to provide a convenient way to dispose of these materials and reduce the potential for improper disposal that could adversely affect water quality.
3. Periodic inspection of the public sewer system to identify deficiencies that could result in leaks.

The 2018 and 2020 studies also recommended that the District approach DEQ about assigning high quality water (HQW) status to the spring sources. This would prevent infrastructure and land use changes that could adversely impact the springs. The study notes that assignment requires a legislative act, necessitating a significant lobbying effort, and entailing a multi-year effort with a significant risk of failure.

Consistent with OAR 333-061-0060(5)(J), a seismic risk assessment and mitigation plan is included in Appendix J.

6.7 INFRASTRUCTURE

6.7.1 Water Supply

From an infrastructure standpoint, capacity of the water supply system is generally adequate for Neah-Kah-Nie during the planning period. This assumes that Hillcrest is operational. Reduction of unaccounted-for water could add capacity if it were possible to eliminate the losses. This is unlikely given the relatively low rate (15 gpm) and the sandy soils that tend to hide leaks until detected by a leak detection effort. The District will need to diligently pursue leak detection and correction to keep the unaccounted-for water to this level. Hopefully, these efforts will result in overall reductions, but for planning purposes, no reduction in unaccounted-for water is assumed. Pumping capacity of the Pirate Spring pump ranges from approximately 30 gpm to 58 gpm (reported VFD range). The source can be utilized at lower spring flows which can occur in late summer/early fall. The submersible pump cycles on and off according to water levels in the collection tank. It can meet projected year 2040 average daily flows of 50 gpm most of the time, but not the current (2020) maximum daily demand of 97 gpm during much of the summer and fall. Use of Pirate Spring as a backup supply when Hillcrest is offline may require supplementation by diversion of Spring #1 water to feed the upper system via Mountain Tank Reservoir (with disinfection) and/or use of the

Manzanita intertie. Since actual water shortages may be limited under these circumstances to periods of higher weekend or holiday demand, reservoir storage may also provide some buffer. Imposed conservation (curtailment) measures consistent with the District's Water Management and Conservation Plan are also a possibility; however, the District's preference is to supplement from other sources if possible, rather than impose curtailment measures. Given the District's desire for operational redundancy and aversion to using the intertie, consideration could be given to expanding the supply capacity of Pirate Spring by adding a second pump with a variable frequency drive (VFD) and a combined operational range of approximately 50 to 100 gpm.[4]

It should be noted that this is less than the flow available in Pirate Spring during part of the year – and less than the water right. To be useful, though, the pumping system at Pirate Spring needs to be able to match the flow available as that flow recedes during the summer. A second pump with a VFD would allow the Pirate Spring pumping system to match the flow available (from 30-100 gpm).

The existing transmission main is 3-inch diameter and would not need to be replaced (line velocity is 4.5 fps at 100 gpm). However, replacing the 3-inch main with a 4-inch main will reduce the head loss and increase potential contact time for disinfection. The District has installed a casing across Beulah Reed Road for a future 4-inch transmission main upgrade. The addition of a second pump exceeds the recent water rights permit extension's development limitation condition of 0.13 cfs (58.4 gpm). Exceeding the 0.13 cfs limitation is possible if doing so is consistent with an approved Water Management and Conservation Plan for the District.

The District recently (2017) expanded the Pirate Spring building to better accommodate miscellaneous improvements and allow a second pump to be added later. While the upgrade itself may be limited in scope (extra space and a second pump), a more detailed evaluation of the facility may reveal elements of the existing system that should be replaced or modified as part of the project, as well as opportunities for more efficient utilization of the space available. A predesign report is recommended. Estimated cost for the report is $25,000. The predesign report includes surveying, geotechnical work, and preliminary engineering, and covers both the spring and the transmission main improvements. Engineering and construction costs could vary significantly according to the final scope and project. An opinion of probable cost based on a preliminary scope that includes a new transmission main is provided in Table 6-4.

[4] Contact time is 35.8 minutes at 100 gpm; CT is 14.3 mg-minutes/l at 100 gpm and 0.4 mg/l free chlorine residual. Calculated minimum chlorine residual needed is 0.17/l (therefore the OHA required minimum is 0.20 mg/l – since the calculated minimum is less than 0.020 mg/l. This is also the current requirement, so increasing the pumping capacity to 100 gpm does not change the disinfection requirements. The calculation is based on data included in the OHA Disinfection Verification Form completed for the Pirate Spring supply and dated July 8, 2013. At 100 gpm the system has adequate CT.

Table 6-4: Pirate Spring Upgrade – Opinion of Probable Cost

Item	Quantity	Units	Total Cost
Mobilization	1	LS	$10,000
Site Preparation	1	LS	$3,000
300' – 4" HDPE Directional Drill	1	LS	$75,000
Misc. Pipe, Valves, Connections	1	LS	$25,000
New Pump, Electrical, Telemetry, Controls	1	LS	$40,000
Misc. Site Restoration	1	LS	$4,000
Construction Subtotal			$157,000
Contingencies at 20%			$31,000
Preliminary Design			$25,000
Engineering and Construction Observation			$38,000
Legal and Administration at 5%			$8,000
OPC Total			**$259,000**

For the District to utilize the improvements, additional Greenlight water will need to be authorized by OWRD; consequently, the District should wait to conduct the pre-design effort until the Greenlight authorization is obtained. The updated Water Conservation Management Plan in Appendix I includes a request for additional Greenlight water. If the Greenlight water request is granted, the District should proceed with perfecting or partially perfecting the water right permits for Springs #1, #2, and #3, and for Pirate Spring. This will require the District to contract with a certified water rights examiner (CWRD) to prepare the claims of beneficial use (COBU) and the request to OWRD prior to the October 21, 2023, expiration of the current permit extensions. Budget $20,000 for the work involved.

The 2018 Water Quality Protection Study included recommendations for improvements to address the risk of contamination to Spring #3 from a hazardous material spill on Highway 101. Two alternatives were developed: a guardrail and curb ($281,531), and drainage improvements ($24,375). A detailed study of the matter was completed by Akana in July 2017 and included in the appendix of the 2018 study. Costs noted above have not been updated. Of the options noted, the 2018 study recommended the second option, redirecting drainage to the unnamed stream and away from Spring #3. The Akana study is included in Appendix K of this Water Master Plan. An updated opinion of probable cost for the drainage improvements is $30,000. The improvement significantly reduces the risk of contamination from a spill on Highway 101.

6.7.2 Storage

6.7.2.1 Capacity Analysis

Total storage capacity of the existing reservoirs is 291,700 gallons (Table 6-5).

Table 6-5: Existing Reservoir Storage Capacity

Existing Reservoirs	Volume (gallons)
Mountain Tank	155,000
Hillcrest	97,000
Reservoir Park	39,700
Total	**291,700**

For the water system, the recommended storage capacity is three times the average day demand (3xADD) plus fire flow (FF). Recommended FF is 1,000 gpm for one hour (60,000 gallon reserve). Table 6-6 projects storage capacity for the District as a whole. Capacity is adequate throughout the planning period since the 2,000 gallon shortfall in year 2040 is nominal (less than one percent of total capacity).

Table 6-6: Projected District Reservoir Capacity Needs

District Total	Average Day Demand (gpd)	3x ADD (gal)	Reservoir Volume Needed at 3xADD + FF (gal)	Existing Reservoir Volume (gal)	Additional Volume Needed (gal)
District Total 2020	59,000	177,000	237,000	292,000	-55,000
District Total 2025	63,000	189,000	249,000	292,000	-43,000
District Total 2030	68,000	204,000	264,000	292,000	-28,000
District Total 2035	73,000	219,000	279,000	292,000	-13,000
District Total 2040	78,000	234,000	294,000	292,000	2,000

The computations above are for the District as a whole. There are no issues with having adequate storage in any of the service areas (except Mountain Zone which relies on a pump and limited pressure tank storage at each of the two homes) since the upper zone can feed the lower zones in the District via PRVs. The homes have a large auxiliary generator that also powers the pump during power outages.

While storage capacity is adequate for the planning period, there are benefits in having additional storage available. The fire flow determination of 1,000 gpm for one hour for one- and two-family residences smaller than 3,600 square feet is derived from the fire code and consideration of the general capabilities of the 6-inch-diameter

mains that the District has made its standard. Nevertheless, there are parts of the system that can exceed the 1,000 gpm delivery rate and there are homes that exceed the 3,600-square-foot criteria. The code requirement for such homes is 1,500 gpm for two hours (180,000 gallons fire reserve) unless modified in accordance with the code (for example – providing sprinklers). Consequently, having extra capacity available could be beneficial for areas and places with higher fire flow capabilities and needs.[5]

In general, more storage is better if it does not result in water quality problems. Excessive storage capacity can result in loss of adequate chlorine residual and the creation of disinfection byproducts. Neah-Kah-Nie does not appear to have problems with either.

6.7.2.2 Deficiencies and Recommendations

The District recently (May 2015) recoated the upper part of the interior of Hillcrest Reservoir where corrosion was appearing. The reservoir was constructed in 1997, refurbished in 2008, and refurbished in 2015 (blasted and recoated above the water line).

Reservoir Park and Mountain Tank reservoirs are concrete and have needed/received minimal maintenance; structural deficiencies may be present based on the age and lack of information regarding design and seismic standards (if any) that the designs were based on. The District's three reservoirs are all located on landslide deposits so performance and reliability under seismic conditions are concerns.

There is an operational issue with Reservoir Park's water surface elevation being ten feet lower than Hillcrest's. Since they are connected to the same pressure zone, a PRV is needed to reduce pressure from Hillcrest to use all the Hillcrest storage capacity and to match the hydraulic grade line at Reservoir Park. The District would like to eventually eliminate the PRV. This could best be accomplished by constructing a new reservoir at Reservoir Park to replace the existing reservoir. The existing concrete reservoir was constructed in 1989. The District is concerned with the reliability of its older reservoirs and in addressing the operational issues between Reservoir Park and Hillcrest. Construction of a new 100,000-gallon reservoir at Hillcrest and a new 50,000-gallon reservoir at Reservoir Park are recommended. Matching water surface elevations will provide redundancy and facilitates maintenance on one reservoir while the other is online and providing water to the common pressure zone. The new reservoirs would allow the removal of the Hillcrest

[5] To be clear, the code as it applies to particular structures does not extend to the District in terms of requiring the District to provide the level of fire protection that may be needed. In other words, if the District has standardized on 6-inch mains, and 1,000 gpm for one hour at most hydrants, then addressing fire protection requirements beyond that is the property owner's responsibility.

PRV. A seismic valve on the reservoir at the Hillcrest site will help preserve water in the event of a major earthquake. Construction of the new reservoir at Reservoir Park first will facilitate removal and replacement of the existing reservoir at Hillcrest; however, construction of the new Hillcrest reservoir will likely require temporary tankage to provide adequate contact time for disinfection. As an alternative, if Pirate Spring is fitted with a second, redundant pump, the supply could be used instead of the Spring #1, #2, and #3 sources. This would eliminate the need for a temporary tank at Hillcrest provided the construction work occurs when flows in Pirate Spring are adequate.

An opinion of probable cost for a new reservoir at Hillcrest is provided in Table 6-7.

Table 6-7: Hillcrest 100,000 Gallon Reservoir – Opinion of Probable Cost

Item	Quantity	Units	Total Cost
Mobilization	1	LS	$18,000
Site Preparation and Removals	1	LS	$25,000
Reservoir (Nominal 100,000 gallon)	1	EA	$150,000
Foundation	1	LS	$25,000
Misc. Pipe, Valves, Connections	1	LS	$35,000
Electrical, Telemetry, Cathodic Protection	1	LS	$25,000
Misc. Site Restoration	1	LS	$5,000
Construction Subtotal			**$283,000**
Contingencies at 20%			$57,000
Geotechnical			$15,000
Engineering and Construction Observation			$68,000
Legal and Administration @ 5%			$14,000
OPC Total			**$437,000**

An opinion of probable cost for a new reservoir at Reservoir Park is provided in Table 6-8.

Table 6-8: Reservoir Park 50,000 Gallon Reservoir – Opinion of Probable Cost

Item	Quantity	Units	Total Cost
Mobilization	1	LS	$15,000
Site Preparation and Removals	1	LS	$25,000
Reservoir (Nominal 50,000 gallon)	1	EA	$100,000
Foundation	1	LS	$20,000
Misc. Pipe, Valves, Connections	1	LS	$45,000
Electrical, Telemetry, Cathodic Protection	1	LS	$30,000
Misc. Site Restoration	1	LS	$5,000
Construction Subtotal			**$240,000**
Contingencies at 20%			$48,000
Geotechnical			$15,000
Engineering and Construction Observation			$58,000
Legal and Administration @ 5%			$12,000
OPC Total			**$373,000**

Much of the District that lies east of Highway 101 is too high to be served by the existing Mountain Tank Reservoir. A higher-level reservoir may be needed in the future to accommodate development in the area – if it is developed. Most of the affected area is included in a single parcel of 181.8 acres that was acquired by a party interested in developing the area. Zoning is Rural Residential for 70.8 acres with a minimum two-acre lot size (approximately 35 lots). The remainder is zoned for forest use. Actual sizing of the reservoir will depend on the development plans for the area and will require coordination between the District, the District's engineer, and the developer. Preliminary planning work has been completed by the developer; studies and additional work have also been completed by the District to ensure that there are adequate protections for the District's primary water supply sources. This is an issue currently being addressed by the District and it is possible that much, possibly most, of the land will not be developed and, instead, will be utilized for source protection. It is uncertain as to when the matter will be resolved.

The Mountain Tank site should have a geotechnical and seismic evaluation to provide information that could be used to evaluate the site's overall suitability and to help with a structural evaluation of the reservoir and its capabilities under seismic conditions. Depending on the availability and quality of the reservoir's original design plans and specifications, a definitive evaluation of the reservoir may not be possible without additional studies, the cost of which is likely to be prohibitive in relation to the residual value of the reservoir. The study is likely to provide some recommendations

for lower cost structural and operational improvements that would help, but not ensure, resistance to stronger earthquakes. Unless the evaluations suggest otherwise, Mountain Tank does not need to be replaced within the next 20 years.

6.7.3 Distribution

6.7.3.1 General

An assessment of Neah-Kah-Nie's distribution system was developed primarily through map review, review of recent construction and improvements, modelling (see Section 6.5.2), and information from staff. Most of the system has been upgraded and replaced in the last 25 years. The District standardized on 6-inch mains, with smaller mains on relatively short dead-end lines without hydrants (Hydrant #61 is the exception; it is on a 4-inch line). The system is a combination of looped and dead-end lines. The dead-end lines typically occur in areas where topography and existing development make looping impractical or costly.

Modelled results for selected locations in the existing system are indicated in Table 6-9. The model was set up and run with the following parameters:

C = 140 for all pipes (newer PVC)
MDD = 91.5 mgd (approximately 1.5 gpm at most nodes)
Mountain Tank: 598 feet water surface
Hillcrest Reservoir/PRV: 299 feet water surface
Reservoir Park Reservoir: 299 feet water surface

Hydrant flows were simulated at locations that were likely to have less flow available based on a review of the system map. The target flow was 1,000 gpm with a residual pressure greater than 20 psi. If 1,000 gpm was not achievable, then 500 gpm was modelled.

The District has completed all the distribution main replacements identified in the previous Master Plan update. There are no new distribution main improvements specifically identified in this plan; consequently, no "future" model was created.

Table 6-9: Existing Water System Model Runs

Run No.	Node	Location	Zone	Target Fire Flow (gpm)	Residual Pressure (psi)	Limiting Pressure (psi)	Maximum Velocity (fps)
1	30	Hwy 101, 450' East Meadow Loop	Upper	1,000	28.6	45.3	11.7
2	42	End of Beulah Reed Rd, Approx. Hydrant #24	Middle	1,000	3.0	29.9	11.7
3	42	End of Beulah Reed Rd Approx. Hydrant #24	Middle	500	50.7	37.6	6.1
4	54	End of Treasure Rocks Rd. Approx. Hydrant #52	Lower	1,000	47.4	40.7	9.6
5	64	Sixth St and Hillcrest Rd, Approx. Hydrant #30	Lower	1,000	51.9	40.7	9.2
6	77	West end of Dewolf Rd, Hydrant #39	Lower	1,000	26.6	26.4	11.4
7	38	North end of James Rd, Hydrant #68	Lower	1,000	51.9	40.7	11.4

In general, the system can achieve the desired fire flow. The exception is along Beulah Reed Road which includes approximately 2,700 feet of dead-end 6-inch main. This line was identified in the 1994 Plan for an upgrade to 6-inch, which was consistent with the fire flow objective at that time of 750 gpm. The line is relatively new and there is no simple way of creating a loop; therefore, no modifications to achieve the 1,000 gpm criteria are recommended at this time.

Unaccounted-for water losses currently total 40 percent and indicate that the water system may have excessive losses. Since losses exceed 10 percent, the District should plan and budget for leak detection. Follow-up replacement of leak-prone lines should also reduce water losses as well as operation and maintenance (O&M) costs associated with emergency main repairs. An opinion of probable cost for leak detection is $6,000.

Hydrant coverage was evaluated by drawing 500-foot-diameter circles around the hydrants on the system map. Fifteen areas with notable gaps (areas outside the circles) were evaluated in more detail consistent with ISO standards. ISO allows credit for fire flow in excess of 250 gpm for distances up to 1,000 feet. On looped lines, this means that flow from two hydrants can be used to achieve the needed fire flow in the gaps provided that the system can convey the general flow required (in this case 1,000 gpm). Nine of the locations met the criteria, four could be credited with 670 gpm, and two with 250 gpm. New hydrants are recommended for the last two locations: on Beulah Reed Road midway between Hydrant # 21 and Hydrant # 23; and near Reservoir Park off Circle Drive. Budget $17,000 for both hydrants.

6.7.4 Pumping

There are no capacity or deficiency issues noted, except as noted for Pirate Spring in Section 6.7.1.

6.7.5 SCADA, Telemetry, and Data Collection

The District has made notable upgrades since the 2015 Master Plan. These include:

- pH and chlorine residuals and now directly logged with the Supervisory Control and Data Acquisitions (SCADA) system and are viewable on a live stream via Apex (the vendor's HMI software).
- The remote terminal unit (RTU) at Hillcrest has been upsized to accommodate additional data functions.
- A new flowmeter was installed at the Reservoir Park PRV vault, replacing the turbine meter. The new meter is connected to the SCADA system.

The District intends to connect the Spring #1 and Spring #2 magmeters to the SCADA system. District staff have been discussing the project needs and potential approaches with the vendor

Budget $5,000 for the Spring #1 and Spring #2 SCADA improvements..

6.8 WATER SYSTEM MANAGEMENT

6.8.1 Planning

The District's Water Conservation Management Plan (WMCP) was completed in 2015 and is being updated as part of this Water Master Plan. The WMCP will need to be updated every five years consistent with agency requirements. The WMCP was originally prepared in-house. Budget $25,000 if future updates are done by a consultant.

A general recommendation is to update the Water Master Plan every five to ten years, depending on the extent of changes to the community and water system. The next update should be undertaken by year 2030. Budget $50,000 – actual cost may vary according to issues and level of detail desired.

The GIS and system mapping should be updated periodically. It is recommended that the District create a file with summaries of changes, corrections, and additions for use by the consultant when updating the GIS or other mapping.

The District is collecting a considerable amount of flow and other data and has plans to expand data collection further. The District should consider working with a consultant to determine how best to manage and evaluate the data collected.

6.8.2 Asset Management

The District should consider developing an asset management program. Asset management is a proactive approach that estimates when critical upgrades or

replacement of infrastructure are needed based on condition and design life. It allows the utility to plan well in advance of need and, therefore, budget more effectively. It also helps minimize management by crisis or urgent need. Initial efforts can be quite labor intensive, since a detailed inventory that includes each component in the water system must be made along with an evaluation of the asset's condition and remaining life. The EPA has free software (CUPSS) and materials available on its website to assist small communities with asset management.

Periodic leak detection surveys of the water system are recommended as general practice to maintain or possibly reduce overall system water losses. This can also provide data for an asset management program for refining the design life estimates for local conditions, and for prioritizing replacement projects. Many communities have found the costs of leak detection to be largely offset by the savings in cost associated with the otherwise lost water. Leak detection and prompt repair of leaks prior to the lower spring flow during the summer can reduce the potential for reliance on supplemental water from Manzanita.

6.8.3 Operations and Maintenance (O&M)

Most of the recommended capital improvements will not result in increased O&M costs; however, O&M costs are subject to inflationary pressures, so annual increases are typically required. Budgets and water rates are typically adjusted to take recent or anticipated changes into account; however, system deficiencies that have not been addressed can increase O&M costs. This may occur in ways and to an extent not easily foreseen; and may take the form of emergency (overtime) callouts and extra cost, interim measures that may be needed until the problem can be addressed correctly, and unbudgeted emergency projects of potentially significant expense. Over time, such costs can add significantly to the overall utility budget.

From an O&M standpoint, there are additional tasks that the District could and should be doing:

- Valve exercising (once per year on main lines and once every three to four years on other lines)
- Hydrant exercising (once per year) and repairs as needed
- Periodic flushing of dead-end lines

SECTION 7 CAPITAL IMPROVEMENT PLAN (CIP)

7.1 INTRODUCTION

This section focuses on recommended capital improvements. The CIP is not exhaustive and does not include many smaller projects or elements that would be more properly characterized as general O&M.

7.2 OPINIONS OF PROBABLE COST (OPC)

7.2.1 Introduction

Opinions of probable costs (OPCs) developed in the Water Master Plan are preliminary in nature and based on the level and extent of planning and for the year completed. It will be necessary to update costs as specific projects proceed and a more detailed understanding of the issues and opportunities is developed.

For general planning purposes, contingencies, engineering, and administration costs are determined on a percentage-of-construction cost basis (see Sections 7.2.3-7.2.5). This is generally most accurate for larger projects. Smaller projects, undertaken independently, may have additional costs associated with mobilization and/or economics of scale.

7.2.2 Construction Cost

Construction costs in the Plan are based on preliminary layouts and design parameters developed, construction bids for similar work, published cost guides, and the author's experience within the State of Oregon. It is common practice to relate the costs to a specific index that tracks changes in the national economy. A commonly referenced index is the Engineering News Record (ENR) Construction Cost Index (CCI). All costs in this Plan are referenced to the June 1, 2020, ENR Construction Cost Index of 11436. Costs in the Plan can be updated in the future by multiplying the Plan cost by the current index value and dividing by 11436. This approach is generally valid for a two- to three-year period, after which the costs should be updated by an engineer. The ENR CCI has increased approximately 14 percent since the 2015 Master Plan was completed (May 2015 ENR CCI: 10036). Construction bids and consequent costs can vary markedly according to the actual and perceived market and economic trends, level of competition, project size, etc.; this is particularly the case during periods of economic uncertainty or volatility.

Since the Engineer has no control over the cost of labor, materials, equipment, or services furnished by others, or the future contractor's methods for determining prices or competitive bidding, or market conditions, the Engineer's opinion of probable "total project cost and construction cost" provided herein is made on the basis of the Engineer's experience and qualifications and represents the Engineer's best judgment as an experienced and qualified professional engineer familiar with the construction industry as it relates to water system improvements. The Engineer cannot and does not

guarantee that proposals, bids, or actual total project or construction costs will not vary from the opinion of probable costs prepared herein.

7.2.3 Construction Contingencies

The Plan includes a contingency factor of 20 percent of the construction cost to allow for variables associated with the bid and construction process, consistent with the level of planning included.

7.2.4 Engineering, Construction Observation, and Construction Management Costs

The Plan includes a general planning allowance of 20 to 25 percent of the construction cost for engineering, construction observation, and construction management. The higher percentage is typically associated with more complex mechanical and electrical work.

7.2.5 Legal and Administrative Costs

An allowance of 5 percent of the construction costs is included for legal and administration costs.

7.2.6 Other Costs

Other costs may include specialized studies, property or right-of-way acquisition, specific equipment or supplies, fees, and other items that are not part of the specific categories discussed above.

Typically, these other costs are listed individually in the OPC.

7.3 CAPITAL IMPROVEMENTS

Recommended capital improvements are summarized in Table 7-1. Table 7-1 includes (referenced) Section and Figure numbers where projects are described or shown in more detail. The table was created in Microsoft Excel; a copy of the spreadsheet file has been provided to the District. It allows staff to modify the CIP implementation schedule and update costs by entering a current Engineering News Record (ENR) Construction Cost Index. The spreadsheet uses the ratio of the current ENR, and the June 2020 reference ENR, to update costs. All costs in the table are referenced to the June 2020 ENR; annual updates of the CIP costs can facilitate project budgeting, planning, and implementation. The table also allows the work and costs for any project to be allocated to any year or even several years according to main length or percentage of the project to be undertaken.

All projects should include a pre-design element that verifies any critical project requirement or data need such as key elevations, pipe size/material/location, operation characteristics, etc.

7.4 PROJECT PRIORITIZATION

Some projects are noted as high priority in Table 7-1; the high priority designation is based on current condition or current lack of capacity. Ideally, these projects will be addressed as soon as possible, possibly as one large, or several smaller, project(s). Deferral of these projects will result in a lower level of service and, depending on the particular projects, leave the District vulnerable to system failures. Project prioritization should ultimately be reflected in the CIP scheduling.

District staff provided input on project prioritization (primarily for water main improvements) in relative terms of "low, medium, or high" priorities. A more precise assignment to specific years was not provided. There are some current developments and concerns that could affect the scheduling; consequently, a tentative CIP is offered that provides for:

- High Priority Projects (implementation year 2021-2025)
- Medium Priority Projects (implementation year 2026-2030)
- Low Priority Projects (implementation year 2031-2040)

For high priority projects, all projects are entered under year 2022 – though it is understood that implementation will actually occur between 2021 and 2025. The CIP table, as previously noted, is in a spreadsheet format that can be readily updated or modified as needed by the District. The CIP and any subsequent modifications will need to be adopted by the District prior to use for SDC (system development charge) purposes.

7.5 FINANCING AND IMPLEMENTATION

Implementation and financing are discussed in Section 8.

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Table 7.1: Neah-Kah-Nie Water District CIP (All costs in current dollars) | **Reference June 2020 ENR CCI:** 11436 | **Current ENR CCI: (June 2020)** 11436 | **Neah-Kah-Nie Water District Master Plan 2020** | **Miscellaneous Improvements**

Constr. Costs June 2020	Total Costs June 2020	Project Priority	Project Name (Description)	Plan Section # Reference	ENR Ratio	Construction Cost ($)	Total Cost ($)	Implementation (% and Total Cost) 2020 (%)	2020 ($)	2021 (%)	2021 ($)	2022 (%)	2022 ($)	2023 (%)	2023 ($)	2024 (%)	2024 ($)	2025-30 (%)	2025-30 ($)	2031-40 (%)	2031-40 ($)	CIP Totals (%)	CIP Totals Cost ($)
	$20,000	H	**COBU Preparation**	**6.7.1**	1.000	$0	$20,000		$0		$0		$0	100	$20,000		$0		$0		$0	100	$20,000
			Prepare claims of beneficial use for Pirate Spring and Springs #1, #2, and #3.																				
157000	$259,000	H	**Pirate Spring Improvements**	**6.7.1**	1.000	$157,000	$259,000		$0		$0	100	$259,000		$0		$0		$0		$0	100	$259,000
			New pump and misc. improvements including new transmission main.																				
	$30,000	H	**Source Protection**	**6.7.1**	1.000	$0	$30,000		$0		$0	100	$30,000		$0		$0		$0		$0	100	$30,000
			Drainage improvements to protect Spring #3.																				
$283,000	$437,000	H	**New Hillcrest Reservoir**	**6.7.2.2**	1.000	$283,000	$437,000		$0		$0	100	$437,000		$0		$0		$0		$0	100	$437,000
			New 100,000 gallon reservoir.																				
$240,000	$373,000	H	**New Reservoir Park Reservoir**	**6.7.2.2**	1.000	$240,000	$373,000		$0		$0	100	$373,000		$0		$0		$0		$0	100	$373,000
			New 50,000 gallon reservoir.																				
	$17,000	H	**New Hydrants**	**6.7.3**	1.000	$0	$17,000		$0		$0	100	$17,000		$0		$0		$0		$0	100	$17,000
			Add two new hydrants to system (see master Plan section 6.7.3 for details).																				
	$5,000	H	**Flowmeter and SCADA/Telemetry Upgrades**	**6.7.5**	1.000	$0	$5,000		$0		$0	100	$5,000		$0		$0		$0		$0	100	$5,000
			Connect magmeters at Spring #1 and Spring #2 to SCADA.																				
	$6,000	H	**Leak Detection**	**6.7.3**	1.000	$0	$6,000		$0	100	$6,000	100	$6,000	100	$6,000	100	$6,000	500	$30,000	1,000	$60,000	1,900	$114,000
			Leak detection for the entire distribution system.																				
	$15,000	H	**Water Rate Study**	**8.2.3**	1.000	$0	$15,000		$0		$0		$0	100	$15,000		$0		$0		$0	100	$15,000
			Prepare a new water rate study. Budget based on recent estimate from a consultant.																				
	$15,000	H	**System Development Charge Study**	**8.3**	1.000	$0	$15,000		$0		$0		$0	100	$15,000		$0		$0		$0	100	$15,000
			Prepare a new water SDC study and methodology.																				
	$50,000	L	**Water Master Plan Update**	**6.8.1**	1.000	$0	$50,000		$0		$0		$0		$0		$0		$0	100	$50,000	100	$50,000
			Periodic update of Plan. Actual budget should be adjusted as needed to reflect theanticipated level of effort required.																				
	$25,000	M	**Water Management and Conservation Plan**	**6.8.1**	1.000	$0	$25,000		$0		$0		$0		$0		$0	100	$25,000	200	$50,000	300	$75,000
			Periodic update of Plan. Actual budget should be adjusted as needed to reflect the anticipated level of effort required. Budget assumes preparation by a consultant.																				
			CIP Total			**$680,000**	**$1,252,000**		**$0**		**$6,000**		**$1,127,000**		**$56,000**		**$6,000**		**$55,000**		**$160,000**		**$1,410,000**

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SECTION 8 RATES AND FINANCING

8.1 RECENT WATER FUND BUDGETS

The District's Water Operating Fund covers personnel and water system costs and is funded primarily through water user fees (water rates) and property taxes. Recent budgets for the fund are shown in Table 8-1.

Table 8-1: General Fund Budgets

Description	Actual Fiscal Year 2015 – 2016	Actual Fiscal Year 2016 – 2017	Actual Fiscal Year 2017 – 2018	Actual Fiscal Year 2018 - 2019
Resources				
Beginning Total	$28,619	$54,316	$83,126	$83,270
Transfer In	$0	$0	$0	$0
Revenue				
User Fees	$143,450	$142,837	$143,198	$146,951
Property Taxes	$112,629	$115,892	$121,306	$125,945
Other	$543	$3,068	$31,336	$3,102
Revenue Total	$256,622	$261,797	$295,840	$275,998
Resources Total	$285,241	$316,113	$378,966	$359,268
Expenses				
Transfer Out	$40,000	$26,000	$26,100	$0
Expenditures				
Personnel Services	$109,261	$112,277	$123,141	$123,297
Materials & Services	$81,844	$94,530	$146,455	$161,995
Capital Outlay	$0	$0	$0	$0
Expenditures Total	$191,105	$206,807	$269,596	$285,292
Expenses Total	$231,105	$232,807	$295,696	$285,292
Revenue – Expenditures	$65,517	$54,990	$26,144	($9,294)
Resources – Expenses	$54,136	$83,126	$83,270	$73,976

For the four fiscal years shown, "Resources minus Expenses" shows a net increase indicating sufficient resources.

8.1.1 Capital Improvement Fund

The District's Capital Improvement Fund covers capital outlay and debt service for expanding and improving the water system and is funded primarily through system development charges (SDCs) and system enhancement fees. Recent budgets for the fund are shown in Table 8-2.

Table 8-2: Capital Improvement Fund Budgets				
Resources				
Description	**Actual Fiscal Year 2015 – 2016**	**Actual Fiscal Year 2016 – 2017**	**Actual Fiscal Year 2017 – 2018**	**Actual Fiscal Year 2018 - 2019**
Beginning Total	$48,484	$44,099	$49,113	$42,226
Transfers In	$0	$0	$0	$0
Revenue				
Enhancement Fees	$88,509	$87,845	$89,674	$90,984
Other	$7	$7	$6	$7
Revenue Total	$88,156	$87,852	$89,680	$90,991
Resources Total	$137,000	$131,951	$138,793	$133,217
Transfers Out	$0	$0	$0	$0
Expenditures				
Materials and Services	$0	$1,243	$94	$1,945
Personnel Services	$477	$2,181	$897	$1,936
Capital Outlay	$14,396	$28,198	$15,147	$35,629
Debt Service	$82,724	$86,524	$85,125	$72,908
Expenditures Total	$97,597	$118,146	$101,263	$112,418
Expenses Total	$97,597	$118,146	$101,263	$112,418
Revenue – Expenditures	($9,081)	($30,924)	($11,583)	($21,427)
Resources – Expenses	$39,403	$13,805	$37,530	$20,799

The Capital Improvement Fund budget shows that a total beginning balance of $20,799 is available for fiscal Year 2019.

8.1.2 SDC Improvement Fund

The District's SDC Improvement Fund covers future capital expenses for expanding and improving the water system and is funded primarily through transfers from other funds. Recent budgets for the fund are shown in Table 8-3.

Table 8-3: SDC Improvement Fund Budgets				
Description	Actual Fiscal Year 2015 – 2016	Actual Fiscal Year 2016 – 2017	Actual Fiscal Year 2017 – 2018	Actual Fiscal Year 2018 – 2019
Resources				
Beginning Total	$452,395	$495,369	$527,089	$563,672
Transfers In	$40,000	$26,000	$26,100	$0
Revenue				
Investments Earnings	$2,974	$5,720	$10,483	$16,197
Other	$0	$0	$0	$0
Revenue Total	$2,974	$5,720	$10,483	$16,197
Resources Total	$495,369	$527,089	$563,672	$579,869
Expenses				
Transfer Out	$0	$0	$0	$0
Expenses Total	$0	$0	$0	$0
Resources – Expenses	$495,369	$527,089	$563,672	$579,672

The SDC Improvement Fund shows that $579,869 is available at the start of fiscal year 2019.

8.1.3 Adopted 2019-2020 Budget

The District's 2019-2020 budget was adopted on June 12, 2019. A copy of the complete budget is included in Appendix L. (Since completion at this Section 8, actual fiscal year 2020 – 2021 data has become available. Copies of the District's complete audit reports showing actual expenditures, including the most recent, fiscal year 2020, are available on the internet. Query "Oregon Secretary of State Audits Division: Audit Report Search" and complete the request.

8.2 CURRENT WATER RATES

8.2.1 Rate Structure

Neah-Kah-Nie's current (effective July 1, 2006) water rate schedule is included in Appendix M. Rates are based on a base monthly service charge of $25.00. To the base charge is added the water usage rate of $0.00275 per gallon (zero to 20,000 gallons) and $0.0035 per gallon for usage beyond 20,000 gallons. Neah-Kah-Nie is a residential community and the rate structure does not include consideration of other customer classes. Meter reading and billings are bi-monthly.

Billings also include a System Enhancement Fee of $20.00 per month which is added to the base and usage charges.

Funding agencies often evaluate a community's rates based on a monthly single-family residential billing associated with 7,500 gallons of usage; for Neah-Kah-Nie, this billing would be $89.74 ($45.63 for base rate plus usage, $20.00 for System Enhancement Fee, and an average of $24.11 for property taxes).

8.2.2 Revenue

For the fiscal year ending June 30, 2019, major sources of revenue included: $146,951 (rates), $90,984 (System Enhancement Fees), $125,945 (property taxes).

8.2.3 Comments

The General Fund budgets appear healthy with substantial reserves and significant allocations for capital improvements. There does not appear to be an immediate need to raise rates, even though rates have not been adjusted in the last 14 years. Nevertheless, the District should consider retaining a consultant to complete a Rate Study. The rate study can be used to evaluate the benefit and feasibility of the rate structure, modification for conservation, surcharges if the District has to purchase water from Manzanita, and for varying cost according to meter size. Budget $15,000 for planning purposes.

The District has developed a resolution (Resolution 2020-5) that is scheduled to be voted on and adopted in 2021. The resolution provides a $15 per month connection fee (Watershed Protection Fee) for repayment of approximately $1,000,000 debt associated with condemnation of property around Springs #1, #2 and #3. The fee will be in place until June 1, 2041.

8.3 CURRENT SYSTEM DEVELOPMENT CHARGE (SDC)

The District's current Water SDC is $6,429 for a new service. SDCs were last updated on July 1, 2006. SDCs utilize an approved capital improvements plan as the basis for the SDC cost computation. As SDCs are based in part on anticipated project costs, the District should consider revising the SDC after the Water Master Plan has been adopted. Estimated cost for a water SDC update is $15,000.

8.4 O&M CONSIDERATIONS

The recommended capital improvements should not result in increased O&M costs; however, O&M costs are subject to market changes and inflationary pressures, so annual increases are typically required. Budgets and water rates are typically adjusted to take recent or anticipated changes into account; however, system deficiencies that have not been addressed can increase O&M costs in ways and to an extent not easily foreseen. This may take the form of emergency (overtime) callouts and extra costs, interim measures that may be needed until the problem can be addressed correctly, and unbudgeted emergency projects of potentially significant expense. Over time, such costs can add significantly to the overall utility budget.

8.5 CAPITAL IMPROVEMENT FINANCE

8.5.1 Introduction

Major capital improvements are often too expensive to fund exclusively with accumulated reserves. Such projects may be economically financed through programs offered by various State and Federal agencies, or a mix of public and local financing. The following discussion identifies potential sources of that funding.

8.5.2 Public Works Funding Sources

This section includes a brief description of several funding programs that are likely to best meet Neah-Kah-Nie's needs. Additional programs are described in Appendix N which includes an excerpt from the Rural Community Assistance Corporation's (RCAC) most recent edition of "Oregon Water & Wastewater Funding and Resource Guide" last updated in March 2016.

- The Safe Drinking Water Revolving Loan Fund (SDWRLF) is funded by EPA grants and from the (Oregon) Water/Wastewater Financing Program. The program is managed by Oregon Health Authority (OHA); the loans are managed by Infrastructure Finance Authority (IFA), a part of Business Oregon, a state agency. The program provides up to $6,000,000 per project with a 20-year term. The interest rate was 2.2 percent (January 2020 – the rate changes quarterly and is based on 80 percent of the state/local bond interest rate). The application process includes an initial Letter of Interest which is used by the state to rate and rank projects to determine which applicants will be invited to submit complete applications.
- The Water/Wastewater Financing Program (W/WW) is capitalized primarily through Oregon Lottery funds and loan repayments. The program is managed by IFA and the focus is on the design and construction of public works infrastructure to ensure compliance with the Safe Drinking Water Act and the Clean Water Act. The program provides up to $10,000,000 per project with a 25-year term. The interest rate was 2.75 percent (January 2020 – the rate changes quarterly). Grants of up to $750,000 are possible with equivalent matching loans; however, grant eligibility is determined on a case by case basis. The application process includes submittal of a Project Notification and Intake Form (PNIF). Qualified applicants are then invited to submit a complete application.
- The Special Public Works Fund (SPWF) is capitalized primarily through Oregon Lottery funds and loan repayments. The program is managed by IFA and the focus is on infrastructure projects that support economic growth and job creation. The program provides up to $10,000,000 per project with a 25-year term. The interest rate was 2.75 percent (January 2020 – the rate changes quarterly). Grants of up to $500,000 (or 85 percent of project cost, whichever is less) are

possible; however, grants are typically based on up to $5,000 per family wage job created or retained; grant eligibility and extent for the project is determined on a case by case basis. If the project is strictly for capacity building, then no grant is awarded. The application process includes submittal of a Project Notification and Intake Form (PNIF). Qualified applicants are then invited to submit a complete application.

- USDA Rural Development (RD) provides funding through the Water & Waste Disposal Direct Loan and Grant Program, and other programs (see Appendix N for information on other programs). The program provides funding for water and waste projects in communities of up to 10,000 persons with priority given to those communities with less than 5,500 persons. Loan terms are up to 25 years with a recent (June 2020) interest rate of 2.375 percent (rates change quarterly). The 2.375 percent rate is based on the District having a median household income (MHI) greater than 100 percent of the statewide nonmetropolitan MHI of $44,212 (U.S. Department of Agriculture Economic Research Service, 2016). Grants are possible, but are generally lower than the agency guidelines suggest and typically require that a District raise their water rates to the state average for communities undertaking comparable projects; the agency will determine how much grant will be included. Applications for funding must include a preliminary engineering report (PER) – or equivalent – and an environmental report (ER).

It is important to understand that funding programs change over time. Interest rates, fund availability, relative grant participation, and eligibility requirements are common areas of change; consequently, the figures and opportunities presented here may not be applicable at the time of funding application and award.

8.5.3 Local Financing Sources

Commonly used local financing sources include the following:

- General obligation (GO) bonds are backed by the full faith and credit of the issuer who is authorized to levy ad valorem (property) taxes for payment. The issuer can use other revenue for payment if desired. A term of 20 years is typical unless RD purchases the bonds (25-year term for RD funding).
- Revenue bonds are backed by the District's pledge to operate the water system in a manner that will generate sufficient revenue to meet the financial obligations of the bond issue. These are generally paid with water rate revenue.
- Sinking funds basically refer to a process of saving a budgeted amount over a period of time until enough funds have been accrued to undertake the project. This approach is generally viable for lower cost projects or ones with long lead times. It can be a significant tool in asset management where future projects are anticipated based on remaining design lives; however, it may result in significant

near-term rate or fee increases that could be politically challenging to adequately implement for large capital improvement budgets.

- Ad valorem tax or property tax is often used to pay all or part of a GO bond. Property taxes can provide an alternative way of distributing project costs and minimizing financial impacts on homeowners with lower property valuations.
- Water rates are a typical source of monies for debt service on loans from the state and federal funding agencies. Water rates can also be used for sinking funds. Water rate revenue increases with community growth and, as such, may help offset the effects of inflation on O&M costs. The assumption of rate revenue growth, for debt repayment, carries some risk insofar as the projected growth may not occur; it also entails greater attention to water rate increases since the added revenue associated with growth no longer buffers the inflationary costs associated with the annually increasing O&M budget.
- System development charges (SDCs) provide monies for improvements that add capacity to the water system for new growth. SDCs are an important source of financing and in rapidly growing districts, can provide substantial revenues. SDCs may not be adequate for the funding of major projects since they are often used when available and not allowed to accumulate. The assumption of future SDCs for debt service payment carries risk, as the projected growth may not occur.

8.6 CAPITAL IMPROVEMENT RATE IMPACTS

Table 8-4 includes debt service and rate impacts on a per EDU basis for projects funded through the programs identified in Section 8.5.2, plus a computation using a 6.5 percent interest rate. Very large projects may require funding through multiple sources; rate impacts for multiple funding sources are simply added together.

Note: Table 8-4 is for general planning purposes only. Actual interest rates, terms, and availability of funds through any given source may vary and are not locked in until an offer of funding is accepted by the District.

Table 8-4: Debt Service and Rate Impacts (per EDU basis)								
	Annual Debt Service	Monthly Per EDU Rate Increase	Annual Debt Service	Monthly Per EDU Rate Increase	Annual Debt Service	Monthly Per EDU Rate Increase	Annual Debt Service	Monthly Per EDU Rate Increase
Interest Rate:	3.51		2.81		3.51		6.5	
Term (Years):	25		20		25		25	
Reserve (%):	10							
EDUs:		370		370		370		370
Loan Total $								
$100,000	$6,681.39	$1.50	$6,604.05	$1.49	$6,073.99	$1.37	$8,198.15	$1.85
$200,000	$13,362.78	$3.01	$13,208.10	$2.97	$12,147.98	$2.74	$16,396.30	$3.69
$300,000	$20,044.17	$4.51	$19,812.16	$4.46	$18,221.97	$4.10	$24,594.44	$5.54
$400,000	$26,725.56	$6.02	$26,416.21	$5.95	$24,295.96	$5.47	$32,792.59	$7.39
$500,000	$33,406.95	$7.52	$33,020.26	$7.44	$30,369.95	$6.84	$40,990.74	$9.23
$600,000	$40,088.34	$9.03	$39,624.31	$8.92	$36,443.94	$8.21	$49,188.89	$11.08
$700,000	$46,769.73	$10.53	$46,228.37	$10.41	$42,517.93	$9.58	$57,387.04	$12.93
$800,000	$53,451.11	$12.04	$52,832.42	$11.90	$48,591.92	$10.94	$65,585.18	$14.77
$900,000	$60,132.50	$13.54	$59,436.47	$13.39	$54,665.91	$12.31	$73,783.33	$16.62
$1,000,000	$66,813.89	$15.05	$66,040.52	$14.87	$60,739.90	$13.68	$81,981.48	$18.46

8.7 CAPITAL IMPROVEMENT IMPLEMENTATION

Capital improvements can be implemented over the planning period according to the nature of the projects, the relative prioritization of the project, and other financial and practical considerations that the District may have. Because of the relatively high costs, funding agency participation may be needed or desired. If the District decides to pursue agency assistance, then once the District has determined which projects to include, the District should contact IFA to set up a One-Stop Meeting in Salem to discuss potential project funding. Representatives of potential funding agencies attend the meeting and can assist in developing an optimal funding approach.

Neah-Kah-Nie Water District
Water Master Plan Update and Water
Management and Conservation Plan Update
Nehalem, Oregon

Appendix A
Natural Hazards

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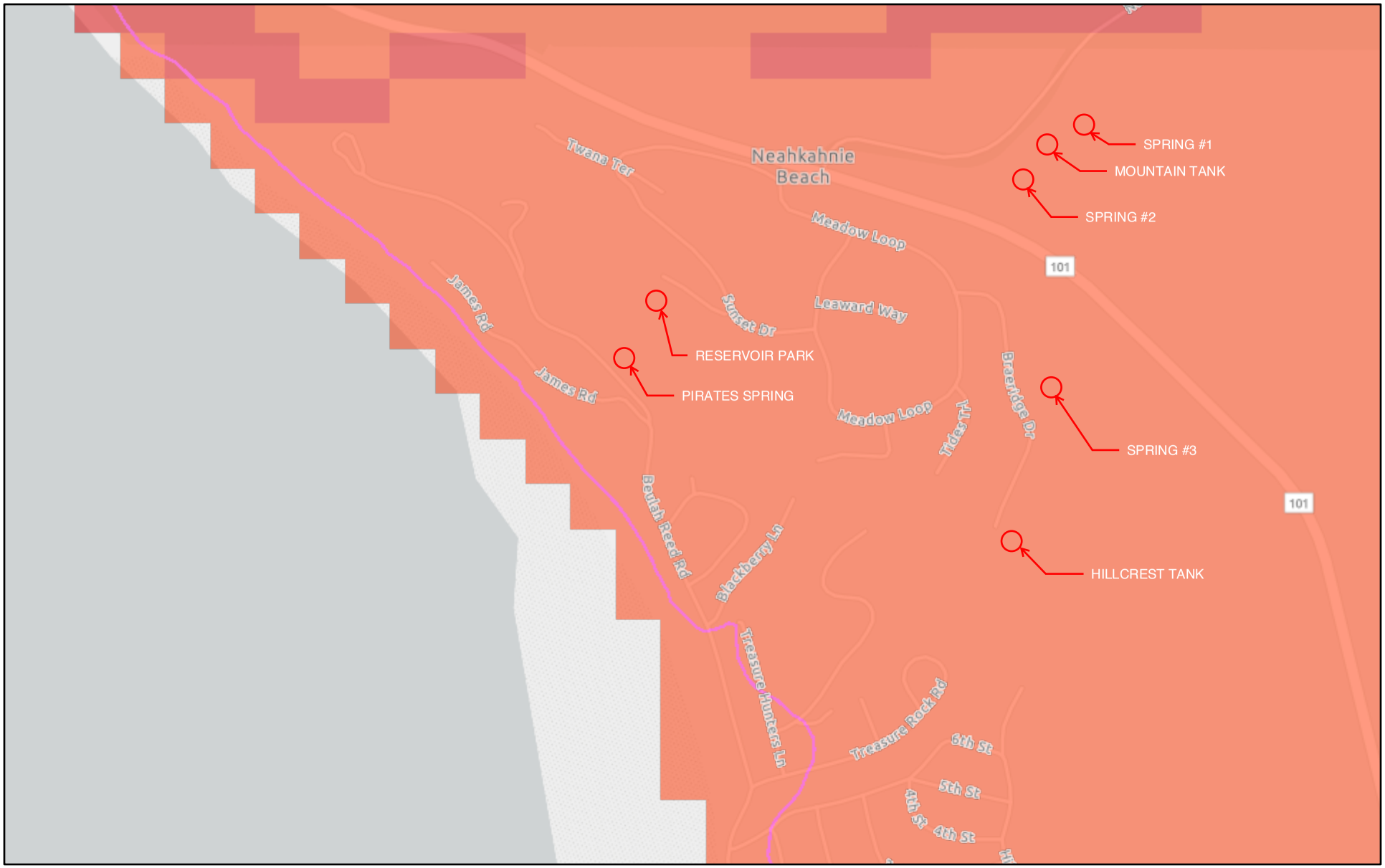
Cascadia Earthquake Hazard



January 3, 2020

Statutory Tsunami Inundation Line

Cascadia Earthquake Expected Shaking

Violent

Severe

Very Strong

Strong

Moderate

Light

1:12,000

0 0.05 0.1 0.2 mi

0 0.1 0.2 0.4 km

Coastal Erosion Hazard

January 3, 2020

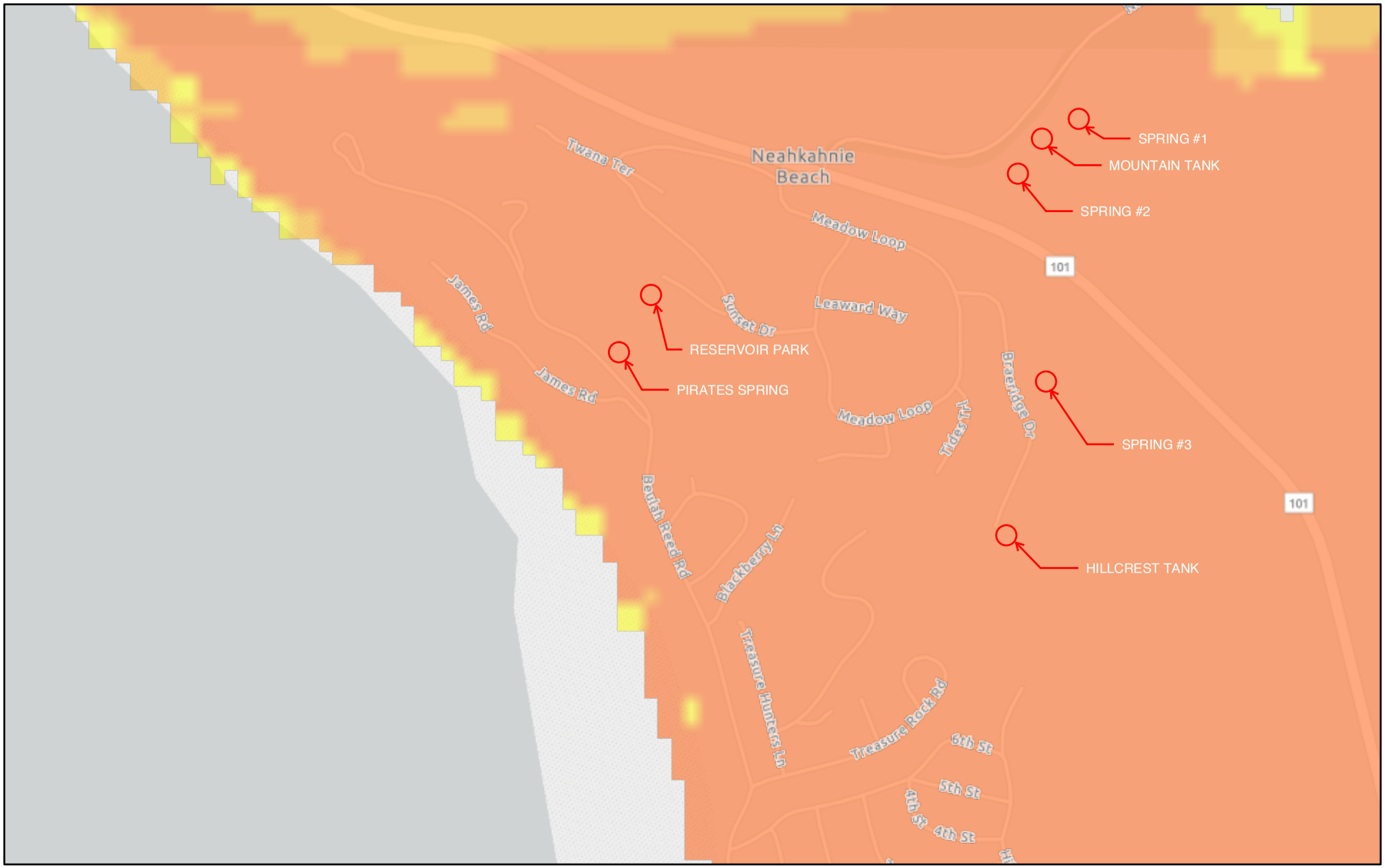
- Very High (Active) Hazard Zone
- High Hazard Zone
- Moderate Hazard Zone
- Low Hazard Zone
- NO DATA

1:12,000

0 0.05 0.1 0.2 mi

0 0.1 0.2 0.4 km

Landslide Hazard



January 3, 2020

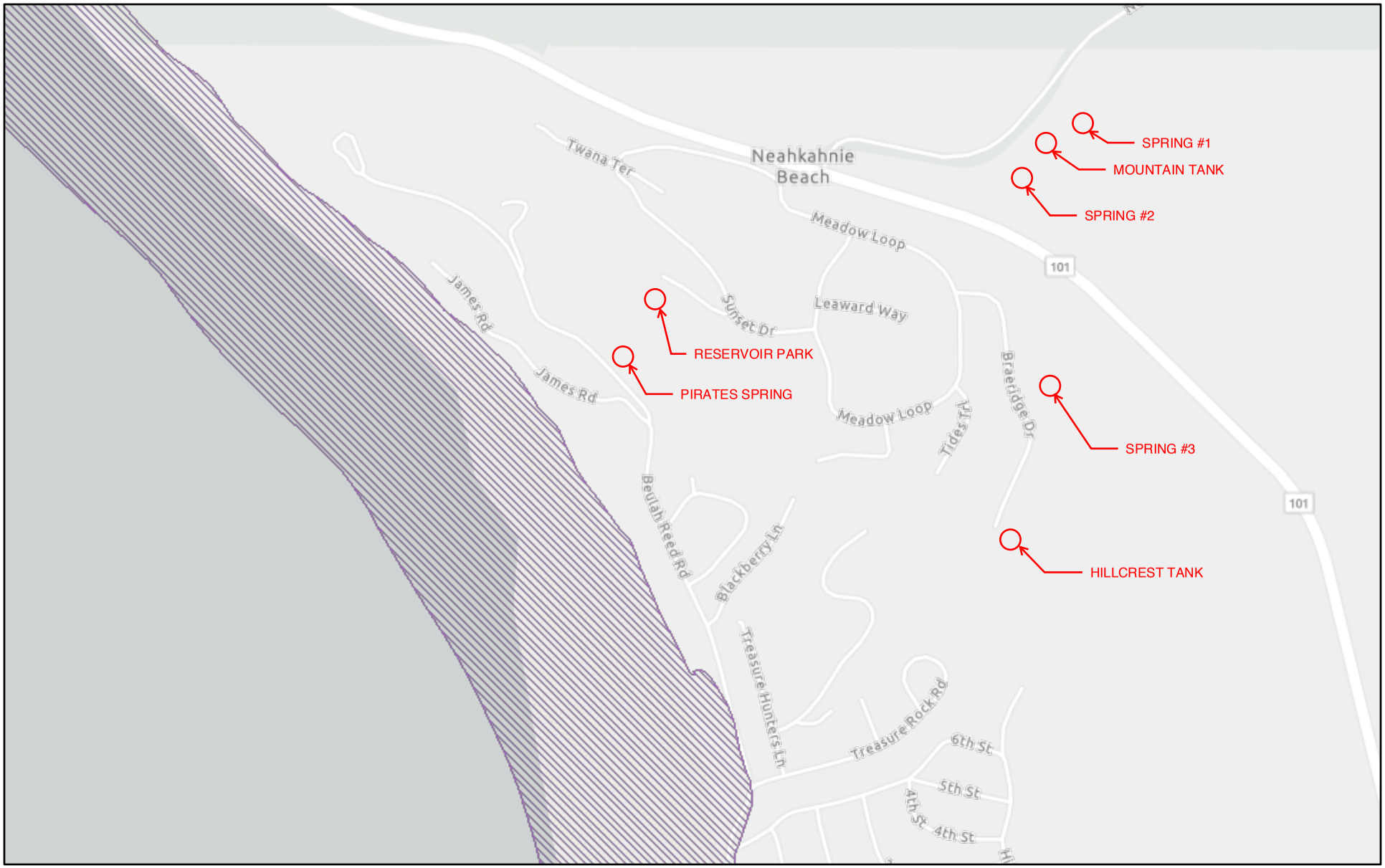
- Low - Landsliding Unlikely
- Moderate - Landsliding Possible
- High - Landsliding Likely
- Very High - Existing Landslide

1:12,000

0 0.05 0.1 0.2 mi

0 0.1 0.2 0.4 km

Flood Hazard



January 3, 2020

Type and Source of Flood Data

- Effective FEMA 100 yr Flood
- Preliminary FEMA 100 yr Flood
- State Digitized Flood Data
- Q3 FEMA Flood Data

1:12,000

0 0.05 0.1 0.2 mi

0 0.1 0.2 0.4 km

Neah-Kah-Nie Water District
Water Master Plan Update and Water
Management and Conservation Plan Update
Nehalem, Oregon

Appendix B
Neah-Kah-Nie Area Zoning Map and Residential Zoning Codes

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3.300 NEAHKAHNIE URBAN RESIDENTIAL ZONE (NK-7.5, NK-15, NK-30)

(1) PURPOSE: The purpose of the NK-7.5, NK-15 and NK-30 zones is to designate area within the Neahkahnie Community Growth Boundary for relatively low-density, single-family, urban area has public sewer and water services. The permitted uses are those that appear most suitable for a coastal community that wished to maintain a primarily single-family residential character. The only differences in the three zoning designations are density provisions for the creation of new lots. These varying densities are designed to be consistent with physical constraints within the Neahkahnie Community.

(2) USES PERMITTED OUTRIGHT: In the NK-7.5, NK-15 and NK-30 zones, the following uses and their accessory uses are permitted outright, subject to all applicable supplementary regulations contained in this ordinance.

(a) Single-family dwellings.

(b) Farm and forest uses.

(c) Public park and recreation areas.

(d) Utility lines.

(e) Utility structures that are less than 120 square feet in size.

(f) Mobile homes or recreational vehicles used for a period of no more than 12 months during the construction of a use for which a building permit has been issued.

(g) Signs, subject to Section 4.020.

(h) Home occupations within a residence or accessory structure which may employ no more than two persons who do not live within the home, provided that there are no external manifestations of a business and that an additional off-street parking site be provided for each non-resident employee.

(3) USES PERMITTED CONDITIONALLY: In the NK-7.5, NK-15 and NK-30 zones, the following uses and their accessory uses are permitted subject to the provisions of Article VI and all applicable supplementary regulations contained in this ordinance.

(a) Planned developments subject to Section 3.080.

(b) Churches and schools.

(c) Nonprofit community meeting buildings and associated facilities.

(d) Utility substations.

(e) Fire station.

(f) Ambulance station.

(g) Sewage collection system appurtenances larger than 120 square feet.

(h) Structures for water supply and treatment that are larger than 120 square feet.

(i) Communication structures that serve more than one residence.

(j) Bed and breakfast facilities within an owner-occupied primary residence which provide for no more than two guest rooms.

(k) Accessory apartment within a residence or accessory structure. Such a unit must be subordinate in size, location and appearance to the primary residence, and shall not be larger than 800 square feet.

(l) Temporary subdivision sales office located within an approved subdivision which shall sell only properties within that subdivision.

(4) STANDARDS: Land divisions in the NK-7.5, NK-15 and NK-30 zones shall conform to the following standards, unless more restrictive supplementary regulations apply:

(a) The minimum size for the creation of new lots or parcels shall be 7,500 square feet in the NK-7.5 zone; 15,000 square feet in the NK-15 zone and 30,000 square feet in the NK-30 zone with the following exceptions:

1. The provisions of the "cluster subdivision" section of the Land Division Ordinance or of the PD Overlay zone in the Land Use Ordinance may be used to concentrate development on a portion of a contiguous ownership except that no lots shall be created that are less than 7,500 square feet.

2. In the Neahkahnie Special Hazard Area, the minimum lot size shall be determined in accord with the requirements of Section 4.130 of the Land Use Ordinance, but such lots shall not be smaller than the minimums provided in the NK-7.5, NK-15 and NK-30 zones.

(b) The minimum lot width shall be 60 feet.

(c) The minimum lot depth shall be 75 feet.

(d) The minimum front yard setback shall be 20 feet.

(e) The minimum side yard setback shall be 5 feet, except on the street side of a corner lot where it shall be 15 feet.

(f) The minimum rear yard shall be 20 feet, except on a street corner lot where it shall be 5 feet.

(g) The maximum building height shall be 17 feet west of the line shown on the zoning maps and 24 feet east of that line. (That line is approximately 500 feet east of the Beach Zone Line.)

(h) Livestock may be located no closer than 100 feet to a residential building on an adjacent lot.

(5) Building Heights within the Neah-Kah-Nie Community Growth Boundary

Within the Neah-Kah-Nie Community Growth Boundary, all buildings within five hundred (500) feet of the State Beach Zone Line shall be limited in height to seventeen (17) feet, and to twenty-four (24) feet otherwise. When the five hundred (500) foot measurement line divides a lot, the entire lot is subject to the seventeen (17) foot limitations. Higher buildings may be permitted only according to the provisions of Article 8.

(6) Special Drainage Enhancement Area Provisions for the South Neahkahnie Area

Section 2.9 of the Goal VII Element of the County Comprehensive Plan identifies a special drainage enhancement area in Neah-Kah-Nie south and east of Nehalem Road at its junction with Beach Street. Section 2.9 of the Goal VII Element also identifies, within the southwest portion of this area, a "potential development area" upon which one dwelling unit may be placed. These areas are further described in the Plan and are identified on the County's Zoning Map. Subject to the following exceptions, development, including fill, will be prohibited within this drainage enhancement area:

(a) Ditching and tiling that improve drainage into or out of the Drainage Enhancement Area shall be permitted.

(b) Activities such as landscaping and gardening, which do not include placement of structures, dikes, levees, or berms, or filling, grading or paving, and which will not restrict drainage into or out of the Drainage Enhancement Area, shall be permitted.

(c) A pond may be created if it can be shown through the flood hazard area development permit process of Section 3.510 of the County's Land Use Ordinance that it will not adversely affect drainage in the area.

(d) One dwelling unit, including necessary fill, shall be permitted within the "potential development area" portion of the Drainage Enhancement Area, providing that the area subject to development for this purpose is contiguous and does not exceed one-half the area of the "potential development areas".

SECTION 3.010: RURAL RESIDENTIAL 2 ACRE AND 10 ACRE ZONE (RR-2) (RR-10)

(1) PURPOSE: The purpose of the RR zone is to provide for the creation and use of small-acreage residential homesites. Land that is suitable for Rural Residential use has limited value for farm or forest use; it is physically capable of having homesites on parcels of five acres or less; and it can be utilized for residential purposes without constraining the use of surrounding resource-zoned properties for resource-production purposes.

(2) USES PERMITTED OUTRIGHT: In the RR zone, the following uses and their accessory uses are permitted outright, subject to all applicable supplementary regulations contained in this Ordinance.

(a) Single-family dwelling.

(b) Mobile or Manufactured Home.

(c) Recreational vehicle used during the construction or placement of a use for which a building or placement permit has been issued.

(d) Home occupations according to the provisions of Section 4.140 of this Ordinance.

(e) Farm uses, including aquaculture.

(f) Forest uses.

(g) Roadside stands for produce grown on the premises.

(h) Signs, subject to Section 4.020.

(i) Electrical distribution lines.

(3) USES PERMITTED CONDITIONALLY: In the RR zone, the following uses and their accessory uses are permitted subject to the provisions of Article 6 and the requirements of all other applicable supplementary regulations contained in this Ordinance.

(a) Planned Developments subject to Section 3.080, or Mixed Use Developments subject to Section 4.130. The number of attached single family dwelling units in a cluster shall be established in the Planned Development approval process and may exceed four units per cluster if it is demonstrated that benefits in protection of natural conditions, better views, or access will be achieved by such clustering. This shall apply only to RR/PD zoned property located within a community growth boundary.

(b) Mobile or manufactured home, in those areas identified in Section 5.160 as being subject to special mobile/manufactured home standards, which do not comply with those standards.

(c) Cottage industries.

(d) Recreational vehicle where not allowed outright by Section 5.130.

(e) A temporary real estate sales office.

(f) Churches and schools.

(g) Accessory structures or accessory uses without an on-site primary structure.

(h) Nonprofit community meeting buildings.

(i) Cemeteries.

(j) Fire or ambulance stations.

(k) Golf courses and associated facilities.

(l) Animal hospital, kennel, or other animal boarding service.

(m) Towers for communications, wind energy conversion systems, or structures having similar impacts.

(n) Public utility facilities, including substations and transmission lines.

(o) Mining, quarrying, and the processing and storage of rock, sand, gravel, peat, or other earth products; on a contiguous ownership of 10 or more acres.

(p) Small-scale primary wood processing facilities, such as a shake mill, chipper, or stud mill, on a contiguous ownership of 10 or more acres.

(q) Rural industries on a contiguous ownership of 10 or more acres.

(r) Foster family homes accommodating six or more children or adults.

(s) Bed and breakfast enterprise.

(t) Temporary placement of a mobile home or recreational vehicle to be used because of health hardship, subject to Section 6.050.

(u) Parks, recreational campgrounds, primitive campgrounds hunting and fishing preserves, and other recreational uses and associated facilities, on a contiguous ownership of 10 or more acres.

(v) Residential care, training, or treatment facility as defined by ORS 443.400; any facility which provides care, training, or treatment for six or more physically, mentally, emotionally, or behaviorally disabled individuals. Facilities that provide for five or less are addressed as ADULT FOSTER HOMES or FOSTER FAMILY HOMES.

(w) Home occupations according to the provisions of Section 4.140 of this Ordinance.

(4) STANDARDS: Land divisions and development in the RR-2 and RR-10 zone shall conform to the following standards, unless more restrictive supplemental regulations apply:

(a) The minimum lot size is two acres for parcels zoned before October 4, 2000.

(b) The minimum parcel/lot size is 10 acres for lots/parcels rezoned Rural Residential on or after October 4, 2000.

(c) Parcels less than two acres in size that were legally established prior to December 18, 2002 may be built upon provided that all other requirements of this Ordinance and other applicable development requirements are met.

(d) Lots in an approved preliminary subdivision plat that is being maintained in an active status as of the date of adoption of this Ordinance may be built upon after approval and recording of the final plat.

(e) The minimum lot width and depth shall both be 100 feet.

(f) The minimum front yard shall be 20 feet.

(g) The minimum side yard shall be 5 feet; on the street side of a corner lot, it shall be no less than 15 feet.

(h) The minimum rear yard shall be 20 feet; on a corner lot, it shall be no less than 5 feet.

(i) The maximum building height shall be 35 feet, except on ocean or bay frontage lots, where it shall be 24 feet. Higher structures may be permitted only according to the provisions of Article 8.

(j) Livestock can be located closer than 100 feet to a nonfarm residential building on an adjacent lot only if one of the following conditions are met:

1. The location of the livestock is a nonconforming use according to the provisions of Article VII of this Ordinance.

2. The property has been taxed at the farm use rate during three of the past five year.

3. The location of the livestock has been reviewed and approved as a conditional use according to the provisions of Article VI of this Ordinance.

(k) No residential structure shall be located within 100 feet of an F-1, F, or SFW-20 zone boundary, unless it can be demonstrated that natural or man-made features will act as an equally effective barrier to conflicts between resource and residential used; or that a residential structure could not otherwise be placed on the property without requiring a variance to the 100 foot requirement. In either case, all yard requirements in this zone shall still apply.

Neah-Kah-Nie Water District
Water Master Plan Update and Water Management and Conservation Plan Update
Nehalem, Oregon

Appendix C
Demographic Data
Source: Oregon Gazetteer
Neah-Kah-Nie Beach, OR, Community Profile July 1, 2020

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Neahkahnie, OR Profile: Facts & Data

Profile ▼ | Maps | Places | Schools | Jobs

Neahkahnie Local Links & Resources: Resources | ALL Neahkahnie Content
Planning to visit Neahkahnie? See Local Hotels

Also See: Neahkahnie, OR ZIP Codes & ZIP Code Maps

Neahkahnie, Oregon - Basic Facts

The Neahkahnie Census Designated Place had a population of 196 as of July 1, 2020. Neahkahnie ranks in the lower quartile for Population Density when compared to the other cities, towns and Census Designated Places (CDPs) in Oregon. See peer rankings below.

The primary coordinate point for Neahkahnie is located at latitude 45.7276 and longitude -123.9376 in Tillamook County. The formal boundaries for the Neahkahnie Census Designated Place encompass a land area of 0.65 sq. miles and a water area of 0 sq. miles. Tillamook County is in the Pacific time zone (GMT -8). The elevation is 52 feet.

Quick & Easy Tools

- Recent Data for Cities, Towns, and ZIP Codes
- Neighborhood Maps, Data, Home Values
- Locate Physical & Cultural Features
- City, Town, and ZIP Code Maps
- COVID-19 Data: Tillamook County | US

The Neahkahnie Census Designated Place (GNIS ID: 2611769) has a U1 Census Class Code which indicates a census designated place with an official federally recognized name. It also has a Functional Status Code of ""

Oregon is one of 20 states where Census County Divisions (CCDs) are used for statistical tracking of subdivisions within each county. The Neahkahnie Census Designated Place is located within Nehalem Division of Tillamook County.

Neahkahnie, OR Data & Demographics (As of July 1, 2020)

POPULATION		HOUSING	
Total Population	196 (100%)	Total HU (Housing Units)	370 (100%)
Population in Households	195 (99.5%)	Owner Occupied HU	78 (21.1%)
Population in Families	138 (70.4%)	Renter Occupied HU	24 (6.5%)

COVID-19 Statistics and D
- COVID-19 Data: Tillamook Coun
- COVID-19 Data: Oregon
- COVID-19 Data: US

Tillamook County
- Data
- Cities
- Map
- ZIP Codes
- Features
- Schools
- Land
- COVID-19 Data

Housing Affordability Index[3]	83

INCOME		HOUSEHOLDS	
Median Household Income	$57,262	Total Households	103
Average Household Income	$80,009	Average Household Size	1.89
% of Income for Mortgage[4]	32%	Family Households	59
Per Capita Income	$42,727	Average Family Size	2
Wealth Index[5]	107		

NOTES

1. **Group Quarters** - a place where people live or stay in a group living arrangement. Includes college residents halls, nursing facilities, military barracks, and correctional facilities.
2. The **Diversity Index** is a scale of 0 to 100 that represents the likelihood that two persons, chosen at random from the same area, belong to different races or ethnic groups. If an area's entire population belongs to one race AND one ethnic group, then the area has zero diversity. An area's diversity index increases to 100 when the population is evenly divided into two or more race/ethnic groups.
3. The **Housing Affordability Index** base is 100 and represents a balance point where a resident with a median household income can normally qualify to purchase a median price home. Values above 100 indicate increased affordability, while values below 100 indicate decreased affordability.
4. The **% of Income for Mortgage** quantifies the percentage of median household income dedicated to mortgage payments on a home priced at the median value (assuming a 30-year mortgage and a 20% down payment).
5. The **Wealth Index** is based on a number of indicators of affluence including average household income and average net worth, but it also includes the value of material possessions and resources. It represents the wealth of the area relative to the national level. Values above or below 100 represent above-average wealth or below-average wealth compared to the national level.

GROWTH RATE / YEAR	2010-2020	2020-2025
Population	0.2%	0.3%
Households	0.19%	0.39%
Families	-1.23%	0.0%
Median Household Income		1.11%
Per Capita Income		1.72%
Owner Occupied HU		0.51%

Neahkahnie, OR - Peer Comparisons by Rank and Percentile

The table below compares Neahkahnie to the other 378 incorporated cities, towns and CDPs in Oregon by rank and percentile using July 1, 2020 data. The location Ranked # 1 has the highest value. A location that ranks higher than 75% of its peers would be in the 75th percentile of the peer group.

Variable Description	Rank	Percentile
Total Population	# 325	14th
Population Density	# 284	25th
Median Household Income	# 171	55th
Housing Affordability Index	# 55	15th
Per Capita Income	# 50	87th
Diversity Index	# 245	35th

Additional comparisons and rankings can be made with a **VERY EASY TO USE** Oregon Census Data Comparison Tool.

- Popularity rankings are based on positive reviews, search queries, and other user data.

Also See: Nearby Hotels | Driving Directions

Use HTL Address Research for a Oregon Address and get...

Boundary Maps, Demographic Data, School Zones

Review maps and data for the ***neighborhood***, city, county, ZIP Code, and school zone. July 1, 2020, data includes ***home values, household income, percentage of homes owned, rented or vacant***, etc.

321 Main Street, City, OR 12345 Search

Quick & Easy Ways to...

1. Get Current Demographic Data for Cities, Towns, and ZIP Codes
2. View Boundary Maps, for Cities, Towns, and ZIP Codes
3. Locate Physical, Cultural, and Historical Features

Oregon Census Data Comparison Tool

Compare Oregon July 1, 2020 Data

Data: Population Population Density Diversity Index Housing Affordability Index Wealth Index

Locations: Cities & Towns Counties ZIP Codes

Highest or Lowest: Show Highest Values Show Lowest Values

Results: Show 20 Results Show 300 Results

Submit

More Tools and Resources:

1. For information about **schools** and **school attendance zones**, use the HTL Address Tool
2. Our new HTL Neighborhood Explorer provides lots of detail about any neighborhood.
3. The new 2-Minute Introduction and Concise Guide to Big Data which will help you make the most effective use of HomeTownLocator Tools.
4. See the References & Data Sources page for more information about methodology and sources of data.
5. See the Oregon COVID-19 Data and US COVID-19 Data for more information on the spread of the novel coronavirus.

Neah-Kah-Nie Water District
Water Master Plan Update and Water
Management and Conservation Plan Update
Nehalem, Oregon

Appendix D
Water Rights Inventory

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Water Right Information Query Results

Contact Information

Current contact information

OWNER:
NEAHKAHNIE WATER CO.
9155 NEHALEM ROAD
NEHALEM, OR 97131

Water Right Information

Status: Non-Cancelled
County: Tillamook
File Folder Location: Salem
Watermaster District: 1

Documents

View all scanned documents

Application: S 12692

Permit: S 10040 document

Certificate: 21423 document , paper map

Certificate
4/30/1929
Springs 1, 2, & 3

- Signature: 8/8/1956
- Type: Original

Order(s)

Order Origin	Volume-Page	Signature	Description
Special	2-1	9/16/1929	DENIES APPLICATION 12873, BEN S & J H LANE & APPROVES APPLICATION 12692, S G REED
Special	2-368	6/28/1934	EXTENSION OF TIME CERTAIN PERMITS - SEE ORDER
Special	2-382	11/19/1934	EXTENSION OF TIME CERTAIN PERMITS - SEE ORDER
Special	2-495	11/20/1935	EXTENSION OF TIME OF CERTAIN PERMITS
Special	4-117	9/25/1941	EXTENSION OF TIME ON CERTAIN PERMITS
Special	4-285	11/20/1942	EXTENSION OF TIME CERTAIN PERMITS
Special	4-437	12/23/1943	EXTENSION OF TIME CERTAIN PERMITS

View right with Web Mapping
View Places of Use from Water Rights in the Same Area
View Reported Water Use

Point(s) of Diversion

POD 1 - SPRING 1 > UNNAMED STREAM

POD 2 - SPRING 2 > UNNAMED STREAM

POD 3 - SPRING 3 > UNNAMED STREAM

Place(s) of Use

Add TRS grouping

Use - DOMESTIC INCLUDING LAWN AND GARDEN (Primary); Priority Date: 4/30/1929

Water Right Genealogy

No genealogy records available for this water right, try the family link below instead.

View Water Rights in same Family

Report Errors with Water Right Data

Return to WRIS Query

Permit A-1—1500—2-56 State Printing 92199

STATE OF OREGON

COUNTY OF TILLAMOOK

CERTIFICATE OF WATER RIGHT

This Is to Certify, *That* NEAH-KAH-NIE WATER COMPANY

of Waldo Bennett, Box 208, Manzanita, *State of* Oregon, *has made proof to the satisfaction of the STATE ENGINEER of Oregon, of a right to the use of the waters of* Three Spring, being 0.01 cfs each from Nos. 1 and 2 and 0.15 cfs from No. 3 *a tributary of* Pacific Ocean *for the purpose of* Domestic, including irrigation of garden for group of houses *under Permit No.* 1004O *of the State Engineer, and that said right to the use of said waters has been perfected in accordance with the laws of Oregon; that the priority of the right hereby confirmed dates from* April 30, 1929;

that the amount of water to which such right is entitled and hereby confirmed, for the purposes aforesaid, is limited to an amount actually beneficially used for said purposes, and shall not exceed 0.17 cubic foot per second

or its equivalent in case of rotation, measured at the point of diversion from the stream. The point of diversion is located in the #1 and 2 - NW¼ NE¼, #3 - SE¼ NW¼, Section 20, Township 3 North, Range 10 West, W. M.

The amount of water used for irrigation, together with the amount secured under any other right existing for the same lands, shall be limited to - - - - - - - *of one cubic foot per second per acre, and shall conform to such reasonable rotation system as may be ordered by the proper state officer.*

A description of the place of use under the right hereby confirmed, and to which such right is appurtenant, is as follows:

Lot #1 - (NE¼ NE¼)
S½ NE¼
Section 19
SW¼ NE¼
SE¼
W½
Section 20
Township 3 North, Range 10 West

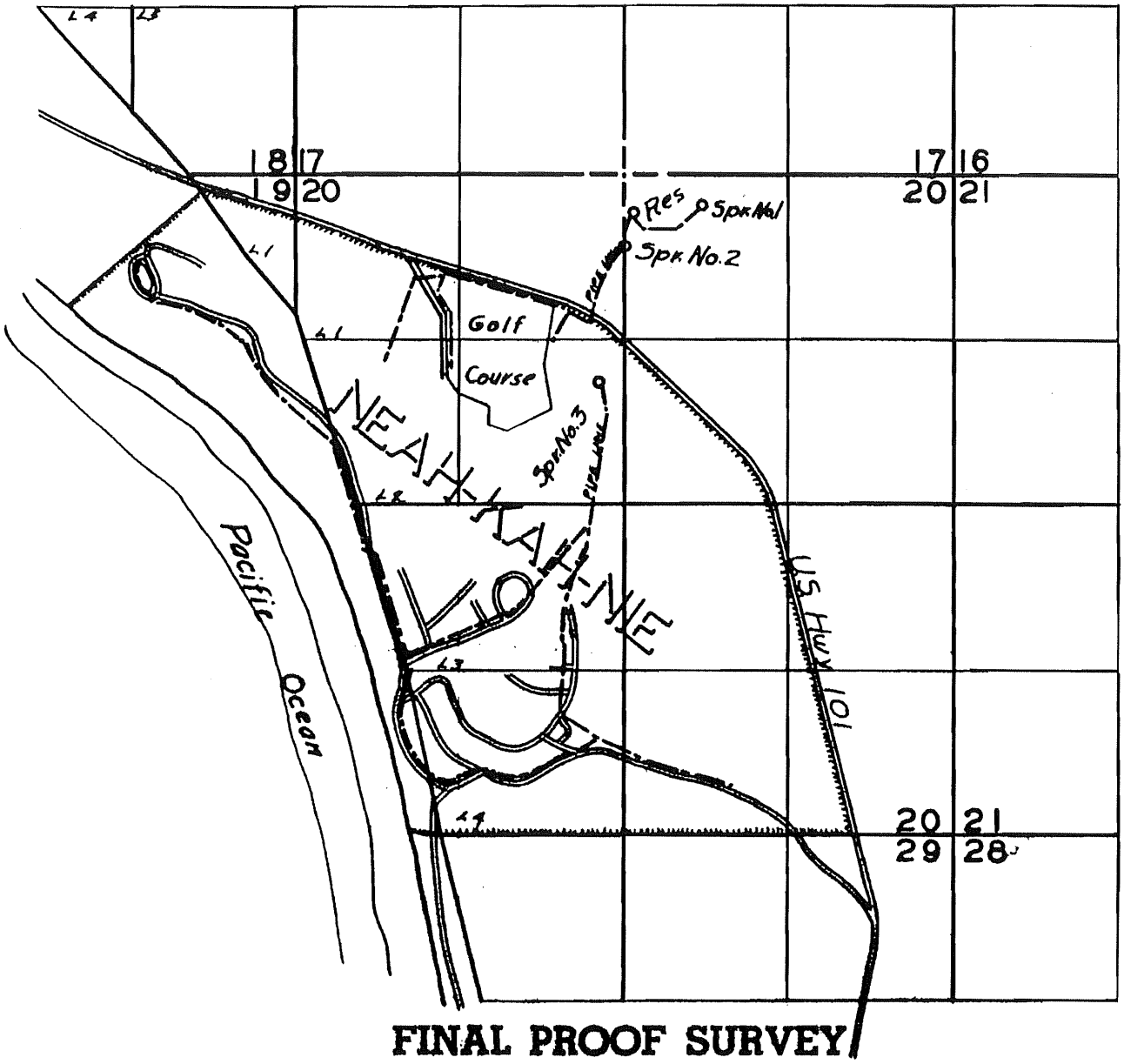
The right to the use of the water for the purposes aforesaid is restricted to the lands or place of use herein described.

WITNESS the signature of the State Engineer, affixed this 8th *day of* August, 56.

LEWIS A. STANLEY
State Engineer

Recorded in State Record of Water Right Certificates, Volume 15, *page* 2123

T3NR10W.W.M.



FINAL PROOF SURVEY

UNDER

Application No. 12602 Permit No. 10040

IN NAME OF

NEAH-KAH-NIE WATER COMPANY

Surveyed 3 August 1955, by [illegible]

FILE COPY

T1-19-Part

10040 (a)

Application No. 12692

Permit No. 10040

PERMIT

TO APPROPRIATE THE PUBLIC WATERS OF THE STATE OF OREGON

Division No. ..... *District No.* .....

This instrument was first received in the office of the State Engineer at Salem, Oregon, on the 30th *day of* April, *192*9, *at* 3:00 *o'clock* P. *M.*

Returned to applicant:

.....

Corrected application received:

.....

Approved:

February 27, 1931.

Recorded in book No. 33 *of Permits on page* 10040

CHAS. E. STRICKLIN
STATE ENGINEER

Drainage Basin 1 Page 1g
Fees Paid $10.00

PERMIT

STATE OF OREGON, } ss.
County of Marion, }

This is to certify that I have examined the foregoing application and do hereby grant the same, subject to the following limitations and conditions:

The right herein granted is limited to the amount of water which can be applied to beneficial use and shall not exceed 0.3 cubic feet per second, or its equivalent in case of rotation with other water users, from Three springs, tributary of Pacific Ocean, 0.075/each from Nos. 1 and 2 and 0.15 from No. 3.

The use to which this water is to be applied is Domestic, including irrigation of garden for group of houses on 220 Lot development and also for stock purposes.

If for irrigation, this appropriation shall be limited to -------- of one cubic foot per second or its equivalent for each acre irrigated and shall be subject to such reasonable rotation system as may be ordered by the proper state officer.

The priority date of this permit is April 30, 1929

Actual construction work shall begin on or before February 27, 1932 and shall thereafter be prosecuted with reasonable diligence and be completed on or before October 1, 1933

Extended to Oct. 1, 1934 Extended to Oct. 1, 1938 Extended to Oct. 1, 1939 Extended to Oct. 1, 1943 Extended to Oct. 1, 1948
Extended to Oct. 1, 1936 Extended to Oct. 1, 1942 Extended to Oct. 1, 1945 Extended to Oct. 1, 1950
Extended to Oct. 1, 1937 Extended to Oct. 1, 1947

Complete application of the water to the proposed use shall be made on or before October 1, 1934

Extended to Oct. 1, 1935 Extended to Oct. 1, 1938 Extended to Oct. 1, 1939 Extended to Oct. 1, 1943 Extended to Oct. 1, 1948
Extended to Oct. 1, 1936 Extended to Oct. 1, 1942 Extended to Oct. 1, 1945 Extended to Oct. 1, 1950
Extended to Oct. 1, 1937 Extended to Oct. 1, 1947

WITNESS my hand this 27th day of February, 1931

CHAS. E. STRICKLIN
STATE ENGINEER.

Permits for power development are subject to the limitation of franchise as provided in section 5728, Oregon Laws, and the payment of annual fees as provided in section 5803, Oregon Laws.

Permit No. 10040

ASSIGNED, Sec. Misc. Rec. Vol. 3, Page 202

ASSIGNED, See Misc. Rec. Vol. 3, Page 826-30

*APPLICATION FOR A PERMIT CERTIFICATE NO. 2423

To Appropriate the Public Waters of the State of Oregon

I, S. G. Reed (Name of applicant)

of Nehalem (Postoffice), County of Tillamook,

State of Oregon, do hereby make application for a permit to appropriate the following described public waters of the State of Oregon, subject to existing rights:

If the applicant is a corporation, give date and place of incorporation .....

1. The source of the proposed appropriation is Three Springs (Name of stream), a tributary of Pacific Ocean

2. The amount of water which the applicant intends to apply to beneficial use is 0.3 cubic feet per second. 0.075 each from Nos. 1 and 2 and 0.15 from No. 3. (If water is to be used from more than one source, give quantity from each)

3. The use to which the water is to be applied is Domestic, including irrigation of (Irrigation, power, mining, manufacturing, domestic supplies, etc.) garden for a group of houses on 220 Lot development and also for stock purposes.

4. The point of diversion is located ..... ft. (N. or S.) and ..... ft. (E. or W.) from the corner of (1) 550' E and 50' N. (Section or subdivision)

(2) 600' S and 100' E. (If preferable, give distance and bearing to Sec. Cor.)

(3) 1500' S and 200' W of the N. quarter corner of Section 20 (If there are more than one points of diversion, each must be described. Use separate sheet if necessary)

being within the (1) SW¼SE¼ (2) NW¼NE¼ (3) SE¼NW¼ (Give smallest legal subdivision) of Sec. 20, Tp. 3 N (No. N. or S.), R. 10 W (No. E. or W.), W. M., in the county of Tillamook.

5. The pipe line (Main ditch, canal or pipe line) to be approx. 5000' of 4" and 5000' of 1½" (No. miles or feet) in length, terminating in the SW¼NW¼, SW¼ and S½ SE¼ (Smallest legal subdivision) of Sec. 20, Tp. 3 N (No. N. or S.), R. 10 W (No. E. or W.), W. M., the proposed location being shown throughout on the accompanying map.

6. The name of the ditch, canal or other works is .....

DESCRIPTION OF WORKS

DIVERSION WORKS—

7. (a) Height of dam None feet, length on top ..... feet, length at bottom ..... feet; material to be used and character of construction ..... (Loose rock, concrete, masonry, rock and brush, timber crib, etc., wasteway over or around dam)

(b) Description of headgate Timber sump at each spring (Timber, concrete, etc., number and size of openings)

* A different form of application is provided where storage works are contemplated. These forms can be secured without charge, together with instructions, by addressing the State Engineer, Salem, Oregon.

CANAL SYSTEM OR PIPE LINE

8. (a) Give dimensions at each point of canal where materially changed in size, stating miles from headgate. At headgate: width on top (at water line) ..... *feet; width on bottom* ..... *feet; depth of water* ..... *feet; grade* ..... *feet fall per one thousand feet.*

(b) At ..... *miles from headgate: width on top (at water line)* ..... *feet; width on bottom* ..... *feet; depth of water* ..... *feet; grade* ..... *feet fall per one thousand feet.*

(c) Length of pipe, main 5000 *ft.; size at intake,* 4" *in.; size at* ..... *ft. from intake* ..... *in.; size at place of use* 4" *in.; difference in elevation between intake and place of use,* 420'in 3000 *ft. Is grade uniform?* ..... *Estimated capacity,* 1.5 ..... *sec. ft.*

FILL IN THE FOLLOWING INFORMATION WHERE THE WATER IS USED FOR IRRIGATION—

9. The land to be irrigated has a total area of ..... *acres, located in each smallest legal subdivision, as follows:* .....

Township	Range	Section	Forty-acre Tract	Number Acres to be Irrigated

(If more space required, attach separate sheet)

(a) Character of soil .....

(b) Kind of crops raised .....

POWER OR MINING PURPOSES—

10. (a) Total amount of power to be developed ..... *theoretical horsepower.*

(b) Quantity of water to be used for power ..... *sec. ft.*

(c) Total fall to be utilized ..... *feet.* (Head)

(d) The nature of the works by means of which the power is to be developed .....

.....

(e) Such works to be located in ..... (Legal subdivision) *of Sec.* ....., *Tp.* ..... (No. N. or S.), *R.* ..... (No. E. or W.), *W. M.*

(f) Is water to be returned to any stream? ..... (Yes or No)

(g) If so, name stream and locate point of return .....

....., *Sec.* ....., *Tp.* ..... (No. N. or S.), *R.* ..... (No E. or W.), *W. M.*

(h) The use to which power is to be applied is .....

.....

(i) The nature of the mines to be served .....

.....

MUNICIPAL SUPPLY—

11. To supply the city of .....

..... *County, having a present population of* .....
(Name of)

and an estimated population of ..... *in 192*.....

(Answer questions 12, 13, 14, and 15 in all cases)

12. Estimated cost of proposed works, $ 5,000

13. Construction work will begin on or before Partly completed

14. Construction work will be completed on or before Two years from date of approval

15. The water will be completely applied to the proposed use on or before Three years

S. G. Reed
(Name of applicant)

Signed in the presence of us as witnesses:

(1) ..... (Name), ... (Address of witness)

(2) ..... (Name), ... (Address of witness)

Remarks: Springs Nos. 1 and 2 are being used at present for stock purposes only and it is intended to make use of them for domestic purposes also at a later date as the development progresses. Pipe line will be extended from Spring No. 3 to Springs Nos. 1 and 2. Spring No. 3 is at present enclosed in a covered spring house.

STATE OF OREGON,
County of Marion, } *ss.*

This is to certify that I have examined the foregoing application, together with the accompanying maps and data, and return the same for

Completion and maps

In order to retain its priority, this application must be returned to the State Engineer, with corrections on or before October 17, *192*9.

WITNESS my hand this 17th *day of* September, *192*9.

RHEA LUPER
STATE ENGINEER

W

Water Right Information Query Results

Contact Information

Current contact information

OWNER:
NEAHKAHNIE WATER DISTRICT
9155 NEHALEM RD
NEHALEM, OR 97131

Water Right Information

Status: Non-Cancelled
County: Tillamook
File Folder Location: Salem
Watermaster District: 1

Documents

View all scanned documents

Application: S 47767

Permit: S 35776 document

Certificate: 80934 document , paper map

Certificate
Spr 1, 2, & 3
12/7/1970

- Signature: 8/25/2004
- Type: Correcting

Order(s)

Order Origin	Volume-Page	Signature	Description
Special	24-74	1/24/1974	EXTENSION OF TIME FOR PERMITS 34032 AND 35776, IN THE NAME OF NEAHKAHNIE

View right with Web Mapping
View Places of Use from Water Rights in the Same Area
View Reported Water Use

Point(s) of Diversion

POD 1 - A SPRING > PACIFIC OCEAN

POD 2 - A SPRING > PACIFIC OCEAN

POD 3 - A SPRING > PACIFIC OCEAN

Place(s) of Use

Add TRS grouping

Use - MUNICIPAL USES (Primary); Priority Date: 12/7/1970

Water Right Genealogy

Cert:57165 OR CN
  Cert:80934 CR *

View Water Rights in same Family

Report Errors with Water Right Data

Return to WRIS Query

STATE OF OREGON

COUNTY OF TILLAMOOK

CERTIFICATE OF WATER RIGHT

THIS CERTIFICATE ISSUED TO

NEAH-KAH-NIE WATER DISTRICT
9155 NEHALEM ROAD
NEHLAEM, OREGON 97131

confirms the right to use the waters of SPRINGS NO.1, 2 AND 3, tributaries of Pacific Ocean, for MUNICIPAL USE.

This right was perfected under Permit 35776. The date of priority is DECEMBER 7, 1970. The amount of water to which this right is entitled is limited to an amount actually beneficially used and shall not exceed 0.17 CUBIC FOOT PER SECOND(CFS); BEING 0.01 CFS FROM SPRING NO. 1, 0.01 CFS FROM SPRING NO. 2 AND 0.15 CFS FROM SPRING NO. 3, or its equivalent in case of rotation, measured at the point of diversion from the source.

The points of diversion are located as follows:

SPRING NO. 1 - NW 1/4 NE 1/4, SECTION 20, TOWNSHIP 3 NORTH, RANGE 10 WEST, W.M.; 200 FEET SOUTH AND 600 FEET EAST FROM THE NORTH 1/4 CORNER OF SECTION 20;

SPRING NO. 2 - NW 1/4 NE 1/4, SECTION 20, TOWNSHIP 3 NORTH, RANGE 10 WEST, W.M.; 550 FEET SOUTH AND 50 FEET EAST FROM THE NORTH 1/4 CORNER OF SECTION 20; AND

SPRING NO. 3 - SE 1/4 NW 1/4, SECTION 20, TOWNSHIP 3 NORTH, RANGE 10 WEST, W.M.; 1650 FEET SOUTH AND 200 FEET WEST FROM THE NORTH 1/4 CORNER OF SECTION 20.

The use shall conform to such reasonable rotation system as may be ordered by the proper state officer.

A description of the place of use to which this right is appurtenant is as follows:

LOT 1 (NE 1/4 NE 1/4)
S 1/2 NE 1/4
SECTION 19
TOWNSHIP 3 NORTH, RANGE 10 WEST, W.M.

This is a final order in other than contested case. This order is subject to judicial review under ORS 183.484. Any petition for judicial review of the order must be filed within the 60 days of the date of service.

SW 1/4 NE 1/4
NE 1/4 NW 1/4
LOT 1 (NW 1/4 NW 1/4)
LOT 2 (SW 1/4 NW 1/4)
SE 1/4 NW 1/4
LOT 3 (NE 1/4 SW 1/4)
LOT 3 (NW 1/4 SW 1/4)
LOT 4 (SW 1/4 SW 1/4)
LOT 4 (SE 1/4 SW 1/4)
SE 1/4
SECTION 20
TOWNSHIP 3 NORTH, RANGE 10 WEST, W.M.

The right to the use of the water for the above purpose is restricted to beneficial use on the lands or place of use described. The use confirmed herein may be made only at times when sufficient water is available to satisfy all prior rights, including rights for maintaining instream flows.

THIS CERTIFICATE IS ISSUED TO CORRECTLY DESCRIBE THE TRIBUTARY AND SUPERSEDES CERTIFICATE 57165, STATE RECORD OF WATER RIGHTS CERTIFICATES.

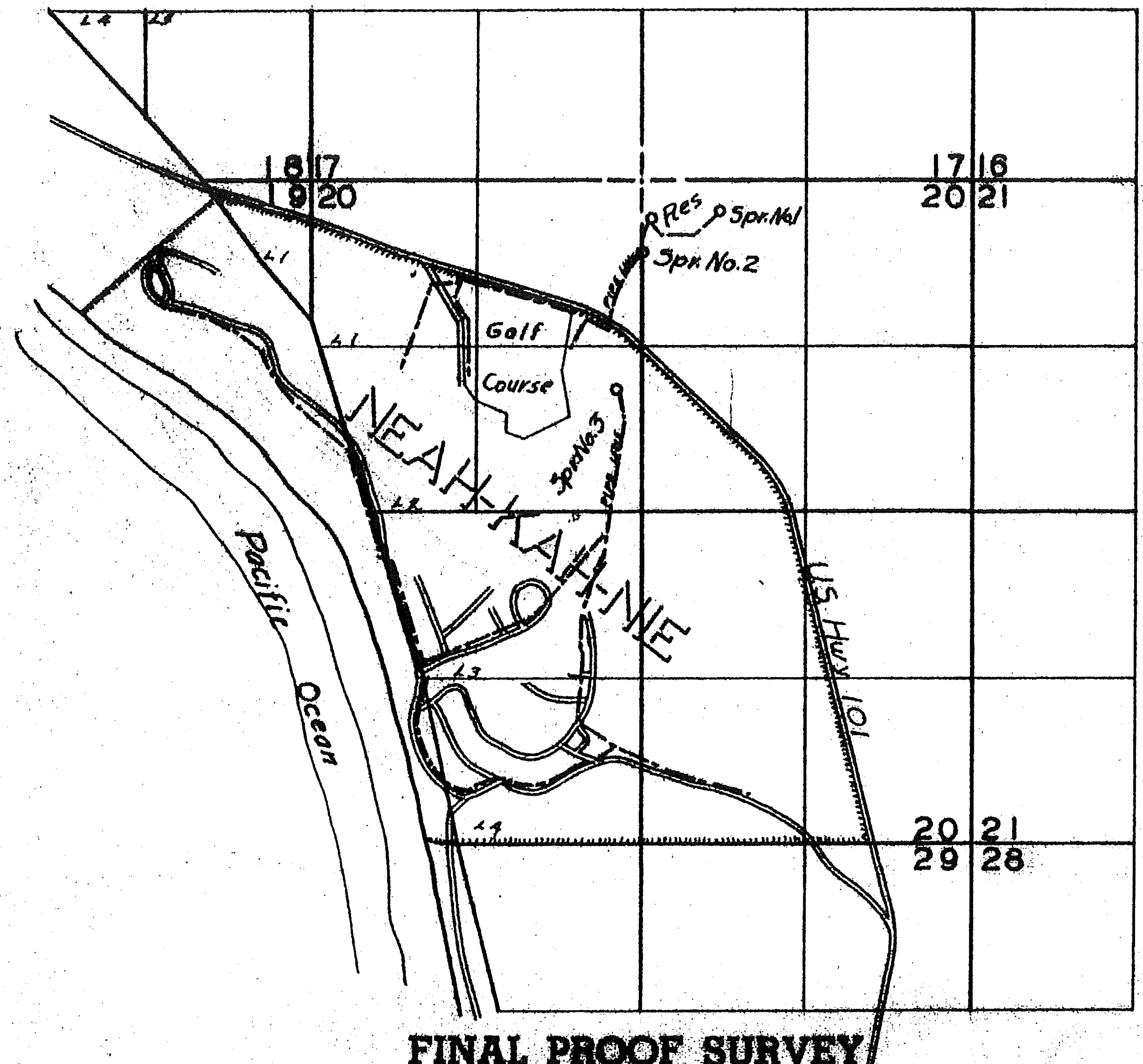
Issued August 25, 2004.

Phillip C. Ward, Acting Director
Water Resources Department

Recorded in State Record of Water Right Certificates Number 80934.

47767COR.SB

T3NR10W.W.M.



FINAL PROOF SURVEY

UNDER

Application No. 47767 / 12602... Permit No. 35776 / 10040

IN NAME OF

NEAH-KAH-NIE WATER COMPANY

Surveyed August 1965, by [signature]

MAY 21, 1984

41057-100-7

PERMIT

STATE OF OREGON,)
County of Marion,) ss.

This is to certify that I have examined the foregoing application and do hereby grant the same, SUBJECT TO EXISTING RIGHTS and the following limitations and conditions:

The right herein granted is limited to the amount of water which can be applied to beneficial use and shall not exceed 0.17 *cubic feet per second measured at the point of diversion from the stream, or its equivalent in case of rotation with other water users, from* three springs being 0.01 cfs from Spring No. 1 and 0.01 cfs from Spring No. 2 and 0.15 cfs from Spring No. 3

The use to which this water is to be applied is municipal use

If for irrigation, this appropriation shall be limited to ..... *of one cubic foot per second or its equivalent for each acre irrigated* .....

and shall be subject to such reasonable rotation system as may be ordered by the proper state officer.

The priority date of this permit is December 7, 1970

Actual construction work shall begin on or before March 30, 1973 *and shall thereafter be prosecuted with reasonable diligence and be completed on or before October 1, 19*73 Extended to Oct. 1 1974 Extended to Oct. 1979

*Complete application of the water to the proposed use shall be made on or before October 1, 19*74. Extended to Oct. 1979

WITNESS my hand this 30th *day of* March, *19* 72

Chris L. Wheeler
STATE ENGINEER

Application No. 47267
Permit No. 35776

PERMIT
TO APPROPRIATE THE PUBLIC WATERS OF THE STATE OF OREGON

This instrument was first received in the office of the State Engineer at Salem, Oregon, on the 7th *day of* December, *19*70, *at* 1:00 *o'clock* P *M.*

Returned to applicant: —

Approved:
March 30, 1972

Recorded in book No. ..... *of Permits on page* 35776

CHRIS L. WHEELER
STATE ENGINEER

Drainage Basin No. 4 *page* 65
Fees $25.00

State Printing 98137

RECEIVED
OCT 30 1970
STATE ENGINEER
SALEM, OREGON

RECEIVED
DEC 7 1970
STATE ENGINEER
SALEM, OREGON

Permit No. 35776

*APPLICATION FOR PERMIT

To Appropriate the Public Waters of the State of Oregon

"CERTIFICATE NO. 57165"

I, NEAH-KAH-NIE WATER DISTRICT
(Name of applicant)

of P.O. Box 172 Manzanita, Oregon 97130
(Mailing address),

State of Oregon, do hereby make application for a permit to appropriate the following described public waters of the State of Oregon, SUBJECT TO EXISTING RIGHTS:

If the applicant is a corporation, give date and place of incorporation 24 Sept. 1965 Tillamook County, Oregon

1. The source of the proposed appropriation is three unnamed springs, designated Nos. 1, 2, and 3 (Name of stream), a tributary of Pacific Ocean

2. The amount of water which the applicant intends to apply to beneficial use is 0.17 cfs cubic feet per second. being 0.01 cfs each from Nos. 1 & 2 and 0.15 cfs from No.3
(If water is to be used from more than one source, give quantity from each)

**3. The use to which the water is to be applied is ~~domestic use~~ MUNICIPAL
(Irrigation, power, mining, manufacturing, domestic supplies, etc.)

4. The point of diversion is located ..... ft. (N. or S.) and ..... ft. (E. or W.) from the corner of # 1 & 2 - NW¼ NE¼, #3 - SE¼ NW¼, Sec. 20, Township 3 N, Range 10 W, WM
(Section or subdivision)

Spring #1 600 ft. East & 200 ft. South of NE. Corner of NW ¼ of Sec. 20 T3N R10W
Spring #2 550 ft. South & 50 ft. East of NE Corner of NW ¼ of Sec. 20 T3N R10W
Spring #3 165 ft. South & 200 ft. West of NE Corner of NW ¼ of Sec. 20 T3N R10W
(If preferable, give distance and bearing to section corner)

(If there is more than one point of diversion, each must be described. Use separate sheet if necessary)

being within the ~~SWxxNE~~ W½ (Give smallest legal subdivision) of Sec. 20, Tp. 3N (N. or S.), R. 10 W (E. or W.), W. M., in the county of Tillamook.

5. The ..... (Main ditch, canal or pipe line) to be ..... (Miles or feet) in length, terminating in the ..... (Smallest legal subdivision) of Sec. ....., Tp. ..... (N. or S.), R. ..... (E. or W.), W. M., the proposed location being shown throughout on the accompanying map.

DESCRIPTION OF WORKS

Diversion Works—

6. (a) Height of dam ..... feet, length on top ..... feet, length at bottom ..... feet, material to be used and character of construction ..... (Loose rock, concrete, masonry, rock and brush, timber crib, etc., wasteway over or around dam)

(b) Description of headgate ..... (Timber, concrete, etc., number and size of openings)

(c) If water is to be pumped give general description ..... (Size and type of pump)

..... (Size and type of engine or motor to be used, total head water is to be lifted, etc.)

*A different form of application is provided where storage works are contemplated.

**Application for permits to appropriate water for the generation of electricity, with the exception of municipalities, must be made to the Hydroelectric Commission. Either of the above forms may be secured, without cost, together with instructions by addressing the State Engineer, Salem, Oregon.

Canal System or Pipe Line—

35776

7. (a) Give dimensions at each point of canal where materially changed in size, stating miles from headgate. At headgate: width on top (at water line) ..... feet; width on bottom ..... feet; depth of water ..... feet; grade ..... feet fall per one thousand feet.

(b) At ..... miles from headgate: width on top (at water line) ..... feet; width on bottom ..... feet; depth of water ..... feet; grade ..... feet fall per one thousand feet.

(c) Length of pipe, ... ft.; size at intake, ... in.; size at ..... ft. from intake ..... in.; size at place of use ..... in.; difference in elevation between intake and place of use, ... ft. Is grade uniform? ..... Estimated capacity, ... sec. ft.

8. Location of area to be irrigated, or place of use Meadowdale Water District

Township North or South	Range E. or W. of Willamette Meridian	Section	Forty-acre Tract	Number Acres To Be Irrigated
T 3 N	10 WWM	20	NW¼ & NE¼ NW¼ & SE¼	—
T 3 N	10 W	20	SW¼ & SE¼ NE¼ & SW¼	
T 3 N	10 W	20	SE¼ & SW¼ NW¼ & SW¼	
T 3 N	10 W	20	SW¼ & SW¼ SE¼ & NW¼	
T 3 N	10 W	20	NE¼ & NW¼ SW¼ & NW¼	
T 3 N	10 W	20	NW¼ & NW¼ SW¼ & NW¼	
T 3 N	10 W	19	NE¼ & NE¼	
T 3 N	10 W	19	SE¼ & NE¼	
T 3 N	10 W	19	NW¼ & NE¼	

(If more space required, attach separate sheet)

(a) Character of soil .....

(b) Kind of crops raised .....

Power or Mining Purposes—

9. (a) Total amount of power to be developed ..... theoretical horsepower.

(b) Quantity of water to be used for power ..... sec. ft.

(c) Total fall to be utilized ..... (Head) feet.

(d) The nature of the works by means of which the power is to be developed .....

.....

(e) Such works to be located in ..... (Legal subdivision) of Sec. ....., Tp. ..... (No. N. or S.), R. ..... (No. E. or W.), W. M.

(f) Is water to be returned to any stream? ..... (Yes or No)

(g) If so, name stream and locate point of return .....

....., Sec. ....., Tp. ..... (No. N. or S.), R. ..... (No. E. or W.), W. M.

(h) The use to which power is to be applied is .....

(i) The nature of the mines to be served .....

Municipal or Domestic Supply—

35776

10. (a) To supply the city of Neah-kah-nie

Tillamook (Name of) County, having a present population of 160 homes

and an estimated population of 275 homes in 1976

(b) If for domestic use state number of families to be supplied 160

(Answer questions 11, 12, 13, and 14 in all cases)

11. Estimated cost of proposed works, $ See Remarks

12. Construction work will begin on or before " "

13. Construction work will be completed on or before " "

14. The water will be completely applied to the proposed use on or before See Remarks

Neah-kah-nie Water District

S. L. Hickox Secretary

(Signature of applicant)

Remarks: This application is solely for the purpose of enlarging the use of water granted by Permit No. 10040 to the Neah-kah-nie Water Company. That company was purchased by the Neah-kah-nie Water District and the use of water from these springs is identical with the use shown in all papers filed with that permit excepting for the increase in the number of users being supplied with water. There are no population figures available for Neah-kah-nie, which is not an incorporated community and which has a large percentage of vacation-type homes.

Questions 11- 12- 13- 14 do not apply in this case.

STATE OF OREGON, } ss.
County of Marion, }

This is to certify that I have examined the foregoing application, together with the accompanying maps and data, and return the same for completion and correction

In order to retain its priority, this application must be returned to the State Engineer, with corrections on or before February 16th, 19 71.

WITNESS my hand this 16th day of December, 19 70.

RECEIVED
JAN 27 1971
STATE ENGINEER
SALEM, OREGON

CHRIS L. WHEELER
STATE ENGINEER

By Larry W. Jebousek
ASSISTANT

Water Right Information Query Results

Contact Information

Current contact information

OWNER:
NEAHKAHNIE WATER DISTRICT
9155 NEHALEM ROAD
NEHALEM, OR 97131

Documents

View all scanned documents

Application: S 72306

Permit: S 51578 document

Signature: 1/13/1995

Permit Workflow

Action	Date	Result	Completed By
Permit Issued	1/13/1995		
Completion Date [C Date]	10/1/1998		
Extension Received	8/12/1999		ANN REECE
Extension Comment Period Ends	4/8/2003		ANN REECE
Extension PFO 315 Issued	8/26/2014	Propose to Approve	ANN REECE
Extension PFO Protest Period Ends	10/10/2014	Propose to Approve	ANN REECE

View right with Web Mapping

View Places of Use from Water Rights in the Same Area

View Reported Water Use

Water Right Information

Status: Non-Cancelled

County: Tillamook

File Folder Location: Salem

Watermaster District: 1

Permit Springs 1, 2, & 3 4/7/1992

Point(s) of Diversion

POD 1 - SPRING 1 > PACIFIC OCEAN

POD 2 - SPRING 2 > PACIFIC OCEAN

POD 3 - SPRING 3 > PACIFIC OCEAN

Place(s) of Use

Add TRS grouping

Use - MUNICIPAL USES (Primary); Priority Date: 4/7/1992

Water Right Genealogy

No genealogy records available for this water right, try the family link below instead.

View Water Rights in same Family

Report Errors with Water Right Data

Return to WRIS Query

STATE OF OREGON

COUNTY OF TILLAMOOK

PERMIT TO APPROPRIATE THE PUBLIC WATERS

THIS PERMIT IS HEREBY ISSUED TO

NEAHKAHNIE WATER DISTRICT
P.O. BOX 172 503-368-6794
MANZANITA, OREGON 97130

to use the waters of THREE SPRINGS, tributaries of NEHALEM BAY, for MUNICIPAL USE.

This permit is issued approving Application 72306. The date of priority is APRIL 7, 1992. The use is limited to not more than 0.32 CUBIC FOOT PER SECOND (CFS), BEING 0.06 CFS FROM SPRINGS 1 & 2 AND 0.20 CFS FROM SPRING 3, or its equivalent in case of rotation, measured at the point of diversion from the source.

The points of diversion are located as follows:

NW 1/4 NE 1/4, SE 1/4 NW 1/4, SECTION 20, T 3 N, R 10 W, W.M.; SPRING 1 - 200 FEET SOUTH AND 600 FEET EAST, SPRING 2 - 550 FEET SOUTH AND 50 FEET EAST, SPRING 3 - 1650 FEET SOUTH AND 200 FEET WEST, ALL FROM N 1/4 CORNER, SECTION 20.

The use shall conform to such reasonable rotation system as may be ordered by the proper state officer.

A description of the proposed place of use under this permit is as follows:

NE 1/4 NE 1/4
S 1/2 NE 1/4
SECTION 19
SW 1/4 NE 1/4
NW 1/4
SW 1/4
SE 1/4
SECTION 20
TOWNSHIP 3 NORTH, RANGE 10 WEST, W.M.

Measurement, recording and reporting conditions:

A. Before water use may begin under this permit, the permittee shall install a meter or other suitable measuring device as approved by the Director. The permittee shall maintain the meter or measuring device in good working order.

B. The permittee shall allow the watermaster access to the meter or measuring device; provided however, where the meter or measuring device is located within a private structure, the watermaster shall request access upon reasonable notice.

C. The Director may require the permittee to keep and maintain a record of the amount (volume) of water used and may require the permittee to report water use on a periodic schedule as established by the Director. In addition, the Director may require the permittee to report general water use information, the periods of water use and the place and nature of use of water under the permit. The Director may provide an opportunity for the permittee to submit alternative reporting procedures for review and approval.

Within one year of permit issuance, the district shall submit a conservation management plan consistent with Oregon Administrative Rule 690-86.

Actual construction work shall begin on or before JANUARY 13, 1996 and shall be completed on or before October 1, 1997. Complete application of the water to the use shall be made on or before October 1, 1998.

Failure to comply with any of the provisions of this permit may result in action including, but not limited to, restrictions on the use, civil penalties, or cancellation of the permit.

This permit is for the beneficial use of water without waste. The water user is advised that new regulations may require the use of best practical technologies or conservation practices to achieve this end.

By law, the land use associated with this water use must be in compliance with statewide land-use goals and any local acknowledged land-use plan.

The use of water allowed herein may be made only at times when sufficient water is available to satisfy all prior rights, including rights for maintaining instream flows.

The Director of the Water Resources Department has found that the proposed use of water described by this permit, as conditioned, will not impair or be detrimental to the public interest.

Issued this date, January 13, 1995.

/s/ MARTHA O. PAGEL

Water Resources Department
Martha O. Pagel
Director

Water Right Information Query Results

Contact Information

Current contact information

OWNER:
NEAHKAHNIE WATER DISTRICT
9155 NEHALEM ROAD
NEHALEM, OR 97131

Water Right Information

Status: Non-Cancelled
County: Tillamook
File Folder Location: Salem
Watermaster District: 1

Documents

View all scanned documents

Application: S 45629

Permit: S 34032 document

Signature: 6/20/1969

Permit Workflow			
Action	Date	Result	Completed By
Permit Issued	6/20/1969		
Completion Date [C Date]	10/1/1998		
Extension Received	8/12/1999		ANN REECE
Extension Comment Period Ends	4/8/2003		ANN REECE
Extension PFO 315 Issued	8/26/2014	Propose to Approve	ANN REECE
Extension PFO Protest Period Ends	10/10/2014	Propose to Approve	ANN REECE

Pirate Spring 12/9/1968

Order(s)

Order Origin	Volume-Page	Signature	Description
Special	21-245	10/8/1971	EXTENDING TIME LIMITS P-34032, NEAHKAHNIE WATER DISTRICT
Special	23-191	5/30/1973	ORDER EXTENDING TIME TO BEGIN AND COMPLETE CONSTRUCTION AND MAKE COMPLETE APPLICATION OF
Special	23-502	12/28/1973	ORDER EXTENDING TIME IN WHICH TO COMPLETE CONSTRUCTION WORK AND MAKE COMPLETE APPLICATIC
Special	24-74	1/24/1974	EXTENSION OF TIME FOR PERMITS 34032 AND 35776, IN THE NAME OF NEAHKAHNIE
Special	34-260	1/28/1981	EXTENDS TIME LIMITS ON PERMIT 34032, NEAHKAHIE WATER DISTRICT
Special	39-40	2/20/1985	EXTENSION OF TIME ORDER
Special	44-53	2/16/1990	EXTENSION ORDER
Special	47-383	12/2/1993	EXTENDS TIME LIMITS ON PERMITS

View right with Web Mapping
View Places of Use from Water Rights in the Same Area
View Reported Water Use

Point(s) of Diversion

POD 1 - PIRATE SPRINGS > PACIFIC OCEAN

POD 2 - PIRATE SPRINGS > PACIFIC OCEAN

Place(s) of Use

Add TRS grouping

Use - MUNICIPAL USES (Primary); Priority Date: 12/9/1968

Water Right Genealogy

No genealogy records available for this water right, try the family link below instead.

View Water Rights in same Family

Report Errors with Water Right Data

Return to WRIS Query

PERMIT

STATE OF OREGON, }
County of Marion, } *ss.*

This is to certify that I have examined the foregoing application and do hereby grant the same, SUBJECT TO EXISTING RIGHTS and the following limitations and conditions:

The right herein granted is limited to the amount of water which can be applied to beneficial use and shall not exceed 0.45 *cubic feet per second measured at the point of diversion from the stream, or its equivalent in case of rotation with other water users, from* Pirate Springs

The use to which this water is to be applied is municipal

If for irrigation, this appropriation shall be limited to ——— *of one cubic foot per second or its equivalent for each acre irrigated*

and shall be subject to such reasonable rotation system as may be ordered by the proper state officer.

The priority date of this permit is December 9, 1968

Actual construction work shall begin on or before June 20, 1970 *and shall thereafter be prosecuted with reasonable diligence and be completed on or before October 1, 19*71

Extended to October 1, 1989 Extended to October 1, 1993

Complete application of the water to the proposed use shall be made on or before October 1, [illegible]

Extended to October 1, 1989 Extended to October 1, 1993

WITNESS my hand this 20th *day of* June, *19*69

B+C Ext. 10-1-98

Extended to Oct. 1 1973
Extended to Oct. 1 1974
Extended to Oct. 1979
Extended to Oct. 1 1973
Extended to Oct. 1 1973
Extended to Oct. 1 1974
Extended to Oct. 1 1973
Extended to Oct. 1 1973
Extended to Oct. 1 1974
Extended to Oct. 1979

CHRIS L. WHEELER
STATE ENGINEER

Application No. 45429
Permit No. 34032

PERMIT
TO APPROPRIATE THE PUBLIC WATERS OF THE STATE OF OREGON

This instrument was first received in the office of the State Engineer at Salem, Oregon, on the 9th *day of* December, *1968, at* 8:00 *o'clock* A. *M.*

Returned to applicant: —

Approved:
June 20, 1969

Recorded in book No. ——— *of Permits on page* 34032

CHRIS L. WHEELER
STATE ENGINEER

Drainage Basin No. 1 *page* 6.9
Fees $25.00

State Printing 96137

RECEIVED
DEC 9 1968
STATE ENGINEER
SALEM OREGON

Permit No. [illegible]32

*APPLICATION FOR PERMIT

To Appropriate the Public Waters of the State of Oregon

I, Neahkahnie Water District
(Name of applicant)

of P. O. Box 172, Manzanita
(Mailing address)

State of Oregon, do hereby make application for a permit to appropriate the following described public waters of the State of Oregon, SUBJECT TO EXISTING RIGHTS:

If the applicant is a corporation, give date and place of incorporation .....

1. The source of the proposed appropriation is Pirate Springs
(Name of stream)
....., a tributary of .....

2. The amount of water which the applicant intends to apply to beneficial use is 0.45 cubic feet per second.
(If water is to be used from more than one source, give quantity from each)

**3. The use to which the water is to be applied is municipal supply
(Irrigation, power, mining, manufacturing, domestic supplies, etc.)

4. The point of diversion is located 1500 ± ft. S (N. or S.) and 0 ft. (E. or W.) from the Common corner of Sections 17, 18, 19 and 20
(Section or subdivision)

.....
(If preferable, give distance and bearing to section corner)

.....
(If there is more than one point of diversion, each must be described. Use separate sheet if necessary)

being within the SW 1/4 of NW 1/4 / SE 1/4 of NE 1/4 (Give smallest legal subdivision) of Sec. 20 / 19, Tp. 3N (N. or S.), R. 10 (E. or W.), W. M., in the county of Tillamook

5. The Pipe line (Main ditch, canal or pipe line) to be 20 feet (Miles or feet) in length, terminating in the ..... (Smallest legal subdivision) of Sec. ....., Tp. ..... (N. or S.), R. ..... (E. or W.), W. M., the proposed location being shown throughout on the accompanying map.

DESCRIPTION OF WORKS

Diversion Works—

6. (a) Height of dam ..... feet, length on top ..... feet, length at bottom ..... feet; material to be used and character of construction .....
(Loose rock, concrete, masonry, rock and brush, timber crib, etc., wasteway over or around dam)

10' x 10' x 6' concrete sump to be constructed.

(b) Description of headgate .....
(Timber, concrete, etc., number and size of openings)

none required

(c) If water is to be pumped give general description 1 - 2.0 h.p. turbine type electric pump - 45 g.p.m. @ 140 ft. T.D.H. ± ;
(Size and type of pump) (Size and type of engine or motor to be used, total head water is to be lifted, etc.)

1 - 7.5 h.p. turbine type electric pump - 160 gpm @ 160 ft. TDH ±

*A different form of application is provided where storage works are contemplated.

**Application for permits to appropriate water for the generation of electricity, with the exception of municipalities, must be made to the Hydroelectric Commission. Either of the above forms may be secured, without cost, together with instructions by addressing the State Engineer, Salem, Oregon.

34032

Canal System or Pipe Line—

7. (a) Give dimensions at each point of canal where materially changed in size, stating miles from headgate. At headgate: width on top (at water line) none required feet; width on bottom ..... feet; depth of water ..... feet; grade ..... feet fall per one thousand feet.

(b) At ..... miles from headgate: width on top (at water line) ..... feet; width on bottom ..... feet; depth of water ..... feet; grade ..... feet fall per one thousand feet.

(c) Length of pipe, 30 ± ft.; size at intake, 6 in.; size at 30 ft. from intake 4 in.; size at place of use 4 in.; difference in elevation between intake and place of use, 40 ft. to 130 ft. ft. Is grade uniform? no Estimated capacity, 0.45 sec. ft.

8. Location of area to be irrigated, or place of use Neahkahnie, Oregon

Township North or South	Range E. or W. of Willamette Meridian	Section	Forty-acre Tract	Number Acres To Be Irrigated
T3N	R 10 W	19	NE 1/4 of NE 1/4	
"	"	19	SE 1/4 of NE 1/4	
"	"	20	SW 1/4 of NE 1/4	
"	"	20	NE 1/4 of NW 1/4	
"	"	20	NW 1/4 of NW 1/4	
"	"	20	SW 1/4 of NW 1/4	
"	"	20	SE 1/4 of NW 1/4	
"	"	20	NE 1/4 of SW 1/4	
"	"	20	NW 1/4 of SW 1/4	
"	"	20	SW 1/4 of SW 1/4	
"	"	20	SE 1/4 of SW 1/4	
"	"	20	NE 1/4 of SE 1/4	
"	"	20	NW 1/4 of SE 1/4	
"	"	20	SW 1/4 of SE 1/4	
"	"	20	SE 1/4 of SE 1/4	

(If more space required, attach separate sheet)

(a) Character of soil .....

(b) Kind of crops raised .....

Power or Mining Purposes—

9. (a) Total amount of power to be developed ..... theoretical horsepower.

(b) Quantity of water to be used for power ..... sec. ft.

(c) Total fall to be utilized ..... (Head) feet.

(d) The nature of the works by means of which the power is to be developed .....

.....

(e) Such works to be located in ..... (Legal subdivision) of Sec. ....., Tp. ..... (No. N. or S.), R. ..... (No. E. or W.), W. M.

(f) Is water to be returned to any stream? ..... (Yes or No)

(g) If so, name stream and locate point of return .....

....., Sec. ....., Tp. ..... (No. N. or S.), R. ..... (No. E. or W.), W. M.

(h) The use to which power is to be applied is .....

(i) The nature of the mines to be served .....

Municipal or Domestic Supply—

10. (a) To supply the city of Neahkahnie Water District

Tillamook (Name of) County, having a present population of 340

and an estimated population of 680 in 1989

(b) If for domestic use state number of families to be supplied 110 present 220 future

(Answer questions 11, 12, 13, and 14 in all cases)

11. Estimated cost of proposed works, $17,000.00

12. Construction work will begin on or before April, 1969

13. Construction work will be completed on or before October, 1969

14. The water will be completely applied to the proposed use on or before January 1970

Willis F. Perley

Neahkahnie Water District
(Signature of applicant)

Willis F. Perley, Engineer

Remarks: The proposed work will consist of the construction of a water pumping station which will be connected to the existing water distribution system of the Neahkahnie Water District.

STATE OF OREGON, }
County of Marion, } ss.

This is to certify that I have examined the foregoing application, together with the accompanying maps and data, and return the same for completion

In order to retain its priority, this application must be returned to the State Engineer, with corrections on or before April 21st, 19 69.

WITNESS my hand this 21st day of February, 19 69.

RECEIVED
MAR 13 1969
STATE ENGINEER
SALEM, OREGON

CHRIS L. WHEELER
STATE ENGINEER

By Larry W. Jebousek
ASSISTANT

Oregon Water Resources Department
Water Right Services Division

Water Rights Application
Number S-45629

Final Order
Extension of Time for Permit Number S-34032
Permit Holder: Neah-Kah-Nie Water District

Permit Information
Application File S-45629/ Permit S-34032
Basin 1 – North Coast Basin / Watermaster District 1
Date of Priority: November 9, 1968

Authorized Use of Water

Source of Water:	Pirate Springs, a tributary of the Pacific Ocean
Purpose or Use:	Municipal Use
Maximum Rate:	0.45 Cubic Feet per Second (cfs)

This Extension of Time request is being processed in accordance with Oregon Revised Statute 537.230 and 539.010(5), and Oregon Administrative Rule Chapter 690, Division 315

Appeal Rights

This is a final order in other than a contested case. This order is subject to judicial review under ORS 183.484. A request for judicial review must be filed within the 60 day time period specified by ORS 183.484(2). Pursuant to ORS 536.075 and OAR 137-004-0080 you may either file for judicial review, or petition the Director for reconsideration of this order. A petition for reconsideration may be granted or denied by the Director, and if no action is taken within 60 days following the date the petition was filed, the petition shall be deemed denied.

Application History

Permit S-34032 was issued by the Department on June 20, 1969. The permit called for completion of construction by October 1, 1971, and complete application of water to beneficial use by October 1, 1972. The most recent extension authorized completion of construction and complete application of water to beneficial use by October 1, 1998. On August 12, 1999, Neah-Kah-Nie Water District submitted an application to the Department for an extension of time for Permit S-34032. In accordance with OAR 690-315-0050(2), on August 26, 2014, the

Department issued a Proposed Final Order proposing to extend the time to complete construction to October 1, 2023, and the time to fully apply water to beneficial use to October 1, 2023. The protest period closed October 10, 2014, in accordance with OAR 690-315-0060(1). No protest was filed.

FINDINGS OF FACT

Except as expressly stated herein, the Department adopts and incorporates by reference the findings of fact in the Proposed Final Order dated August 26, 2014.

Based on oral information provided by NKNWD, Finding of Fact 14 is modified as follows (additions are shown in "underline" text, deletions are shown in "strikethrough" text):

14. The NKNWD currently takes ~~most of~~ its water from Spring 1, Spring 2, and Spring 3 by gravity to its distribution system. ~~Spring 2 is not used at this time to meet current demand.~~ Water from ~~the~~ Pirates Spring ~~Pump Station~~ is only used for emergency and backup supply. ~~during the months of August and September when the spring flows in Springs 1 and 3 are lowest.~~ The NKNWD utilizes a storage system to meet peak demands.

CONDITIONS

1. **Development Limitations**

   Diversion of any water beyond 0.13 cfs under Permit S-34032 up to 0.45 cfs shall only be authorized upon issuance of a final order approving a Water Management and Conservation Plan (WMCP) under OAR Chapter 690, Division 86 that authorizes access to a greater rate of diversion of water under the permit consistent with OAR 690-086-0130(7). The required WMCP shall be submitted to the Department within 3 years of this Final Order. The amount of water used under Permit S-34032 must be consistent with this and subsequent WMCP's approved under OAR Chapter 690, on file with the Department.

   The deadline established in this Extension Final Order for submittal of a WMCP shall not relieve a permit holder of any existing or future requirement for submittal of a WMCP at an earlier date as established through other orders of the Department. A WMCP submitted to meet the requirements of this final order may also meet the WMCP submittal requirements of other Department orders.

CONCLUSION OF LAW

The applicant has demonstrated good cause for the permit extension pursuant to ORS 537.230, 539.010(5) and OAR 690-315-0080(3).

ORDER

The extension of time for Application S-45629, Permit S-34032, therefore, is approved subject to conditions contained herein. The deadline for completing construction is extended from October 1, 1998 to October 1, 2023. The deadline for applying water to full beneficial use within the terms and conditions the permit is extended from October 1, 1998 to October 1, 2023.

DATED: October 17, 2014

Dwight French
Water Right Services Division Administrator, for
Thomas M. Byler, Director
Oregon Water Resources Department

If you have any questions about statements contained in this document, please contact Ann L. Reece at (503) 986-0834.

If you have other questions about the Department or any of its programs, please contact our Water Resources Customer Service Group at (503) 986-0900

Oregon Water Resources Department
Water Right Services Division

Water Rights Application
Number S-72306

Final Order
Extension of Time for Permit Number S-51578
Permit Holder: Neah-Kah-Nie Water District

Permit Information
Application File S-72306/ Permit S-51578
Basin 1 – North Coast Basin / Watermaster District 1
Date of Priority: April 7, 1992

Authorized Use of Water

Source of Water:	Three Springs, a tributary of the Pacific Ocean
Purpose or Use:	Municipal Use
Maximum Rate:	0.32 Cubic Feet per Second (cfs), being 0.06 cfs from Springs 1 and 2, and 0.20 cfs from Spring 3

This Extension of Time request is being processed in accordance with Oregon Revised Statute 537.230 and 539.010(5), and Oregon Administrative Rule Chapter 690, Division 315

Appeal Rights
This is a final order in other than a contested case. This order is subject to judicial review under ORS 183.484. A request for judicial review must be filed within the 60 day time period specified by ORS 183.484(2). Pursuant to ORS 536.075 and OAR 137-004-0080 you may either file for judicial review, or petition the Director for reconsideration of this order. A petition for reconsideration may be granted or denied by the Director, and if no action is taken within 60 days following the date the petition was filed, the petition shall be deemed denied.

Application History
Permit S-51578 was issued by the Department on January 13, 1995. The permit called for completion of construction by October 1, 1997, and complete application of water to beneficial use by October 1, 1998. On August 12, 1999, Neah-Kah-Nie Water District submitted an application to the Department for an extension of time for Permit S-51578. In accordance with OAR 690-315-0050(2), on August 26, 2014, the Department issued a Proposed Final Order

proposing to extend the time to complete construction to October 1, 2023, and the time to fully apply water to beneficial use to October 1, 2023. The protest period closed October 10, 2014, in accordance with OAR 690-315-0060(1). No protest was filed.

FINDINGS OF FACT

Except as expressly stated herein, the Department adopts and incorporates by reference the findings of fact in the Proposed Final Order dated August 26, 2014.

Based on oral information provided by NKNWD, Finding of Fact 13 is modified as follows (additions are shown in "underline" text, deletions are shown in "strikethrough" text):

13. The NKNWD currently takes ~~most of~~ its water from Spring 1, Spring 2, and Spring 3 by gravity to its distribution system. ~~Spring 2 is not used at this time to meet current demand.~~ Water from ~~the~~ Pirates Spring ~~Pump Station~~ is only used for emergency and backup supply. ~~during the months of August and September when the spring flows in Springs 1 and 3 are lowest.~~ The NKNWD utilizes a storage system to meet peak demands.

At time of issuance of the Proposed Final Order the Department concluded that, based on the factors demonstrated by the applicant, the permit may be extended subject to the following conditions:

CONDITIONS

1. **Development Limitations**

   Diversion of any water beyond 0.16 cfs under Permit S-51578 up to 0.32 cfs shall only be authorized upon issuance of a final order approving a Water Management and Conservation Plan (WMCP) under OAR Chapter 690, Division 86 that authorizes access to a greater rate of diversion of water under the permit consistent with OAR 690-086-0130(7). The required WMCP shall be submitted to the Department within 3 years of this Final Order. The amount of water used under Permit S-51578 must be consistent with this and subsequent WMCP's approved under OAR Chapter 690, on file with the Department.

   The deadline established in this Extension Final Order for submittal of a WMCP shall not relieve a permit holder of any existing or future requirement for submittal of a WMCP at an earlier date as established through other orders of the Department. A WMCP submitted to meet the requirements of this final order may also meet the WMCP submittal requirements of other Department orders.

CONCLUSION OF LAW

The applicant has demonstrated good cause for the permit extension pursuant to ORS 537.230, 539.010(5) and OAR 690-315-0080(3).

ORDER

The extension of time for Application S-72306, Permit S-51578, therefore, is approved subject to conditions contained herein. The deadline for completing construction is extended from October 1, 1997 to October 1, 2023. The deadline for applying water to full beneficial use within the terms and conditions the permit is extended from October 1, 1998 to October 1, 2023.

DATED: October 17, 2014

Dwight French
Water Right Services Division Administrator, for
Thomas M. Byler, Director
Oregon Water Resources Department

If you have any questions about statements contained in this document, please contact Ann L. Reece at (503) 986-0834.

If you have other questions about the Department or any of its programs, please contact our Water Resources Customer Service Group at (503) 986-0900

MEMORANDUM

Oregon Department of Fish and Wildlife

Date: January 27, 2014

To: Curt Melcher

From: Tim Hardin; Rick Kepler

Subject: **Briefing regarding Municipal Water Right Extensions, North Coast**

This memo requests your signature on two municipal extension "listed fish persistence" advice letters to the Water Resources Department (WRD). There are no listed fish species involved.

- The water source for Application S-45629 is Pirate Springs, and for S-72306 it is Unnamed Springs. Each drains directly to the Pacific Ocean, north of the city of Nehalem.
- The undeveloped amounts are 0.32 cfs and 0.16 cfs, respectively.
- The District Biologist has determined there are no fish in either spring.
- ODFW therefore determined that use of the undeveloped water will not affect fish persistence.

Oregon
John A. Kitzhaber, MD, Governor

Department of Fish and Wildlife
Office of the Director
4034 Fairview Industrial Dr SE
Salem, OR 97302-1142
503-947-6044
Fax: 503-947-6042
www.dfw.state.or.us

February 5, 2014

Phil Ward, Director
Water Resources Department
725 Summer Street NE, Suite A
Salem, OR 97301

Re: ODFW's Division 315 Evaluation of Fish Persistence for Municipal Extension, Neah-kah-nie Water District Application # S-45629 / Permit # 34032

Dear ~~Director~~ Phil Ward:

The Neah-kah-nie Water District has a water right on Pirate Springs for 0.45 cfs. The undeveloped portion of this water right is 0.32 cfs.

Pirate Springs drains directly to the Pacific Ocean about 3 miles NW of the city of Nehalem. The Department of Fish and Wildlife District Biologist has determined that there are no fish in Pirate Springs.

Since there are no fish species listed as sensitive, threatened, or endangered under state or federal law in the waterways affected by use of the undeveloped portion under the permit, the Department finds that the use of the undeveloped portion of the permit will not affect fish persistence.

Sincerely,

Curt Melcher
Deputy Director

c: Rick Kepler, Oregon Department of Fish and Wildlife
Richard Felley, Neah-kah-Nie Water District

Oregon
John A. Kitzhaber, MD, Governor

Department of Fish and Wildlife
Office of the Director
4034 Fairview Industrial Dr SE
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Fax: 503-947-6042
www.dfw.state.or.us

February 5, 2014

Phil Ward, Director
Water Resources Department
725 Summer Street NE, Suite A
Salem, OR 97301

Re: ODFW's Division 315 Evaluation of Fish Persistence for Municipal Extension, Neah-kah-nie Water District Application # S-72306/ Permit S-51578

Dear ~~Director~~ Phil Ward:

The Neah-kah-nie Water District has a water right on Unnamed Springs for 0.32 cfs. The undeveloped portion of this water right is 0.16 cfs.

The Unnamed Springs drain directly to the Pacific Ocean about 3 miles NW of the city of Nehalem. The Department of Fish and Wildlife District Biologist has determined that there are no fish in the Unnamed Springs.

Since there are no fish species listed as sensitive, threatened, or endangered under state or federal law in the waterways affected by use of the undeveloped portion under the permit, the Department finds that the use of the undeveloped portion of the permit will not affect fish persistence.

Sincerely,

Curt Melcher
Deputy Director

c: Rick Kepler, Oregon Department of Fish and Wildlife
Richard Felley, Neah-kah-Nie Water District

APPENDIX "A"

Neahkahnie Water District Water Rights Inventory

(...as of July 7, 2015)

Appl. No.	Permit No.	Certificate No.	Priority Date	Source	Use	Maximum Permitted Rate (cfs)	Current Allowed Rate under "Development Limitations"	Actual Diversion: Maximum Instantaneous Rate Diverted to Date (cfs)	Actual Diversion: Maximum Annual Quantity Diverted to Date (MG)	Actual Diversion: Average Monthly Diversion (MG)	Actual Diversion: Average Daily Diversion (Gallons)	Authorized Completion Date
S-12692	S-10040	21423	4-30-1929	Springs 1, 2 & 3	Domestic including irrigation of garden for group of houses	**0.17 cfs (76.3 gpm)**, being: 0.01 cfs (4.49 gpm)from Spring 1 0.01 cfs (4.49 gpm)from Spring 2 0.15 cfs (67.3 gpm) from Spring 3	**N/A – certificated at 0.17 cfs (76.3 gpm)**	0.17 cfs (certificated)	5.369	0.29	9,628	N/A (certificated)
S-47767	S-35776	80934	12-7-1970	Springs 1, 2 & 3	Municipal	**0.17 cfs (76.3 gpm)**, being: 0.01 cfs (4.49 gpm) from Spring 1 0.01 cfs (4.49 gpm) from Spring 2 0.15 cfs (67.3 gpm) from Spring 3	**N/A – certificated at 0.17 cfs (76.3 gpm)**	0.17 cfs (certificated)	5.369	0.29	9,628	N/A (certificated)
S-72306	S-51578	------	4-7-1992	Springs 1, 2 & 3	Municipal	**0.32 cfs[1] (143.6 gpm)**, being: 0.06 cfs (26.9 gpm) from Spring 1 0.06 cfs (26.9 gpm) from Spring 2 0.20 cfs (89.8 gpm) from Spring 3	**0.16 cfs[1] (71.8 gpm)** Diversion of water under this permit is currently limited by conditions set forth by the Final Order issued on 10-17-2014 approving an Extension of Time for Permit S-51578.	0.32 cfs on 11/29/2011	10.104	0.55	18,119	10-1-2023
Subtotal: ***(...all water rights and permits for Springs 1, 2 & 3)***						**0.66 cfs (296.2 gpm)**	**0.5 cfs (224.4 gpm)**	Due to the questionable nature of some of the data prior to 2007, the District has elected to use only those data from 2007 forward.				

Appl. No.	Permit No.	Certificate No.	Priority Date	Source	Use	Maximum Permitted Rate (cfs)	Current Allowed Rate under "Development Limitations"	Actual Diversion: Maximum Instantaneous Rate Diverted to Date (cfs)	Actual Diversion: Maximum Annual Quantity Diverted to Date (MG)	Actual Diversion: Average Monthly Diversion (MG)	Actual Diversion: Average Daily Diversion (Gallons)	Authorized Completion Date
S-45629	S-34032	------	12-9-1968	Pirate Springs	Municipal	**0.45 cfs[2] (202.0 gpm)**	**0.13 cfs[2] (58.4 gpm)** Diversion of water under this permit is currently limited by conditions set forth by the Final Order issued on 10-17-2014 approving an Extension of Time for Permit S-34032.	0.13 cfs	1.53	0.0045	268	10-1-2023
Subtotal: ***(...all water rights and permits for Pirate Springs)***						**0.45 cfs (202.0 gpm)**	**0.13 cfs (58.4 gpm)**					

	Maximum Permitted Rate (cfs)	Current Allowed Rate under "Development Limitations"
Grand Total: **(for all water rights and permits for Springs 1, 2 & 3 *and* Pirate Springs)**	**1.11 cfs (493.7 gpm)** Combined total of all water right certificates/permits held	**0.63 cfs (282.2 gpm)** Total maximum instantaneous rate legally authorized for diversion *at this time* from all sources combined

[1] The maximum instantaneous diversion of water under ***Permit S-51578*** is currently limited to ***no more than 0.16 cfs***. See Final Order issued Oct. 17, 2014 approving Extension of Time for Permit S-51578.

[2] The maximum instantaneous diversion of water under ***Permit S-34032*** is currently limited to ***no more than 0.13 cfs***. See Final Order issued Oct. 17, 2014 approving Extension of Time for Permit S-34032.

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Neahkahnie Water District Water Rights Inventory

(...as of July 7, 2015)

Appl. No.	Permit No.	Certificate No.	Priority Date	Source	Use	Maximum Permitted Rate (cfs)	Current Allowed Rate under "Development Limitations"	Actual Diversion: Maximum Instantaneous Rate Diverted to Date (cfs)	Actual Diversion: Maximum Annual Quantity Diverted to Date (MG)	Actual Diversion: Average Monthly Diversion (MG)	Actual Diversion: Average Daily Diversion (Gallons)	Authorized Completion Date
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APPENDIX "A"

Neahkahnie Water District Water Rights Inventory

(...as of July 7, 2015)

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Neah-Kah-Nie Water District
Water Master Plan Update and Water Management and Conservation Plan Update
Nehalem, Oregon

Appendix E
Neahkahnie-Manzanita Intertie Detail
Otak, Inc., August 19, 2014

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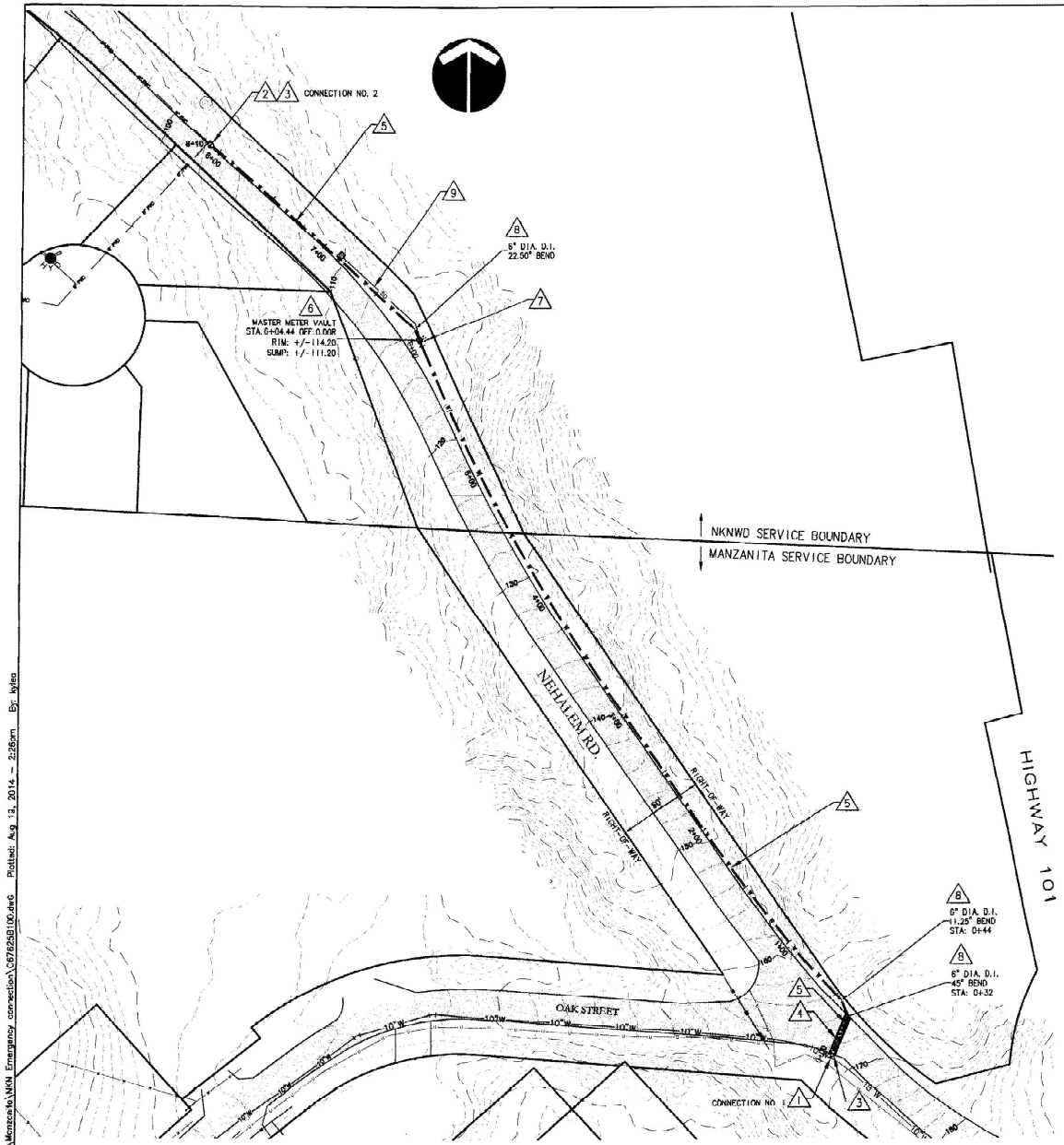


WATER MAIN ALIGNMENT
SCALE: 1" = 40'

WATER NOTES

1. CONNECTION NO. 1 – STA: 0+00
SEE DETAIL 1/2. HOT-TAP EXISTING 10" HDPE PIPE WITH 10x6 STAINLESS STEEL TAPPING SLEEVE. CONTRACTOR SHALL VERIFY EXISTING WATER MAIN PIPE SIZE PRIOR TO ORDERING ANY PARTS.

2. CONNECTION NO. 2 – STA: 8+10
SEE DETAIL 2/2. CONNECT TO EXISTING 6" TEE. CONTRACTOR SHALL POTHOLE TEE, REMOVE EXISTING THRUST BLOCKING, DISCONNECT EXISTING BLOWOFF, INSTALL NEW 6" GATE VALVE AND RECONNECT NEW WATER LINE INCLUDING MECHANICAL RESTRAINT AND THRUST BLOCKING. CONTRACTOR SHALL VERIFY EXISTING WATER MAIN PIPE SIZE PRIOR TO ORDERING ANY PARTS.

3. CONSTRUCT VALVE BOX AS PER DETAIL 2/3.

4. SAWCUT ASPHALT ROADWAY, REMOVE AND DISPOSE OF EXISTING ASPHALT. CONTRACTOR SHALL "T-CUT" ROADWAY AND REPAIR CROSSING AS PER TILLAMOOK COUNTY PERMIT REQUIREMENTS. CONTRACTOR SHALL UTILIZE CDF BACKFILL AND REPAVE TRENCH WITH MIN. 6" HMAC INSTALLED IN (2) 3" LIFTS. SEE DETAIL 1/3.

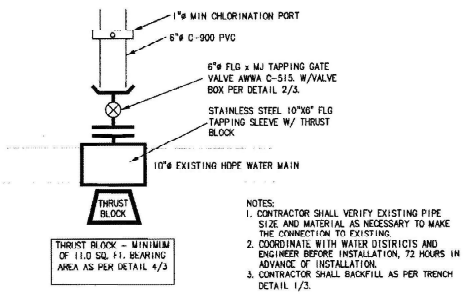
5. CONSTRUCT 6"ø AWWA C-900, DR14 PVC WATER MAIN PIPE INCLUDING TRENCH EXCAVATION, SELECT BEDDING AND SELECT BACKFILL, DISINFECTION AND TESTING. SEE DETAIL 1/3.

6. CONSTRUCT METER VAULT (444-LA) ON MIN. 8" COMPACTED CRUSHED ROCK AS PER DETAIL 5/3. CONTRACTOR SHALL INSTALL VAULT LID WITHIN +/- 4" OF EDGE OF ROAD ELEVATION. PREP VAULT LOCATION BY STRIPPING SOIL 4"-6" AND REPLACE WITH COMPACTED ¾"-0" CRUSHED ROCK. CONTRACTOR SHALL ENSURE POSITIVE DRAINAGE AWAY FROM VAULT.

7. CONSTRUCT MASTER FLOW METER AND EXTERNAL METER MOUNT AS PER DETAIL 6/3 INCLUDING WATERPROOF ENCLOSURE. CONTRACTOR SHALL INSTALL BOLLARD PROTECTION AS PER DETAIL 3/3.

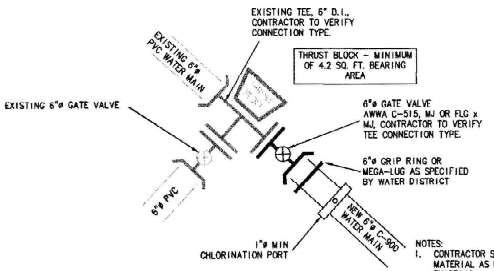
8. CONSTRUCT 6" D.I. BEND WITH MECHANICAL RESTRAINT AND THRUST BLOCKING AS PER DETAIL 4/3.

9. DAYLIGHT 2" SCH. 40 PVC DRAIN PIPE WITH MINIMUM 0.5% SLOPE. INSTALL STAINLESS STEEL RODENT SCREEN ON OUTLET. CONSTRUCT ROCK OUTLET WITH P.T. OUTLET MARKER POST.



NOTES:
1. CONTRACTOR SHALL VERIFY EXISTING PIPE SIZE AND MATERIAL AS NECESSARY TO MAKE THE CONNECTION TO EXISTING.
2. COORDINATE WITH WATER DISTRICTS AND ENGINEER BEFORE INSTALLATION, 72 HOURS IN ADVANCE OF INSTALLATION.
3. CONTRACTOR SHALL BACKFILL AS PER TRENCH DETAIL 1/3.

1/2 CONNECTION NO. 1 DETAIL
NO SCALE



NOTES:
1. CONTRACTOR SHALL VERIFY EXISTING PIPE SIZE AND MATERIAL AS NECESSARY TO MAKE THE CONNECTION TO EXISTING.
2. CONTRACTOR SHALL ISOLATE TEE AND CAREFULLY REMOVE EXISTING BLOW-OFF FROM TEE. ADAPT AND CONNECT WITH 6" GATE VALVE AND MECHANICAL RESTRAINT AS PER DISTRICT STANDARDS AND REQUIREMENTS.
3. COORDINATE WITH WATER DISTRICTS AND ENGINEER BEFORE INSTALLATION, 72 HOURS IN ADVANCE OF INSTALLATION.
4. CONTRACTOR SHALL BACKFILL AS PER TRENCH DETAIL 1/3.

2/2 CONNECTION NO. 2 DETAIL
NO SCALE

NO.	DATE	BY	REVISION COMMENTS

Design	Drawn	Checked	Date	Initial Issue Date:
KKA	KKA	RCE		

MANZANITA & NKNWD
WATER SYSTEM INTERTIE PROJECT
WATER MAIN PLAN VIEW – STA: 0+00 TO 8+10
TILLAMOOK COUNTY, OR

HLB otak Incorporated
4855-A HWY 101 N.
GEARHART, OREGON 97138
Phone: (503) 738-3625
FAX: (503) 738-7455
Internet: WWW.HLB-OTAK.COM

67625 C67625B100.DWG
Project No. Drawing No.

2
Sheet No.

M:\Gov\Manzanita\NKN Emergency connection\C67625B100.dwg Plotted: Aug 13, 2014 - 2:25pm By: kyles

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Neah-Kah-Nie Water District
Water Master Plan Update and Water
Management and Conservation Plan Update
Nehalem, Oregon

Appendix F
Hydrant Data

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Neah-Kah-Nie Water District
Fire Hydrant Attributes
as of April 2020

Hydrant number	Count	Zone	Location Description	GPS coordinates	Elev. ft.	Nrst Taxlot	Nearest address	Nearest Cross street	Brand	Model	Date installed	PSI	Notes	Hydrant number
1	1	U	Mt. Tank Tuffshed	N 045.73881 W 123.93591	626	300	38560 NKN Mt. Rd.	Hwy 101 N			2005	15		1
2	2	U	Hwy 101		440	300	38400 Hwy 101 N	NKN Mt. Rd.	Mueller		2010	62		2
3	3	U	Upper Sunset Drive			303	7854 Sunset Drive	Hwy 101				47		3
4	4	U	Sunset & Twana Trace			2400	7835 Sunset Drive	Twana Trace				67		4
5	5	U	Middle Sunset Drive			1301	7855 Sunset Drive	Twana Trace				88		5
6	6	U	Sunset & Circle			1200	8015 Circle Drive	Sunset Drive				125		6
7		U	West Circle Drive			1490	8275 Circle Drive	Sunset Drive					Planned future	7
8	7	U	Upper Meadow Loop			1300	38575 Meadow Loop	Sunset Drive				74		8
9	8	U	Meadow Lp & Leaward			2300	38390 Meadow Loop	Leaward Way				100		9
10	9	U	SW Meadow Loop			502	38405 Meadow Loop	Mariner's Trail				128	F.V. stuck open	10
11	10	U	Mariner's Trail			1100	8780 Mariner's Trail	Meadow Loop				147		11
12		MT	future			4200	38415 Meadow Loop	Meadow Loop					Planned future	12
13	11	U	Braeridge & Meadow Lp			BA2800	8700 Braeridge Drive	Meadow Loop				85		13
14	12	U	West Braeridge Drive			BD2800	8730 Braeridge Drive	Meadow Loop				94		14
15	13	U	East Braeridge Drive			BD4300	8790 Braeridge Drive	Meadow Loop				103		15
16	14	U	Lower Braeridge Dr			BD4800	8790 Braeridge Drive	Meadow Loop				124		16
17	15	U	Meadow Lp & Tides Trail			BD1800	8770 Tides Trail	Meadow Loop				112		17
18	16	U	Lower Tides Trail			BD2000	8770 Tides Trail	Meadow Loop				132		18
19			future										Planned Future	19
20	17	M	deTurk Way			1401	38445 Beulah Reed Rd	James Rd.				108		20
21	18	M	Reed Rd & deTurk Way			1300	38435 Beulah Reed Rd	James Rd.				128		21
22		M	future			1500	38505 Beulah Reed Rd	James Rd.					Planned future	22
23	19	M	Upper Reed Rd Loop			2500	38645 Beulah Reed Rd	James Rd.				109		23
24	20	M	Upper Reed Rd			2705	38755 Beulah Reed Rd	James Rd.				71		24
25		M	future			2702	38755 Beulah Reed Rd	James Rd.					Planned future	25
30	21	L	Hillcrest & Sixth			3000	9000 Hillcrest Rd.	Sixth St.				68		30
31	22	L	Hillcrest & Fifth			3900	37415 Fifth St.	Hillcrest Rd.				83		31
32	23	L	Hillcrest & Third			201	37330 Third St.	Hillcrest Rd.				98		32
33	24	L	Nehalem Rd near Indian Gap			5200	8194 Nehalem Rd.	Indian Gap				118		33
34	25	L	Nehalem Rd			600	9000 Nehalem Rd.	Indian Gap				115		34
35	26	L	Nehalem Rd			501	9190 Nehalem Rd.	Olive Way				114		35
36		L	future										Planned future	36
37	27	L	Nehalem Rd & Olive Way			1400	37130 Olive Way	Nehalem Rd.				102		37
38	28	L	DeWolf East			1406	9330 DeWolf Rd.	Olive Way				105		38
39	29	L	DeWolf West			1417	9285 Nehalem Rd.	Olive Way				105		39
40	30	L	Fifth & NKN Rd.			3400	8505 NKN Rd.	Fifth St.				75		40
41	31	L	Fourth St.			500	37400 Fourth St.	NKN Rd.				76	Flo test 4/14/2016	41
42	32	L	Third St.			3100	37400 Third St.	NKN Rd.				89		42

Neah-Kah-Nie Water District
Fire Hydrant Attributes
as of April 2020

Hydrant number	Count	Zone	Location Description	GPS coordinates	Elev. ft.	Nrst Taxlot	Nearest address	Nearest Cross street	Brand	Model	Date installed	PSI	Notes	Hydrant number
43	33	L	NKN Rd. & Second St.			4100	8235 NKN Rd.	Second St.				103		43
44	34	L	Second St. West			6500	37420 Second St.	NKN Rd.				99		44
45	35	L	Second St. East			5800	37270 Second St.	Indian Gap				103		45
46	36	L	Third St. & Second St.			2700	37310 Third St.	Second St.				93		46
47	37	L	N. First St.			900	37380 First St.	NKN Rd.				110		47
48	38	L	S. First St.			200	37250 First St.	Nehalem Rd.				114		48
49	39	L	Lower Reed Rd.			1600	37395 Reed Rd.	NKN Rd.				125		49
50	40	L	Reed Rd & Nehalem Rd.			2100	37245 Reed Rd.	Nehalem Rd.				123		50
51	41	L	Beach St.			2804	37215 Beach St.	Ocean Rd.				116		51
52	42	L	Treasure Rocks Loop			200	8520 Treasure Rocks R	Pirates Way				59		52
53	43	L	Treasure Rocks & Pirates Way			1500	8330 Treasure Rocks R	Pirates Way				95		53
54	44	L	Lower Treasure Rocks Rd.			2000	8160 Treasure Rocks R	Pirates Way				101		54
55	45	L	Reed Rd. & Treasure Rks			3502	37605 Reed Rd.	Treasure Rocks Rd.				120		55
56	46	SD	Upper Sand Dune Rd.			703	8500 Sand Dune Rd.	Beeswax Trail				92	Flo test 10/5/2016	56
57	47	L	Middle Sand Dune			1500	8370 Sand Dune Rd.	Beeswax Trail				75		57
58	48	L	Lower Sand Dune			1400	8350 Beeswax Trail	SandDune Rd.				112		58
59	49	L	Teasure Hunters Ln.			900	37785 Treasure Hunter	Beeswax Trail				115	Leaky seat	59
60	50	L	Reed Rd. below Blackberry Ln.			4200	37785 Beulah Reed Rd	Blackberry Lane				120		60
61	51	MT	Upper Blackberry Ln.			3500	8135 Blackberry Ln.	Reed Rd.				90		61
62	52	L	Reed Rd. & Kahnie Trail Lp.			2900	8000 Kahnie Trail Loop	Reed Rd.				100		62
63	53	L	Kahnie Trail Loop			3700	38160 Vantage Rd.	Vantage Rd.				76		63
64	54	L	Reed Rd. N. of Kahnie Trail			401	38145 Reed Rd.	Kahnie Trail Loop				95		64
65	55	L	Reed Rd. & James Rd.			301	38265 Reed Rd.	James Rd.				77	Stuck F. Valve	65
66	56	L	Reed Rd. & Pirates Spring			200	38305 Reed Rd.	James Rd.				65		66
67	57	L	James Rd. South			900	38245 James Rd.	Reed Rd.				92		67
68	58	L	James Rd. North			800	38420 James Rd.	Reed Rd.				96		68
69	59	MT	Ville al Mare			3700	8075 Kahnie Trail Loop	Vantage Rd.			2018	85		69
70	60	U	Ville al Mare			502	8055 Sunset Drive	Circle Drive			2018	140		70
Mariners Trail														
Sandune Road														

Neah-Kah-Nie Water District
Water Master Plan Update and Water
Management and Conservation Plan Update
Nehalem, Oregon

Appendix G
PRV and Control Valve Data

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NEAHKAHNIE CONTROL VALVE SETTINGS
PSI unless otherwise stated

RESERVOIR PARK PRV (Upper zone to Middle zone)					
2" 90G-01AS			INLET 135		SET @ 65
6" 90G-01AB			INLET 135		SET @ 60
1-1/2" 50G-01					SET @ 75
HILLCREST PRV (Reservoir Park level control)					
6" 90G-01AB			INLET 20-55		SET @ 4
2" 90G-01AS					SET @ 2
3" 43EG-01BCDSY			115 GPM		
SANDUNE ROAD (Intertie)					
3" 50G-01			INLET 55		SET @ 75
4" 90G-01BCSY			INLET 135		SET @ 55 back 60
RESERVOIR PARK CONTROL VALVE (Earthquake valve)					
4" 50G-07B		INLET & OUTLET 14			CRL SET @ 5
MARINER PRV (Upper Zone to upper Blackberry Ln.)					
1-1/2" 90G-01ABSV			INLET 162		SET @ 60
4" 90G-01BY			INLET 162		SET @ 55
2" 50G-01					SET @ 70
UPPER SANDUNE PRV (Upper Zone to upper Sandune Rd.)					
2" 90G-01ABSVKC			INLET 143		SET @ 63
6" 90G-01BYVKC			INLET 143		SET @ 58
3" 50G-01BKC					SET @ 73

Neah-Kah-Nie Water District
Water Master Plan Update and Water Management and Conservation Plan Update
Nehalem, Oregon

Appendix H
2019 Oregon Fire Code
Appendix B: Fire-Flow Requirements for Buildings
Appendix C: Fire Hydrant Locations and Distribution

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APPENDIX B
FIRE-FLOW REQUIREMENTS FOR BUILDINGS

The provisions contained in this appendix are adopted by the State of Oregon.

User note:

About this appendix: *Appendix B provides a tool for the use of jurisdictions in establishing a policy for determining fire-flow requirements in accordance with Section 507.3. The determination of required fire flow is not an exact science, but having some level of information provides a consistent way of choosing the appropriate fire flow for buildings throughout a jurisdiction. The primary tool used in this appendix is a table that presents fire flow based on construction type and building area based on the correlation of the Insurance Services Office (ISO) method and the construction types used in the International Building Code®.*

The availability of water is essential for fire fighting operations. The amount of water required to fight a fire depends on many things, including the type of construction, the location of the fire, the contents of the building, response time and the capabilities of the fire department. Limiting the maximum fire flow to 3,000 gallons per minute provides local water purveyors with a predictable and cost-effective method to forecast infrastructure expenditures and can serve to lessen local fire services' apparatus capital expenditures.

SECTION B101
GENERAL

B101.1 Scope.

The procedure for determining *fire-flow* requirements for buildings or portions of buildings hereafter constructed shall be in accordance with this appendix and as required by the *fire code official*. This appendix does not apply to structures other than buildings.

B101.2 Protected areas.

The provisions of Section B105 are intended for use by the *fire code official* in *protected areas* in which adequate and reliable water systems exist. Refer to Section B106 for additional alternative provisions regarding limiting *fire flows*. Refer to Section B107 *fire flow* for buildings in *protected areas* without adequate and reliable water systems.

SECTION B102
DEFINITIONS

B102.1 Definitions.

For the purpose of this appendix, certain terms are defined as follows:

FIRE FLOW. The flow rate of a water supply, measured at 20 pounds per square inch (psi) (138 kPa) residual pressure, that is available for fire fighting.

FIRE-FLOW CALCULATION AREA. The floor area, in square feet (m^2), used to determine the required *fire flow*.

PROTECTED AREAS. Geographic areas where a service or an agency has been established for the purpose of providing fire suppression services for buildings and other structures. Examples of agencies typically include public fire departments, rural fire protection districts and private fire protection services.

UNPROTECTED AREAS. Geographic areas where no organized service or agency exists to provide fire suppression services for buildings and other structures. Examples of *unprotected areas* typically include areas where wildland fire protection is provided by federal (USFS, BLM, BIA, etc.), state (ODF), or regional (forest protection associations) organizations and other areas that are generally in remote or rural isolated areas where no structural fire protection service is present.

SECTION B103
MODIFICATIONS

B103.1 Decreases.

The *fire code official* is authorized to reduce the *fire flow* where the development of full *fire-flow* requirements is impractical based on, but not limited to, the following: type of occupancy, type of construction, location on property, floor area, height and number of stories, yards as defined by the *International Building Code*, fire walls and the fire-fighting capabilities of the jurisdiction.

B103.2 Increases.

The *fire code official* is authorized to increase the *fire-flow* requirements where conditions indicate an unusual susceptibility to group fires or conflagrations. An increase shall be not more than twice that required for the building under consideration.

B103.3 Limiting.

The *fire code official* is authorized to limit the maximum required *fire flow* based on, but not limited to, the fire-fighting capabilities of the jurisdiction. *Fire-flow* limitations shall be in accordance with Section B106, which are in addition to the *fire-flow* requirements as specified in Section B105.

SECTION B104
FIRE-FLOW CALCULATION AREA

B104.1 General.

The *fire-flow calculation area* shall be the total floor area of all floor levels within the *exterior walls*, and under the horizontal projections of the roof of a building, except as modified in Sections B104.2 and B104.3.

B104.2 Area separation.

Portions of buildings that are separated by *fire walls* constructed in accordance with the *International Building Code* are allowed to be considered as separate *fire-flow calculation areas*.

B104.3 Type IA and Type IB construction.

The *fire-flow calculation area* of buildings constructed of Type IA and Type IB construction shall be the area of the three largest successive floors.

Exception: *Fire-flow calculation area* for open parking garages shall be determined by the area of the largest floor.

SECTION B105
FIRE-FLOW REQUIREMENTS FOR BUILDINGS IN PROTECTED AREAS WITH ADEQUATE AND RELIABLE WATER SYSTEMS

B105.1 One- and two-family dwellings, Group R-3 and R-4 buildings and townhouses.

The minimum *fire-flow* and flow duration requirements for one- and two-family *dwellings*, Group R-3 and R-4 buildings and *townhouses* shall be as specified in Tables B105.1(1) and B105.1(2).

Exception: Where there is not more than one each of Group R, Division 3 and Group U occupancies or agricultural buildings, as defined by Oregon Revised Statute (ORS) 455.315, on a single parcel of not less than 1 acre, the requirements of this section may be modified provided that the occupancy does not require a *fire flow* in excess of 1,500 gallons per minute (5678 L/min) and in the opinion of the *fire code official*, fire-fighting or rescue operations would not be impaired.

TABLE B105.1(1)
REQUIRED *FIRE FLOW* FOR ONE- AND TWO-FAMILY DWELLINGS, GROUP R-3 AND R-4 BUILDINGS AND TOWNHOUSES

***FIRE-FLOW* CALCULATION AREA (square feet)**	**AUTOMATIC SPRINKLER SYSTEM (Design Standard)**	**MINIMUM FIRE FLOW (gallons per minute)**	**FLOW DURATION (hours)**
0–3,600	No automatic sprinkler system	1,000	1
3,601 and greater	No automatic sprinkler system	Value in Table B105.1(2)	Duration in Table B105.1(2) at the required *fire-flow* rate
0–3,600	Section 903.3.1.3 of the *International Fire Code* or Appendix T of the *Oregon Residential Specialty Code*	500	1/2
3,601 and greater	Section 903.3.1.3 of the *International Fire Code* or Appendix T of the *Oregon Residential Specialty Code*	1/2 value in Table B105.1(2)	1

For SI: 1 square foot = 0.0929 m^2, 1 gallon per minute = 3.785 L/m.

TABLE B105.1(2)
REFERENCE TABLE FOR TABLES B105.1(1) AND B105.2

FIRE-FLOW CALCULATION AREA (square feet)					FIRE FLOW (gallons per minute)[b]	FLOW DURATION (hours)
Type IA and IB[a]	Type IIA and IIIA[a]	Type IV and V-A[a]	Type IIB and IIIB[a]	Type V-B[a]		
0-22,700	0-12,700	0-8,200	0-5,900	0-3,600	1,500	2
22,701-30,200	12,701-17,000	8,201-10,900	5,901-7,900	3,601-4,800	1,750	
30,201-38,700	17,001-21,800	10,901-12,900	7,901-9,800	4,801-6,200	2,000	
38,701-48,300	21,801-24,200	12,901-17,400	9,801-12,600	6,201-7,700	2,250	
48,301-59,000	24,201-33,200	17,401-21,300	12,601-15,400	7,701-9,400	2,500	
59,001-70,900	33,201-39,700	21,301-25,500	15,401-18,400	9,401-11,300	2,750	
70,901-83,700	39,701-47,100	25,501-30,100	18,401-21,800	11,301-13,400	3,000	3
83,701-97,700	47,101-54,900	30,101-35,200	21,801-25,900	13,401-15,600	3,250	
97,701-112,700	54,901-63,400	35,201-40,600	25,901-29,300	15,601-18,000	3,500	
112,701-128,700	63,401-72,400	40,601-46,400	29,301-33,500	18,001-20,600	3,750	
128,701-145,900	72,401-82,100	46,401-52,500	33,501-37,900	20,601-23,300	4,000	4
145,901-164,200	82,101-92,400	52,501-59,100	37,901-42,700	23,301-26,300	4,250	
164,201-183,400	92,401-103,100	59,101-66,000	42,701-47,700	26,301-29,300	4,500	
183,401-203,700	103,101-114,600	66,001-73,300	47,701-53,000	29,301-32,600	4,750	
203,701-225,200	114,601-126,700	73,301-81,100	53,001-58,600	32,601-36,000	5,000	
225,201-247,700	126,701-139,400	81,101-89,200	58,601-65,400	36,001-39,600	5,250	
247,701-271,200	139,401-152,600	89,201-97,700	65,401-70,600	39,601-43,400	5,500	
271,201-295,900	152,601-166,500	97,701-106,500	70,601-77,000	43,401-47,400	5,750	
295,901-Greater	166,501-Greater	106,501-115,800	77,001-83,700	47,401-51,500	6,000	
—	—	115,801-125,500	83,701-90,600	51,501-55,700	6,250	
—	—	125,501-135,500	90,601-97,900	55,701-60,200	6,500	
—	—	135,501-145,800	97,901-106,800	60,201-64,800	6,750	
—	—	145,801-156,700	106,801-113,200	64,801-69,600	7,000	
—	—	156,701-167,900	113,201-121,300	69,601-74,600	7,250	
—	—	167,901-179,400	121,301-129,600	74,601-79,800	7,500	
—	—	179,401-191,400	129,601-138,300	79,801-85,100	7,750	
—	—	191,401-Greater	138,301-Greater	85,101-Greater	8,000	

For SI: 1 square foot = 0.0929 m^2, 1 gallon per minute = 3.785 L/m, 1 pound per square inch = 6.895 kPa.

a. Types of construction are based on the *International Building Code*.
b. Measured at 20 psi residual pressure.

TABLE B105.2
REQUIRED FIRE FLOW FOR BUILDINGS OTHER THAN ONE- AND TWO-FAMILY DWELLINGS, GROUP R-3 AND R-4 BUILDINGS AND TOWNHOUSES

AUTOMATIC SPRINKLER SYSTEM (Design Standard)	MINIMUM FIRE FLOW (gallons per minute)	FLOW DURATION (hours)
No automatic sprinkler system	Value in Table B105.1(2)	Duration in Table B105.1(2)
Section 903.3.1.1 of the *International Fire Code*	25% of the value in Table B105.1(2)[a]	Duration in Table B105.1(2) at the reduced flow rate
Section 903.3.1.2 of the *International Fire Code*	25% of the value in Table B105.1(2)[b]	Duration in Table B105.1(2) at the reduced flow rate

For SI: 1 gallon per minute = 3.785 L/m.

a. The reduced fire flow shall be not less than 1,000 gallons per minute.
b. The reduced fire flow shall be not less than 1,500 gallons per minute.

B105.3 Water supply for buildings equipped with an automatic sprinkler system.

For buildings equipped with an *approved automatic sprinkler system*, the water supply shall be capable of providing the greater of:

1. The *automatic sprinkler system* demand, including hose stream allowance.
2. The required *fire flow*.

SECTION B106
LIMITING FIRE-FLOW REQUIREMENTS FOR BUILDINGS IN PROTECTED AREAS WITH ADEQUATE AND RELIABLE WATER SYSTEMS

B106.1 General.

The provisions of Section B106 are intended for use by the *fire code official* in addition to the provisions specified in Section B105 as authorized by Section B103.3. This section is intended to apply in *protected areas* in which adequate and reliable water systems exist.

B106.2 Limiting required *fire flow*.

No building shall be constructed, altered, enlarged, moved or repaired in a manner that, by reason of size, type of construction, number of stories, occupancy, or any combination thereof, creates a need for a *fire flow* in excess of 3,000 gallons per minute (11 356 L/min) at 20 pounds per square inch (138 kPa) residual pressure, as specified in Table B105.2, or exceeds the available *fire flow* at the site of the structure.

Exception: *Fire-flow* requirements in excess of 3,000 gallons per minute (11 356 L/min) may be allowed if, in the opinion of the *fire code official*, all reasonable methods of reducing the *fire flow* have been included within the development and no unusual hazard to life and property exists.

B106.3 Existing buildings.

Existing buildings, regardless of the time of construction, that require a *fire flow* in excess of 3,000 gallons per minute (11 356 L/min) are not required to comply with the *fire-flow* requirements of this section. Additionally, changes in use or occupancy, alterations, or repairs, shall not necessitate further increases in the required *fire flow*. Additions to the building shall not require a *fire flow* in excess of 3,000 gallons per minute (11 356 L/min).

SECTION B107
FIRE-FLOW REQUIREMENTS FOR BUILDINGS IN PROTECTED AREAS WITHOUT ADEQUATE AND RELIABLE WATER SYSTEMS

B107.1 Areas without water supply systems.

The provisions of Section B107 are intended for use by the *fire code official* in *protected areas* in which adequate and reliable water supply systems do not exist. In determining the *fire flow* for buildings, the *fire code official* is authorized to utilize the following nationally recognized standards: NFPA 1142, the *International Wildland-Urban Interface Code* or the *ISO Guide for Determining Needed Fire Flow*.

SECTION B108
FIRE-FLOW REQUIREMENTS FOR BUILDINGS IN UNPROTECTED AREAS (RESERVED)

SECTION B109
REFERENCED STANDARDS

ICC	IBC—18	International Building Code	B103.1, B104.2
ICC	IFC—18	International Fire Code	B105.3
ICC	IWUIC—18	International Wildland-Urban Interface Code	B107.1
ICC	IRC—18	International Residential Code	Table B105.1(1)
ISO	06—2014	Guide for Determining Needed Fire Flow	B107.1
NFPA	13—16	Standard for the Installation of Sprinkler Systems	B105.2.1, B105.3
NFPA	13D—16	Standard for the Installation of Sprinkler Systems in One- and Two-family Dwellings and Manufactured Homes	B105.2.1.1
NFPA	13R—16	Standard for the Installation of Sprinkler Systems in Low-rise Residential Occupancies	B105.2.1.1
NFPA	72—16	National Fire Alarm and Signaling Code	B105.2.1.2
NFPA	1142—17	Standard on Water Supplies for Suburban and Rural Fire Fighting	B107.1

APPENDIX C
FIRE HYDRANT LOCATIONS AND DISTRIBUTION

The provisions contained in this appendix are adopted by the State of Oregon.

User note:

About this appendix: *Appendix C focuses on the location and spacing of fire hydrants, which is important to the success of fire-fighting operations. The difficulty with determining the spacing of fire hydrants is that every situation is unique and has unique challenges. Finding one methodology for determining hydrant spacing is difficult. This particular appendix gives one methodology based on the required fire flow that fire departments can work with to set a policy for hydrant distribution around new buildings and facilities in conjunction with Section 507.5.*

SECTION C101
GENERAL

C101.1 Scope.

In addition to the requirements of Section 507.5.1, fire hydrants shall be provided in accordance with this appendix for the protection of buildings, or portions of buildings, hereafter constructed or moved into the jurisdiction.

SECTION C102
NUMBER OF FIRE HYDRANTS

C102.1 Minimum number of fire hydrants for a building.

The number of fire hydrants available to a building shall be not less than the minimum specified in Table C102.1.

TABLE C102.1
REQUIRED NUMBER AND SPACING OF FIRE HYDRANTS[h]

FIRE-FLOW REQUIREMENT (gpm)	MINIMUM NUMBER OF HYDRANTS	AVERAGE SPACING BETWEEN HYDRANTS[a, b, c, f, g] (feet)	MAXIMUM DISTANCE FROM ANY POINT ON STREET OR ROAD FRONTAGE TO A HYDRANT[d, f, g]
1,750 or less	1	500	250
1,751–2,250	2	450	225
2,251–2,750	3	450	225
2,751–3,250	3	400	225
3,251–4,000	4	350	210
4,001–5,000	5	300	180
5,001–5,500	6	300	180
5,501–6,000	6	250	150
6,001–7,000	7	250	150
7,001 or more	8 or more[e]	200	120

For SI: 1 foot = 304.8 mm, 1 gallon per minute = 3.785 L/m.

a. Reduce by 100 feet for dead-end streets or roads.

b. Where streets are provided with median dividers that cannot be crossed by fire fighters pulling hose lines, or where arterial streets are provided with four or more traffic lanes and have a traffic count of more than 30,000 vehicles per day, hydrant spacing shall average 500 feet on each side of the street and be arranged on an alternating basis.

c. Where new water mains are extended along streets where hydrants are not needed for protection of structures or similar fire problems, fire hydrants shall be provided at spacing not to exceed 1,000 feet to provide for transportation hazards.

d. Reduce by 50 feet for dead-end streets or roads.

e. One hydrant for each 1,000 gallons per minute or fraction thereof.

f. A 50-percent spacing increase shall be permitted where the building is equipped throughout with an approved automatic sprinkler system in accordance with Section 903.3.1.1 of the *International Fire Code*.

g. A 25-percent spacing increase shall be permitted where the building is equipped throughout with an approved automatic sprinkler system in accordance with Section 903.3.1.2 or 903.3.1.3 of the *International Fire Code* or Section P2904 of the *International Residential Code*.

h. The fire code official is authorized to modify the location, number and distribution of fire hydrants based on site-specific constraints and hazards.

User note:

Previous editions of Table C102.1 had large gaps between *fire-flow* requirements. These gaps provided the *fire code official* with discretion based on site-specific considerations. “Note h” provides that same discretion based on the jurisdiction’s determination that conditions particular to a location justify either an increase or a decrease in the number of hydrants, or a change in their arrangement. Any decreases in the general fire protection scheme should take into account possible future development that may occur.

SECTION C103
FIRE HYDRANT SPACING

C103.1 Hydrant spacing.

Fire apparatus access roads and public streets providing required access to buildings in accordance with Section 503 shall be provided with one or more fire hydrants, as determined by Section C102.1. Where more than one fire hydrant is required, the distance between required fire hydrants shall be in accordance with Sections C103.2 and C103.3.

C103.2 Average spacing.

The average spacing between fire hydrants shall be in accordance with Table C102.1.

Exception: The average spacing shall be permitted to be increased by 10 percent where existing fire hydrants provide all or a portion of the required number of fire hydrants.

C103.3 Maximum spacing.

The maximum spacing between fire hydrants shall be in accordance with Table C102.1.

SECTION C104
CONSIDERATION OF EXISTING FIRE HYDRANTS

C104.1 Existing fire hydrants.

Existing fire hydrants on public streets are allowed to be considered as available to meet the requirements of Sections C102 and C103. Existing fire hydrants on adjacent properties are allowed to be considered as available to meet the requirements of Sections C102 and C103 provided that a fire apparatus access road extends between properties and that an easement is established to prevent obstruction of such roads.

SECTION C105
REFERENCED STANDARD

ICC	IRC—18	International Residential Code	Table C102.1

Neah-Kah-Nie Water District
Water Master Plan Update and Water Management and Conservation Plan Update
Nehalem, Oregon

Appendix I
Water Conservation Management Plan

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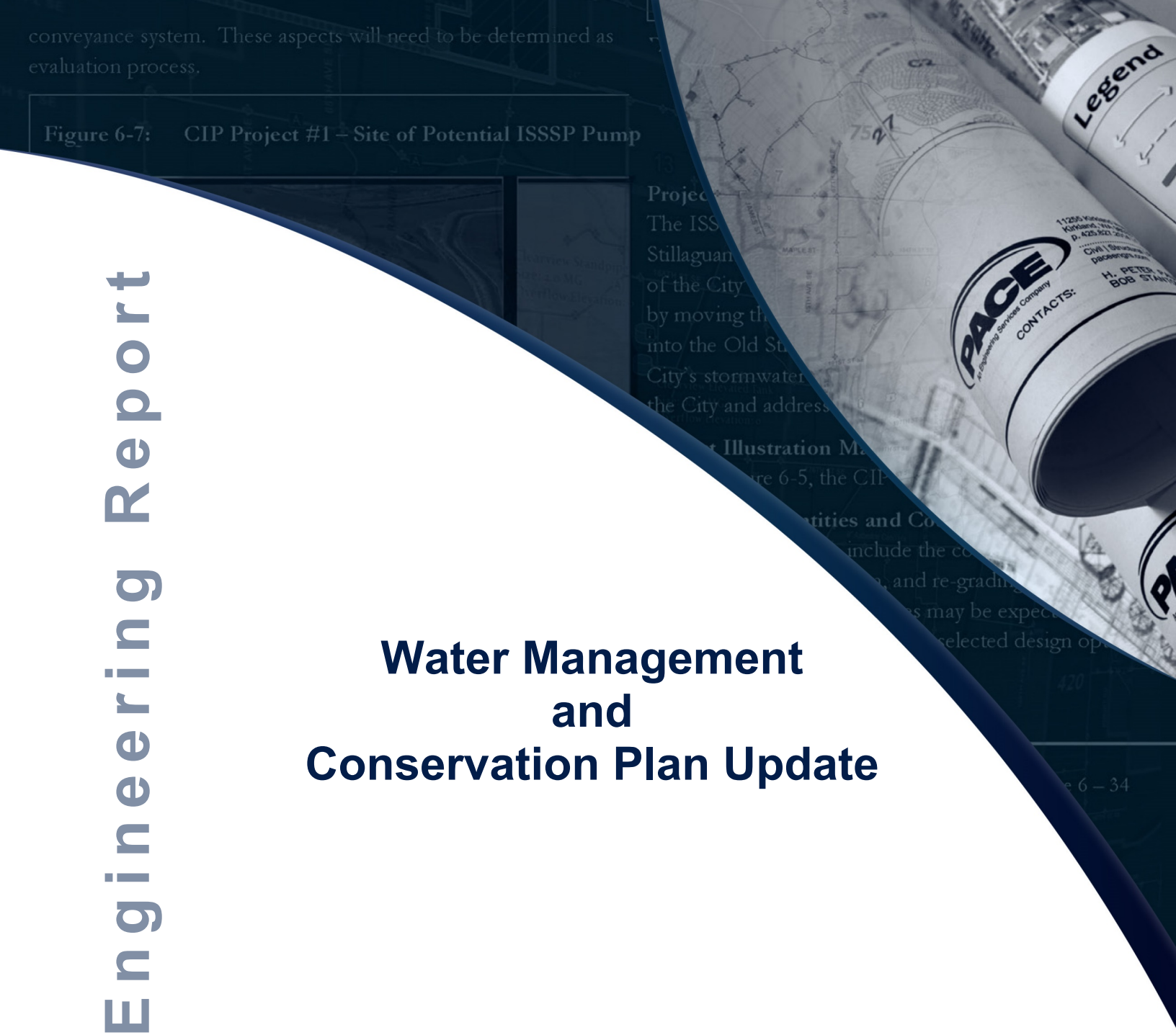

Engineering Report

Water Management and Conservation Plan Update

Prepared For:

Neah-Kah-Nie Water District
9155 Nehalem Road
Nehalem, Oregon 97131

February 2021

PACE
An Engineering Services Company

Water Management
And
Conservation Plan Update

Neah-Kah-Nie Water District
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Lake Oswego, Oregon 97035
PACE Project No. 19863.00

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PROJECT CERTIFICATION

The technical material and data contained in this report was prepared by PACE Engineers, Inc., under the supervision of the below listed individuals. Those responsible staff members who are registered professional engineers are licensed in the State of Oregon.

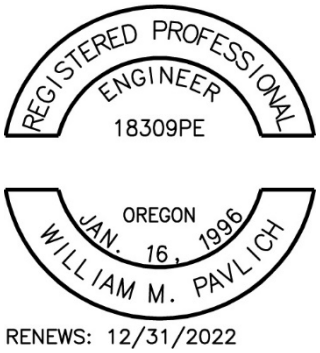

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TABLE OF CONTENTS

SECTION # TITLE **PAGE #**

SECTION -- 1: OVERVIEW

1.1 General System Description

Neah-Kah-Nie Water District (NKN WD) serves the unincorporated community north of Manzanita known as Neah-Kah-Nie Beach. A detailed description of the existing water system is included in Section 3 of the 2020 Water Master Plan Update (2020 WMP).

1.2 Purpose

In April of 2003 NKN WD requested water rights permit extensions on permit numbers 34032 (Pirates Spring) and 51578 (Springs #1-#3 inclusive), thereby triggering the requirement for an approved WMCP as described in OAR 086- 690-315. The 2015 WMCP was prepared and approved by OWRD thereby satisfying the requirement.

This 2020 WMCP is tied to the District's 2020 Water Master Plan Update in identifying opportunities for improving water conservation, correcting system leakage and in planning for future growth and sustainability of sources. In addition, the updated WMCP includes a request for expanding the allowed greenlight water to allow perfection or partial perfection of the District's extended permits by the authorized completion date of October 1, 2023.

1.3 Proposed Progress Report and Update Schedule

Following the administrative rules, the District proposes to submit a progress report on or before October 2025 (five years) to review noted benchmarking and water use progress.

1.4 Summary of Data Sources

Water data presented in this report were entirely derived by NKN WD employees using District-owned telemetry equipment and water billing information and the most recent District Water Master Plan. Plan development is intended to comply with OWRD requirements for a municipal water management and conservation plan. The District relied upon Oregon demographic data and a recent buildable lands survey for historic information and future projections.

1.5 Input During Plan Development

The following is a list of local public agencies and governments that are affected by the operations of the NKN WD.

Nehalem Bay Wastewater Agency - The NBWA provides and maintains sanitary sewer service for all of the Neah-Kah-Nie service area with the exception of three homes located to the north and east of Highway 101.

Tillamook County - The County provides and maintains all public roads and storm drainage facilities in the Neah-Kah-Nie area. Tillamook County is also the local land use authority for all land use planning in the NKN WD area.

Oregon Department of Transportation - ODOT operates and maintains Highway 101, the Oregon Coast Highway, which traverses the northeast Neah-Kah-Nie area.

City of Manzanita - the City is the closest municipality to the NKN WD and operates a regional water system serving the incorporated towns of Wheeler, and Manzanita as well as the rural areas in and around those towns. For emergency use only, in the past, a connection has temporarily been made with the City of Manzanita water system.

Nehalem Bay Fire and Rescue - NBFR provides fire protection to all properties in the Neah-Kah-Nie area, making use of the fire hydrants and water supply of the NKN WD.

Oregon State Parks and Recreation Department (Oswald West State Park) - the OPRD owns and operates Oswald West State Park which abuts the entire North line of the NKN WD service area, although the District supplies no water to this State Park at this time.

1.6 Document Organization

This WMCP is organized in a manner consistent with the Division 86 rules and is based on the text and format of the 2015 WMCP with the notable exception of referencing the 2020 WMP Sections 2, 3, and 5 for descriptions of the water supply system, including key demographic information, water consumption, and the type of infrastructure present in the water system. This was done to avoid repetition and is consistent with OAR 690-086-0120(6) that a water master plan that meets the OAR Chapter 333, Division 61 requirements, and substantially meets the requirements of OAR 690-086-0120 to OAR 690-086-0170 may be submitted to meet the WMCP requirements. WMCP Section 3 identifies the conservation measures the District has implemented and any proposed new measures and the associated benchmarks for each new measure. WMCP Section 4 describes the three tools available to the District in the event of a water emergency, including a water curtailment plan. WMCP Section 5 uses the information referenced in WMCP Section 2 (including references to sections of the Water Master Plan) to forecast future demand, compare that demand to present water rights, and assesses the need for additional source water diversions.

SECTION -- 2: WATER SUPPLIER DESCRIPTION

2.1 Water Supplier Description

See Sections 2, 3, and 5 of the 2020 Water Master Plan Update for water supplier (NKN WD) information.

2.2 Assessment of Supply

See Section 6.3 of the 2020 Water Master Plan Update for an assessment of the water supply.

Table 2.1 below is based on a similar table in the 2015 WMCP and is included below since it is not included in the 2020 WMP.

Table 2.1: Average Monthly and Daily Diversions

Permit No. (Certificate No.)	Water Year	Avg Monthly Diversion (MG)	Avg. Daily Diversion (gallons)
S-10040	2019	0.411	13,497
	2018	0.396	13,033
	2017	0.396	13,033
	2016	*0.324*	*10,641*
	2015	*0.254*	*8,338*
S-35776 (80934)	2019	0.411	13,497
	2018	0.396	13,033
	2017	0.396	13,033
	2016	0.324	10,641
	2015	0.254	8,338
S-51578	2019	0.875	28,762
	2018	0.846	27,798
	2017	1.052	34,591
	2016	0.690	22,683
	2015	0.760	24,986
S-34032	2019	0.059	1,955
	2018	0.045	1,482
	2017	0.046	1,526
	2016	0.000	9
	2015	0.128	4,196

Table 2.1 includes average monthly and daily data but does not reflect the existing and potential future peak usage in the District. The District has seen an increase in short-stay rentals that have had a notable impact on water usage. These rentals are regulated by the County – the District is not able to limit their presence in the community. Increasing water rates to discourage water consumption is possible but is more likely to penalize residents while not impacting rentals since the costs can easily be passed on to renters. Peak usage often occurs during and either side of the 4th of July holiday and during the following days of July and August that are often very dry. During this time, it is important to refill reservoirs as quickly as possible to take advantage of diurnal periods of low usage, and to maintain reservoir levels for potential fire protection needs.

Pirate Spring and Springs #1, #2, and #3 have separate catchments, each with existing potential for contamination as well as reductions in availability in Summer and early Fall. Consequently, the District needs the flexibility of using either or both sources to best meet its needs. As such the District is requesting an increase in the allowed greenlight water (see Section 5.4).

SECTION -- 3: CONSERVATION ELEMENT

3.1 Previous and Current Conservation Efforts

3.1.1 Residential Metering

Each customer in the District is required to have a meter on the service line to the house. Except for six l" meters, all are industry standard 5/8" - 3/4" nutating disk, direct read meters. Meters are read and reported on a regular basis (every two months) by the System Operator for billing purposes.

Blow-offs and fire hydrants are not metered. The District staff is contacted by the Nehalem Bay Fire Department prior to each fire hydrant test when water is used. Similarly, the District is informed by the Nehalem Bay Fire Department following any use of water for firefighting or training purposes in order to estimate the amount of water used for those purposes.

3.1.2 System-wide Monitoring

Five master meters are in place to measure flow into and out of the storage facilities and into each of the three pressure zones. These quantities are then compared to residential meter readings to determine the amount of leakage and unauthorized use. The District General Manager prepares an annual water audit and annual use report to the Board of Directors of the District.

Due to the small size of the Neah-Kah-Nie community, virtually every excavation and construction project in the community is of general knowledge. All of the local excavating contractors are in close communication with the Water District staff, therefore, unmetered and unauthorized uses are very rare and infrequent and are detected almost immediately. The District has found only one unauthorized use in the last 15 years. That unauthorized use was immediately disconnected by the District.

As stated above, all residential services are metered and regularly monitored. Use of water for non-residential uses, such as flushing of lines and fire-fighting purposes, is not directly measured. The District typically only flushes water lines in the winter months when there is an abundance of water and water usage is low. The water used for such flushing is recorded by the telemetry system.

3.1.2.1 Source Metering

Source flows have historically been monitored once a month, using a bucket/stopwatch method, recording the time to fill a 5-gallon bucket. Since 2006 Spring #1, Spring #2 and Spring #3 operate combined and overflow is registered through a propeller meter reporting to the SCADA system. Pirate Spring is likewise equipped with a propeller meter tied to SCADA and a master meter is in place to record water delivered to the distribution system.

3.1.2.2 Master Metering

The primary master meter relied upon to record raw water delivered to the system is a 2" MagnetoFlow meter located in the Hillcrest bunker. This meter records water used from Springs #1 through #3 as it flows from those springs, through the treatment system and into Hillcrest Reservoir.

A 6-inch MagnetoFlow meter is located in the distribution main where it crosses Highway 101. This meter records flows when water is transferred from Hillcrest Reservoir up to the Mt. Reservoir (less any usage occurring in the Upper Zone), and when water is not being transferred, records water leaving the Mt. Reservoir and entering all pressure zones. There are two homes adjacent to the Mt. Reservoir whose water use is not "seen" by this master meter at Hwy 101 or any other master meter. The residential meters serving those two homes are the only data sources for that water use.

Another 6-inch MagnetoFlow meter is located below Hillcrest Reservoir and logs all water moving from that reservoir to the Lower Pressure Zone.

A 2-inch turbine meter is located in the line from the Upper Pressure Zone that feeds the Middle Pressure Zone and tracks all water moving into the Middle Zone.

A 2-inch turbine meter located in the line from Pirates Spring to the Reservoir Park tank logs any water transferred from Pirates Spring to the Lower Pressure Zone via that storage tank.

3.1.2.3 Water Meter Testing

The District does not have a formal meter testing and maintenance program at this time. Meters are visually inspected as part of bimonthly meter reading and are serviced when problems occur. The master meters should be checked for accuracy and calibration on a regular basis. We recommend a maximum of 5 years between calibration and checking on the master water meters. The 2-inch MagnetoFlow meter located in the Hillcrest bunker, and the 2-inch turbine meter located in the line from Pirates Spring to the Reservoir Park were last tested on May 11, 2020.

3.1.3 Leak Detection and Repair

The District uses a SCADA system that logs totals each hour from each master meter in the system. In addition, the System Operator can view live streaming data of instantaneous use at any time he chooses. Furthermore, an automated alarm phone dialer system is in place which will notify registered phone numbers of extreme flow rates or unusually low reservoir levels.

Based on the recommendations of the 2001 Master Plan, replacement of older pipes that have been the historic source of leaks in the system was completed in 2010. Specifically, all asbestos-cement (AC) pipe has been replaced. The NKN Water District staff monitors water use on a daily basis and aggressively looks for water leaks that appear as abnormally high-water use during non -peak use times.

Recent leak detection surveys were conducted on November 29, 2017 (3 leaks, 2.75-3.75 gpm) and March 13-14, 2018 (4 leaks, 9.5-12.5 gpm). Generally, water leaks are repaired on an immediate basis with the assistance of local excavating contractors that work for the District as an on-call basis.

Although proven as an excellent water conservation tool, the use of AMR systems (automated meter reading) or other state-of-the-art meter reading and water use reporting systems cannot be justified for this small district at this time due to the high cost of these systems. The District will continue with bimonthly manual meter reading indefinitely.

3.1.4 Water Policies

The District last updated its water policies in 1998. Among other things, the policies discuss rate schedules, metering, leakage, waste, disconnection and reconnection, cross connection rules, and more.

A rate structure is in place that imposes a disincentive for excessively high volumes of water usage. In addition to an initial monthly base rate charge, water used is also charged for by the gallon, and the charges increase by 40 percent for water usage over 20,000 gallons per bimonthly billing period.

3.2 Water Use and Reporting

The District reports its water use in compliance with OAR 690-085. The report is submitted annually in the format required by OWRD using data from the 2" Hillcrest MagnetoFlow meter and the Pirates Spring 2" turbine meter.

3.3 Rate Structure and Metering

The present rate structure for the District was adopted in 2006 and there are no immediate plans to change the rates. Presently all customer accounts are metered using industry-standard 5/8" - 3/4" residential meters (with 6 exceptions of 1" meters in special instances).

The District charges a monthly base rate (before water charges) of $25.00 and a monthly System Enhancement Fee (SEF) of $20.00. This SEF is in place to pay down two large infrastructure loans used to enhance the system mains, storage and related facilities. Water is sold at the rate of $2.75 per thousand gallons up to 20,000 gallons per bimonthly period. Designed as a conservation incentive, water used past the 20,000 mark is charged at $3.50 per thousand gallons.

3.4 Additional Conservation Measures

After the regular bimonthly meter readings, any residences indicating unusually high use are noted and their owners or managers are contacted immediately or by mail depending upon the severity of the indicated problem.

The District includes with its bimonthly billing, a newsletter which always includes some discussion on the topic of water conservation.

3.5 Planned Conservation Measures

The District has researched recent advances in leak detection to select a method that might help locate the apparent leakage occurring in the system.

Management will periodically execute water audits in the 3 pressure zones to try to determine leakage and trends. With the recent upgrade of the SCADA system, the outcomes of these audits promise to be more informative and useful than past audits.

The District will augment its education and outreach to customers with installed irrigation systems or those customers known to irrigate manually to educate them about the advantages of watering during night-time hours rather than daytime.

3.6 Conservation Benchmarks

The District is actively engaged in leak detection and repair. A residential meter replacement program has not yet been implemented. Proposed conservation benchmarks in the 2015 WMCP are summarized in Table 3.1.

Table 3.1: Conservation Activities (2015 WMCP)

	Year	2014	2015	2016	2017	2018
Measure						
Leakage Analysis		Ongoing				
System Repair		Ongoing as needed				
Low Flow Fixtures		Develop for future – 3 to 4 year timeline				
Irrigation Management		Develop for future – 3 to 4 year timeline				
Public Education		Ongoing				

As noted in Section 3.1.3, the District has continued with leak detection efforts and follow up repairs as needed. Low flow fixtures, irrigation management, and public education have been achieved via the District's bimonthly newsletter. The 2015 WMCP also mentioned development and implementation of a residential meter replacement program by year 2020. This did not occur. Projected conservation activities are shown in Table 3.2.

Table 3.2: Conservation Activities (2020 WMCP)

	Year	2021	2022	2023	2024	2025
Meter Replacement		Develop and implement program by year 2024				
Leakage Analysis		Ongoing				
System Repair		Ongoing as needed				
Low Flow Fixtures		Continue providing information in bimonthly newsletter				
Irrigation Mgmt.		Continue providing information in bimonthly newsletter				
Public Education		Continue providing information in bimonthly newsletter				

SECTION 4: CURTAILMENT PLAN ELEMENTS

4.1 Context

4.1.1 Water Conservation Plan

A water conservation plan was prepared for the District by HLB in 1997. That plan was prepared and submitted to the Oregon State Health Division and addressed issues different in scope from the 2015 WMCP. The 2020 Water Conservation and Management Plan is very similar to the 2015 WMCP with the notable exception of the additional Greenlight water being requested.

4.1.2 Conservation Measures

Conservation measures that have been implemented by the District include leak detection and correction, graduated rates based on usage, and education of the public on methods of conservation.

4.1.3 Water Auditing

Master meters are in place to measure flow into and out of the storage facilities. These quantities are then compared to residential meter readings to determine the amount of leakage and unauthorized use. The District General Manager prepares an annual water audit and annual use report to the Board of Directors of the NKN Water District.

Due to the small size of the Neah-Kah-Nie community, virtually every excavation and construction project in the community is of general knowledge. All the local excavating contractors are in close communication with the Water District staff. Therefore, un-metered and unauthorized uses are very rare and detected almost immediately. The District has found only one unauthorized use in the last 15 years. That unauthorized use was immediately disconnected by the District.

4.2 Curtailment Plan

Historically, system deficiencies have typically been the result of problems in conveying the water from the source to the customer. Damage to the system mains have been caused by construction activities as well as natural causes, including downed trees and localized landslides. The Oregon One Call Notification System and its subscribers have been largely responsible for a decrease in these service interruptions.

4.2.1 Shortages

Since the "Big Project" was completed in 2006, there have been few shortages or near shortages for NKN Water District. With the exception of routine line flushing and hydrant flushing which cause short duration lowering of reservoir levels, all reservoir levels have remained within normal range. The District has come close to needing the water system emergency intertie that was constructed between the District and Manzanita. To date the intertie has not been utilized.

4.2.2 Stages

Because of the comprehensive improvements implemented during the Big Project and related improvement projects following the Big Project, any shortages that occur will likely affect the entire system rather than individual zones.

The District has developed (but has never needed to implement) a water curtailment notification plan that includes three levels of notification. Water users receive a different colored notice on the door of each residence whenever minimum notification thresholds are met. This method of notification is deemed by the District to be the best means of communicating water shortages given the transient nature of the population in the NKN Water District. Each different level of colored notices asks water users to voluntarily curtail certain water uses.

4.2.3 Causes of Shortages

1. Mountain reservoir reaches a critical level. Activates pump at Reservoir Park.
2. Reservoir Park reservoir reaches a critical level. Activates pump at Pirate Springs.

3. Hillcrest Reservoir reaches a critical level. Activates inlet from Springs #1 through #3.
4. Continuous collection and transmission from Pirate Springs repeatedly fail to meet daily shortfalls in supply. District implements emergency community conservation measures encouraging reduced water use.
5. Mechanical or electrical malfunctions of pumping capabilities or one of the booster stations.
6. Interruption of the local power company supply.
7. Abnormal weather conditions determined by low rainfall during winter months reducing groundwater levels in the District's watershed.
8. Declaration of a drought for the area by the Governor pursuant to Oregon Revised Statute 536.720.
9. Natural disasters that damage critical infrastructure hindering the water system to operate under normal conditions.
10. The deliberate act of contaminating at various points in the water system.

4.2.4 Alert Levels

Since the District is entirely residential, curtailment actions are limited to those related to residential activities and operation of the District facilities.

Stage 1 Alert Level (Mild) The indication that a Mild alert level will be necessary is based on any one of the following:

1. Water usage reaches 80% of capacity for three consecutive days.
2. Constriction that impedes full capacity flow of system for more than 5 days.
3. A complete shut down or any action that may reduce flow capacity below 80%.
4. A sudden drop in normal flows for Springs #1 through #3, especially Spring #3.

Curtailment Actions - The General Manager will notify customers of need to conserve by reducing water use at least 15%. Communicate this to customers using temporary road signs (in stock), radio broadcasts, announcements on the local Internet bulletin board service and via the bimonthly newsletter sent with water bills. The System Operator will identify any possible actions that could reverse the trend and will implement them as appropriate.

Stage 2 Alert Level (Serious) The indication that a Serious alert level will be necessary is based on any one of the following:

1. Water usage reaches 95% of capacity for three consecutive days.
2. Delivery rate is reduced to 70%
3. Normal flow is reduced to 70%
4. The area is declared in a severe drought.

Curtailment Actions - The same as for a Stage 1 Alert but will also stress curtailment of outdoor watering and washing of cars, boats, driveways, etc. The General Manager will personally contact short- term rental companies asking them to urge their customers to conserve. The District will cease using any water for flushing or any other tasks not deemed absolutely necessary. Road signs will be replaced with Stage 2 signs.

Stage 3 Alert Level (Critical) The indication that a moderate alert level will be necessary is based on any one of the following:

1. Pumping capacity is reduced to 50%
2. Normal flow is reduced to 50%
3. A natural disaster that incapacitates the water system or contaminates the water source.
4. Intentional act causing long term disabling of the water system.
5. Other event resulting in a sustained deficit of water.

Curtailment Actions - The same as for a Stage 1 & 2 Alert levels but will create a mandatory curtailment of outdoor watering and washing of cars, boats, driveways, etc. The District will cease using any water for flushing or any other tasks not deemed absolutely necessary. The General Manager will make direct contact with homeowners known to have automated irrigation systems and ask that their use be discontinued until further notice. The System Operator will install Stage 3 road signs. The System Operator and General Manager will both patrol the community in order to assure compliance.

SECTION 5: MUNICIPAL WATER SUPPLY ELEMENT

5.1 Future Service Area

The current and future service area for the District is described in Section 2.3 of the 2020 WMP.

Estimated growth at 1.4% average annual growth rate (AAGR) represents an increase of 123 new connections over the next 20 years (to year 2040) for a total of 511 connections. Ultimate buildout, at 1.4% AAGR, is projected to occur in 2066 with 774 total connections.

Growth of the District boundaries are not anticipated, based on geographical limitations: City of Manzanita to the south, Pacific Ocean to the west, Oswald West State Park to the north, and mountainous terrain to the east.

5.2 Future Demand

Projected water system demands for the District are shown in Section 5.8 of the 2020 WMP. All parameters noted increase by 1.4% per year for planning purposes and represent an average over the planning period. The water demands in Section 5.8 represent a 24-hour average. Water supply and treatment capacity are more appropriately based on a shorter period, with the maximum day volume averaged over a 20-hour period. Doing so increases the 24-hour average an additional 20%. Based on a 20-hour calculation:

- The projected maximum instantaneous diversion rate that will be needed to meet the District's demands for water in year 2030 is 0.30 cfs (or 134 gpm).
- The projected maximum instantaneous diversion rate that will be needed to meet the District's demands for water in year 2040 is 0.34 cfs (or 154 gpm).

5.3 Long Range Supply Plan

The long-range supply plan goals for the District includes:

- Using District sources, provide the water supply needed to accommodate the projected growth over the next 20 years to the extent possible.
- Provide for enhanced system reliability by expanding supply in Pirate Spring to better provide for circumstances, including potential contamination of the Springs #1, #2, and #3 source, when Pirate Spring is the only District source available.
- Increase capacity of the Springs #1, #2, and #3 supply to expedite refilling of reservoirs after maintenance or during operations that deplete reservoir capacity; and to better meet peak system demand if Pirate spring is unavailable.
- Perfect or partially perfect remaining water right permits prior to the need to extend them

Background information that supports these goals include:

- The District has had long-standing plans to add a second pump to Pirate Spring for both reliability (allowing alternating, simplex operation) and for increased flow when spring flow is available and flow from Spring 1, 2, 3 is limited or unavailable. Duplex operation capability during times of need would be a nominal additional cost to the proposed addition of a (second) similarly sized pump.
- Infrastructure to accommodate the full permitted flow from Springs #1, #2, and #3 is already existing and operational. Currently, a flow controller is used to limit flow to the allowed maximum. Since the means exist, there is no additional cost to the District for implementing this capability.

- In a January 27, 2014 memorandum, Oregon Department of Fish and Wildlife (ODFW) determined that "there are no fish in either spring", and that "use of the undeveloped water will not affect fish persistence."
- The District has completed hydrogeological studies of both water sources. Findings include assessments of contamination potential and indications that Springs #1, #2, and #3 have low to high risks and Pirate Spring has low to moderate risks based on current and proposed development. The District is planning to implement protections to reduce the risks to low risk, and is considering the acquisition of substantial acreage in the defined source protection area for Springs #1, #2, and #3 to better protect its main water source. The risks that exist and persist is why there is a definite benefit of maximizing the production of each source so as to have the capacity to provide water for the District if one source is unavailable for an extended period because of contamination.
- While an emergency connection exists with the City of Manzanita, it is much more cost-effective for the District to provide for its supply and operational needs than to utilize the connection. In addition, the Manzanita/Wheeler water system is currently extending its well supply permits. Preliminary indications from OWRD and ODFW indicate that fish presence concerns will result in curtailment requirements during periods of low streamflow; consequently, water supply may not be available for Neah-Kah-Nie except to address true emergencies.

Expanding supply capabilities requires an increase in allowed Greenlight water. Section 5.4 below includes a request to OWRD for an increase in greenlight water.

5.4 Greenlight Water Request

The Greenlight Water quantity requested is shown in Table 5.1 below. A summary of the water supply goals and background information is provided in Sections 5.2 and 5.3 above.

The District has implemented water conservation measures (see Chapter 3), but none that can reduce the cost to be equal or less than the proposed modifications that would provide the additional Greenlight water requested. In addition, the District has a population of less than 1,000.

Increased use from the District's two sources is the most feasible and appropriate water supply alternative, since the additional capacity is associated with existing infrastructure (Springs #1, #2, and #3) or the proposed rationally sized reliability enhancements (Pirate Spring).

As noted in Section 5.3 above, ODFW has indicated that "use of the undeveloped water will not affect fish persistence." Also, there is one senior water right holder on Pirate Spring that was diverting water in excess of their water right. This has been corrected, resulting in more water available for the District and effectively ending calls by the senior right holder for the District to limit withdrawals (see Sections 3.3.3 and 6.3.1 of the 2020 WMP for details).

There is no legal requirement for mitigation associated with increased water diversions associated with the two permits.

Table 5.1: Water Right Development Projection

Permit (P) or Certificate (C)	Priority Date	Spring Name	Certificate or Permit Rate (cfs)	2015 Greenlight Allowance (cfs)	Requested 2020 Greenlight Allowance (cfs)	Antcipated 2020 Greenlight Implementation
C 21423	04/30/1929	1	0.01	—	—	—
C 21423	04/30/1929	2	0.01	—	—	—
C 21423	04/30/1929	3	0.15	—	—	—
C 80934	12/07/1970	1	0.01	—	—	—
C 80934	12/07/1970	2	0.01	—	—	—
C 80934	12/07/1970	3	0.15	—	—	—
P 51578	04/07/1992	1	0.06	0.03	0.06	2020-2025
P 51578	04/07/1992	2	0.06	0.03	0.06	2020-2025
P 51578	04/07/1992	3	0.20	0.10	0.20	2020-2025
P 34032	12/09/1968	Pirate	.045	0.13	0.26	2020-2025
Total	—	1, 2, 3	0.66	0.16	0.32	2020-2025
Total	—	Pirate	0.45	0.13	0.26	2020-2025

Both permits (S51578 and S34032) were extended to October 1, 2023. The development plan assumes that the District will perfect or partially perfect its permits prior to the need to apply for a new permit extension.

Neah-Kah-Nie Water District
Water Master Plan Update and Water
Management and Conservation Plan Update
Nehalem, Oregon

Appendix J
Seismic Risk Assessment and Mitigation Plan
PACE Engineers, Inc., October 2020

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Seismic Risk Assessment and Mitigation Plan

Neah-Kah-Nie Water District

February 2021

INTRODUCTION

Oregon Health Authority (OHA) currently requires community water systems with more than 300 connections, and with facilities located in Areas VII through X on *Map of Tsunami Damage Potential for a Simulated Magnitude 9 Cascadia Earthquake*, Open File Report 0-13-06, Plate 7 published by the State of Oregon, Department of Geology and Mineral Industries, to complete a seismic risk assessment and mitigation plan as part of their new or updated water master plan. Neah-Kah-Nie currently has 388 connections and is predominantly in Area VIII. Area VIII is associated with moderate to heavy damage. Neah-Kah-Nie also includes some areas (such as the tsunami inundation zone) that may be characterized as Area IX or X. Damage in these areas is characterized as heavy to very heavy.

This Plan is being prepared in conjunction with the Neah-Kah-Nie Water Master Plan Update 2020; consequently, much of the background and related information is included in the body of the 2020 Master Plan.

CRITICAL FACILITIES

Neah-Kah-Nie Water District is a residential community. Critical facilities within the community include:

- Water District office (currently located within the tsunami inundation area).
- District water sources (Pirate Spring; Springs #1, #2, and #3).
- District storage reservoirs (Reservoir Park, Mountain Tank, Hillcrest).
- District treatment facilities (Pirate Spring, Hillcrest, Mountain Tank).
- District transmission and distribution system.
- Intertie with the Manzanita water system.
- Wastewater pump stations.
- Highways and road access to Neah-Kah-Nie.

Neah-Kah-Nie Water District does not have a fire department or healthcare facilities. Emergency response within Neah-Kah-Nie is limited to repairs to water system infrastructure and to the limited capabilities of local residents. True emergency response capabilities can be provided by local (Tillamook County and others) agencies and jurisdictions if they can mobilize and deliver or provide the needed services.

LIKELIHOOD AND CONSEQUENCES OF SEISMIC FAILURES

Natural hazards are discussed in Section 2.2.4 of the 2020 Water Master Plan (2020 WMP). Vulnerabilities (including landslides, seismic risk, and reliability) are discussed in Section 6.6.

Most of the District is on hillsides overlain with landslide deposits. There are developed areas within the District that are within the tsunami zone. Weather can be extreme in terms of wind and rain during much of the year. The recharge area for Pirate Spring includes considerable development that is served by a gravity sewer system. A Cascadia earthquake in this area could be especially severe in its impact to critical facilities depending on the other variables present. Based on the statistical frequency of Cascadia earthquakes the likelihood of an event affecting Neah-Kah-Nie is moderate, but the consequences are likely to be moderate to severe. Potential impacts and consequences of seismic failures include:

- Water District office. The office includes the District's computer and SCADA hub and is located within the tsunami inundation zone. Loss of the office would impair monitoring and operation of the water system and complicate coordination of repair efforts.
- District water sources. The recharge area for Pirate Spring includes gravity sewers that could break during a seismic event with a potential for contaminating Pirate Spring. Seismic events can trigger ground movement that can choke or enhance flow from a spring. As such there is potential for diminution or loss of spring flow. Ground movement or landslides at the Pirate Spring site could severely damage the spring collection and pumping system rendering them inoperable until repaired.
- The recharge area for Springs #1, #2, and #3 is currently undeveloped, but the District is concerned about water quality impacts associated with potential development in the area. Any wastewater collection and onsite treatment/disposal facilities would be vulnerable to damage in a severe earthquake that could result in leakage of wastewater to the recharge area and contamination of the water source. Concerns with diminishment of flow and loss of functionality are similar to those discussed above for Pirate Spring.
- District storage reservoirs. The District's reservoirs are older and, with the possible exception of Mountain Tank Reservoir, likely do not substantially meet the current seismic code. The District's reservoirs are located on landslide deposits and may be susceptible to slides associated with large seismic events. Catastrophic failure of a reservoir is less likely than loss of a roof through excessive sloshing of water in the reservoir, partial buckling, or other structural damage, or shearing or breakage of piping and consequent draining of the reservoir.
- District treatment facilities. The District performs minimal treatment and under emergency conditions disinfection alone would be needed. Damage to equipment is possible but the District should be able to repair or substitute an alternative disinfection process in relatively short order.
- District transmission and distribution system. The raw water transmission main between Springs #1, #2, and #3 and Hillcrest is probably the single most critical main. Hillcrest includes treatment and storage facilities and is located in the middle of the District. Assuming these facilities are functional, the facility could function as a central site for filling water containers with potable water even if the rest of the distribution system is too damaged to be used to deliver water to residents. The distribution system includes several options for routing water throughout the systems pressure zones; consequently, damage to part of the system may not overly affect the ability to provide service to other parts. The District has replaced all AC mains in the system with PVC; consequently, the likelihood of damage is less than it would have been but is still significant since the mains are located in landslide deposits. Loss of the distribution system would also affect

the ability to provide fire protection since the District would be dependent on fire fighters from outside the District to be available with tankers and have access via the few roads into the District.

- Intertie with the Manzanita water system. The likelihood of damage to the intertie is probably similar to that of other water mains in the area. Failure of the intertie may not have a significant consequence if mains in the District's water system have also failed such that service cannot be provided. Loss of the intertie would be critical if both District sources were unavailable (for reasons discussed above) and the distribution system (in whole or part) was still functional and able to convey water delivered via the intertie.
- Wastewater pump stations. Failure of the wastewater pump stations could, if prolonged, result in areas without effective sewerage. This could result in an "alternative means" of waste disposal by residents that could result in source contamination.
- Highway and road access. Road access to Neah-Kah-Nie is limited and ultimately dependent on the functionality of Highway 101. Damage to the highway could adversely affect the ability of people to evacuate or obtain medical assistance, or for outside agencies and assistance to reach the community.

GENERAL ASSESSMENT AND MITIGATION PLAN

Neah-Kah-Nie Water District serves a small community located in an area with significant risk to the ability to provide water service after a Cascadia subduction zone earthquake. The District possesses several features that enhance system reliability and mitigate for possible adverse impacts to District facilities. These features include:

- Multiple sources (two springs, one intertie).
- Multiple storage reservoirs (three distributed across the system).
- Limited treatment needs (disinfection).
- Multiple pathways for shuttling water to the various service areas and pressure zones.
- Recent replacement of AC and older mains with new PVC mains.
- SCADA system for monitoring.
- Diligent operation and maintenance.

Projects to be completed over the next 50-years to upgrade, retrofit, or rebuild District facilities to better protect against adverse impacts from a Cascadia subduction zone earthquake include:

- New reservoirs. Two new reservoirs are planned for replacement of Hillcrest and Reservoir Park reservoirs within the next 5 years. The reservoirs will be designed to current seismic standards. A seismic evaluation of the Mountain Tank reservoir site will also be conducted and include evaluations regarding potential improvements. During design, consideration will be given to adding a seismic valve to one of the reservoirs – most probably Hillcrest because of the proximity of other critical facilities.
- Source protection. Section 6.6 of the 2020 WMP includes recommended mitigation measures that should be implemented within the next 5 years.
- Pirate Spring improvements. The District plans on adding a second pump to Pirate Spring thereby increasing capacity and enhancing reliability in the event of damage to one of the pumps. The transmission main between Pirate Spring will also be replaced. These improvements should be implemented within 5 years.

- SCADA/telemetry upgrades. These improvements should be implemented within 5 years.
- Location of critical SCADA and related facilities at Hillcrest. This is a project that the District is pursuing in-house to locate SCADA controls and related facilities at the Hillcrest site to serve as a backup if a tsunami should occur and damage the existing District office. These improvements should be implemented within 5 years.
- Leak detection. This is a recommended annual activity for the District. Prompt attention to detected leaks can prevent minor defects from becoming major breaks during a seismic event. This is in addition to benefits of reducing lost water.
- "50-year" improvements. Improvements over the next 50 years that are not discussed above are likely to include new infrastructure to serve new development and replacement of aging infrastructure. Timing and the specific nature of each improvement will need to be determined and will be guided by regulatory changes, revised guidelines and best practices, and technological improvements in materials and equipment. New infrastructure (needed for specific developments) should be provided as needed by the developers, but the design and construction reviewed and approved by the District to ensure conformance with District standards. Replacement of infrastructure other than as noted above, may be limited with the likely exception of replacement of Mountain Tank reservoir. The nature and timing of Mountain Tank related improvements will be dependent on findings of the anticipated seismic site evaluation.

Neah-Kah-Nie Water District
Water Master Plan Update and Water
Management and Conservation Plan Update
Nehalem, Oregon

Appendix K

Feasibility Study of Protective Measures Related to Highway Construction

Akana Engineering, July 25, 2017

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AKANA
Plan + Design + Engineer + Manage
6400 SE LAKE ROAD, SUITE 270
PORTLAND, OR 97222
Phone (503) 652-9090 Fax (503) 652-9091

TECHNICAL MEMORANDUM

Neah Kah Nie Water District
Spring 3 Water Quality Protection
Feasibility Study of Protective Measures Related to Highway Construction

TO: Mr. Richard Felley, General Manager
Neah Kah Nie Water District

FROM: Paul Knox, PE

COPIES: Robert Long, Ryan Shojinaga, CwM H2O; File

DATE: July 25, 2017

PROJECT NO.: 17-026

Introduction and Scope

The Neah Kah Nie Water District is a water purveyor located in Nehalem, Oregon, on the northern Oregon coast. One of its principal water sources is an improved spring, known as Spring 3, located down gradient of Highway 101, the principal state highway in the region. Akana has been contracted to recommend and assess two engineering mitigation alternatives to reduce risks posed to Spring 3 from a contaminant spill on Highway 101.

Existing Conditions

Highway 101 runs generally northwest to southeast along a curve in the vicinity of Spring 3, sloping downward in the southeasterly direction at an average slope of roughly 3 to 4 percent. The highway is superelevated (banked) through the curve, with the cross-slope of the roadway draining to the west, toward Spring 3. A small, unnamed stream crosses the highway in an existing culvert. The stream continues generally southward direction and passes below Spring 3 approximately 450 feet from the culvert, at a much lower elevation. Contaminant spills which reach the unnamed

stream will pass below the spring. A topographic map of the project area is included in Appendix A.

Figure 1 - Highway 101 above Spring 3
(Photo taken from east side looking north)

Spring 3 is located at a distance of approximately 300 feet perpendicular from the centerline of Highway 101, which is located to the northeast, and approximately 450 feet south of the culvert which carries the unnamed stream under the highway. An unpaved access road provides access from the highway to the spring enclosure.

Figure 2- Spring 3
(Photo taken from south end of spring, looking north)

Design Criteria

Proposed improvements such as guardrails, drainage curbs, storm sewers, and improved roadside ditches placed within the right-of-way of Highway 101 will need to conform to the design standards of the Oregon Department of Transportation (ODOT), the agency having jurisdiction of this section of roadway.

Proposed Mitigation Measures

For the purpose of this study, two engineered mitigation alternatives have been considered: 1. Guardrail and drainage curb at the highway and 2. Open channel drainage improvements at the highway and near the spring. In addition, we have performed an analysis of the topography between the highway and Spring 3.

Topographic Analysis

During our visit to the site, we made a detailed examination of the area between Highway 101 and Spring 3. During this examination, we observed that the surface area which directly drains onto the fenced area of the spring was relatively small, and that surface drainage from the highway appeared to be diverted by a shallow channel running along the roadside to the unnamed stream, where it would pass below the spring. It was not clear if the shallow depth of the open channel running along the roadside is the result of surface runoff eroding the existing ground, or if a constructed channel may have filled in due to a lack of maintenance. Figure 3 on the following page shows a representative view of the existing open channel along the roadside.

Once we had the topographic map, we were able to verify our field observations by performing a "water drop" analysis of the existing ground surface, in which in which various points along the highway surface were selected, and the path over which an imaginary drop of water would flow is drawn. A copy of the topographic mapping and water drop analysis is shown in Appendix B.

In the event, a higher level of protection for the Spring is desired, or if there is concern that a potential spill may not be adequately contained by the existing topographic controls, more extensive control measures have been developed.

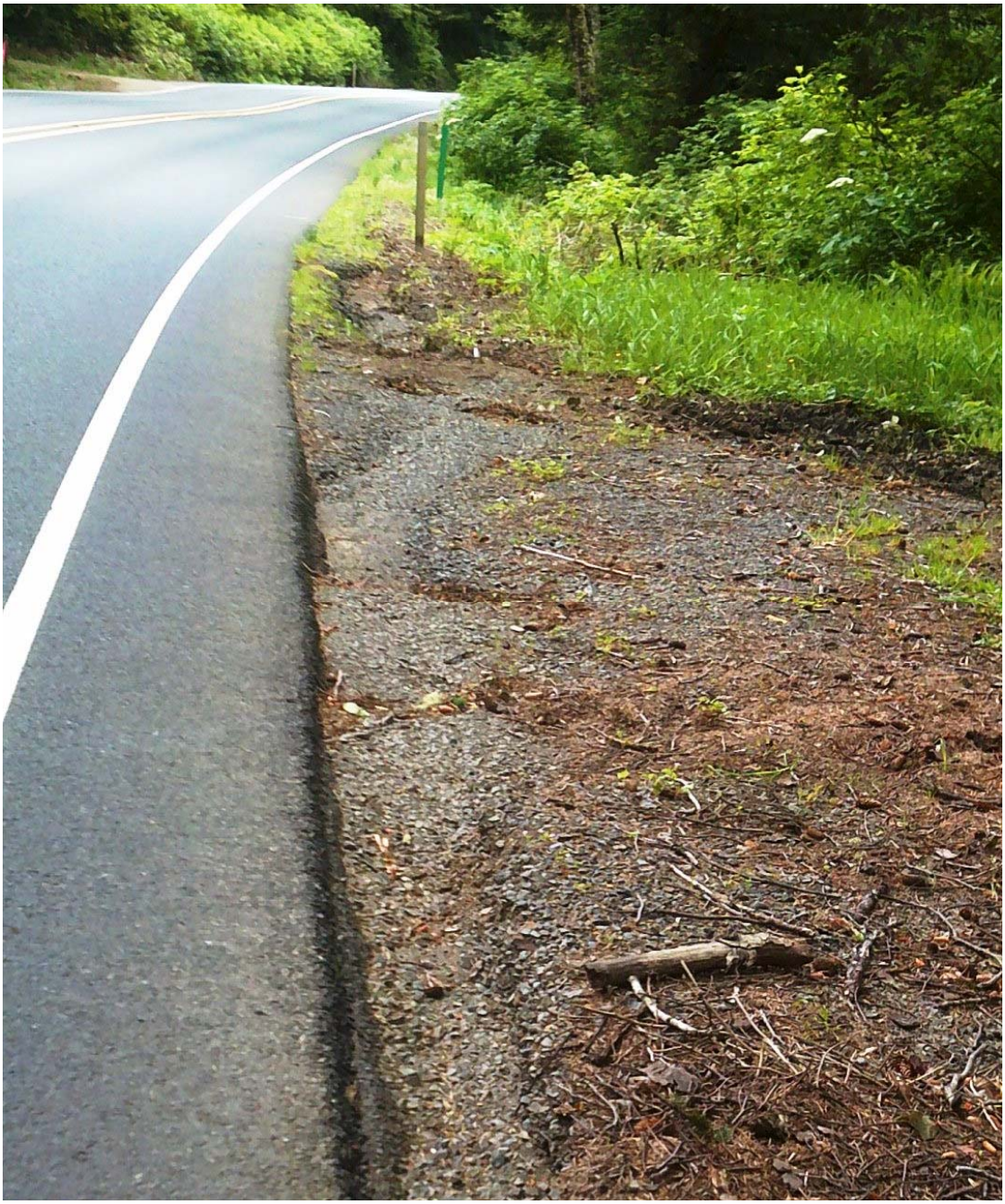


Figure 3- Existing shallow open channel along roadside

Alternative 1: Guardrail And Drainage Curb At The Highway

In this alternative, a combination of guardrail and drainage curb would be installed along the lower (west) edge of the highway to provide a physical barrier to vehicles and the flow of liquid contaminants. The guardrail and drainage curb would extend approximately 300 feet, roughly conforming to that portion of the highway where the embankment was placed over the historic stream channel. In order to meet ODOT clear zone requirements, the curb and guardrail would be placed 10′ outside the existing travel lane, which will require that additional earthen material be placed along the

highway embankment. A new manhole would be placed near the end of the existing culvert and new culvert pipe will be placed at an angle from the existing culvert to direct water in the culvert to the point where the new widened embankment meets the existing stream channel. A riprap splash pad will be placed at the lower (southeast) end of the drainage curb, where runoff from the highway will leave the curb and flow back onto the existing ground. A plan view and cross section of these proposed improvements are shown on Appendix C.

Figure 4 - Conceptual Guardrail Location

This alternative would provide a higher level of physical separation of vehicles and liquid contaminants than for the other alternative under consideration.

Due to the steep slopes in the area, the need to maintain traffic flows during construction, and the probable presence of wetlands in the vicinity of the stream banks, construction costs for these improvement can be expected to be considerably higher than for the other alternative under consideration. In addition, the guardrail, terminals, and anchors are quite costly. Finally, the level of involvement by ODOT during the review, approval and permitting of this work will be greater than for the other alternative under consideration, which will also add to project costs.

A budget-level cost estimate of these proposed improvements is shown on Appendix C. The total construction cost, including a 25% contingency and an allowance for design, permitting and construction services, is estimated to be $281,531 for this alternative.

Alternative 2: Open Channel Drainage Improvements

In this alternative, the existing poorly maintained open drainage channel running beside the highway would be cleaned and deepened to increase its flow capacity. A new channel depth of 12″ to 18″ would represent a significant improvement over the existing condition. A culvert could be added near the location where the unpaved access road to Spring 3 connects to the highway. This open channel would extend approximately 300 feet, from the south end of the widened pavement apron at 38400 Highway 101 to the point where the existing open channel runs down the edge of the road embankment to the end of the existing culvert.

Figure 5 - Upstream end of existing open channel along roadside
(Beginning of channel is visible approximately 6' from end of widened pavement)

Figure 6 - Downstream end of existing open channel along roadside
(Green stake in background marks location of culvert end crossing highway)

Additional protection of Spring 3 would be provided by excavating a diversion channel into the existing ground surface in the area upstream of the fence enclosing Spring 3. Work in this area, which is located well outside of the highway right-of-way, would serve to direct liquids flowing along the ground surface above the spring to the stream, rather than ponding in this area, as they appear to do in the present condition. A plan view and cross section of these proposed improvements are shown on Appendix D.

This alternative would improve the ability of the existing open channel to divert liquid contaminants which could be released by a spill on the highway away from Spring 3. This is not to say that such a spill would not have a serious environmental impact; however, Spring 3 would be protected and drainage pattern would not be fundamentally changed from what exists at present.

Due to the relatively simple nature of the work, the short duration of time needed to perform the work, and the fact that it could be considered as maintenance work, rather than a significant new construction project, it is anticipated that construction costs for this alternative would be considerably lower than for the other alternative under consideration.

A budget-level cost estimate of these proposed improvements is shown on Appendix D. The total construction cost, including a 25% contingency and an allowance for design, permitting and construction services, is estimated to be $24,375 for this alternative, which is less than 10% of the cost of Alternative No. 1.

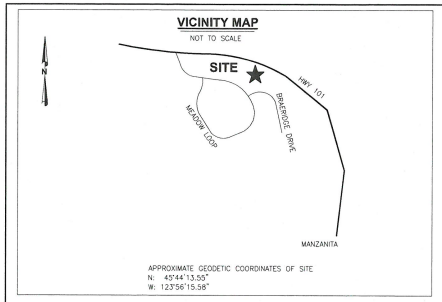
APPENDIX A

TOPOGRAPHIC MAP

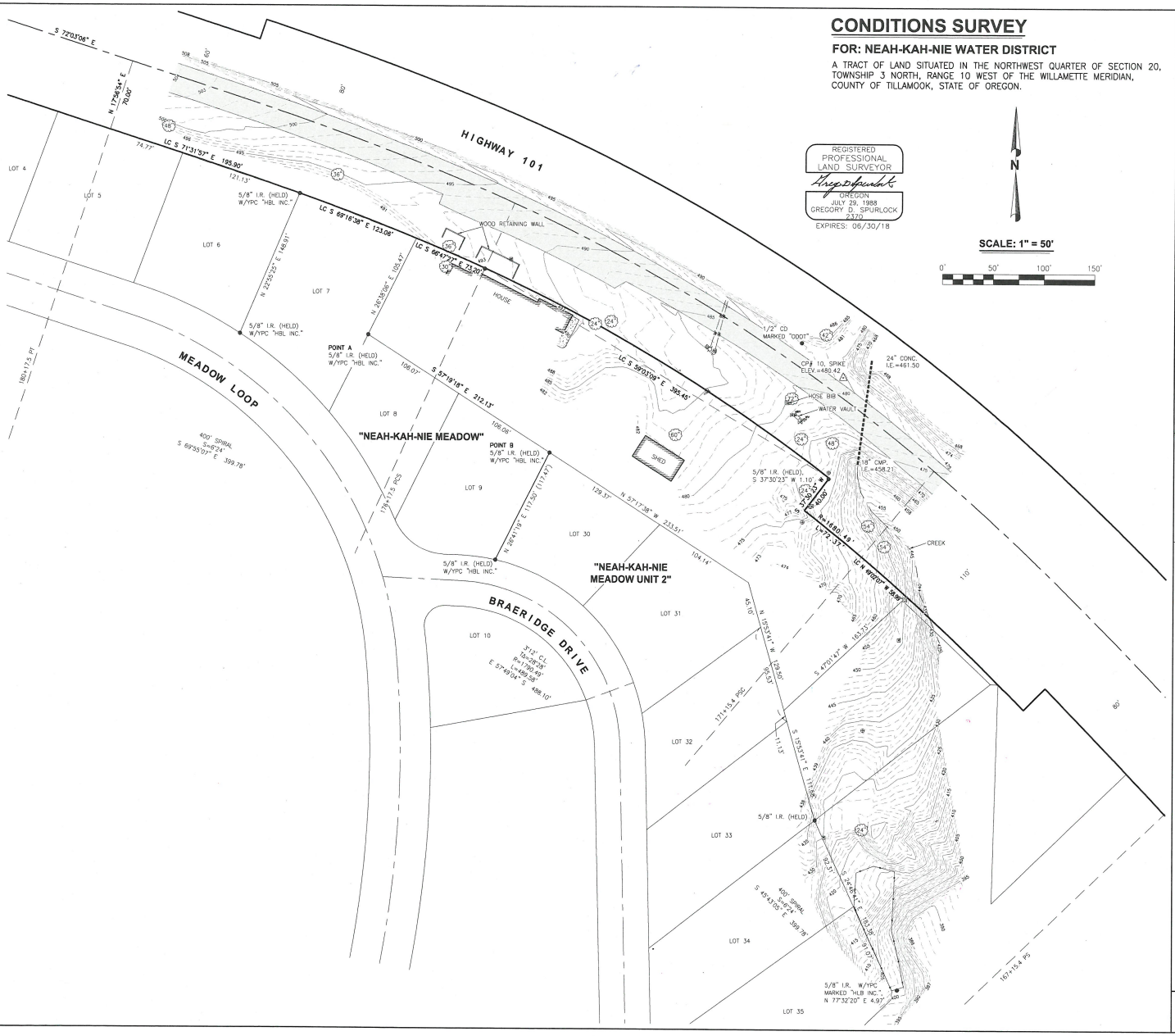
CONDITIONS SURVEY

FOR: NEAH-KAH-NIE WATER DISTRICT

A TRACT OF LAND SITUATED IN THE NORTHWEST QUARTER OF SECTION 20, TOWNSHIP 3 NORTH, RANGE 10 WEST OF THE WILLAMETTE MERIDIAN, COUNTY OF TILLAMOOK, STATE OF OREGON.



APPROXIMATE GEODETIC COORDINATES OF SITE
N: 45°44'13.55"
W: 123°56'15.58"



REGISTERED PROFESSIONAL LAND SURVEYOR
OREGON
JULY 29, 1988
GREGORY D. SPURLOCK
2370
EXPIRES: 06/30/18

N

SCALE: 1" = 50'

0' 50' 100' 150'

LEGEND

- ● = DENOTES FOUND MONUMENT AS NOTED
- CD = COPPER DISK
- I.R. = IRON ROD
- LC = LONG CHORD
- L = LENGTH
- R = RADIUS
- ⊞ = POWER METER
- ⊠ = WATER METER
- ⊠ = TELEPHONE "J" BOX
- Ø = UTILITY POLE
- ○ = FENCE POST
- ⊕ = WATER LINE MARKER POST
- = SPRINKLER
- ▨ = POWER VAULT
- = WATER VALVE
- = BUILDING LINE
- = CENTERLINE
- = WIRE FENCE
- = ASPHALT SURFACE
- = CONCRETE SURFACE
- I.E. = INVERT ELEVATION
- ELEV. = ELEVATION
- CMP = CORRUGATED METAL PIPE
- CONC. = CONCRETE
- W/YPC = WITH YELLOW PLASTIC CAP

TREES

○ = DECIDUOUS TREE, WITH DIAMETER AT BREAST HEIGHT

HORIZONTAL DATUM

OREGON COORDINATE REFERENCE SYSTEM
3601 NORTH ZONE
NORTH AMERICAN DATUM OF NAD83/2011(EPOCH 2010.0000)
UNITS IN INTERNATIONAL FEET

A G.P.S. VECTOR OBSERVED BETWEEN THE MONUMENTS SHOWN AT POINT "A" AND POINT "B", IS THE BASIS OF BEARINGS FOR THIS SURVEY, BEARING BEING S 57°19'18" E 212.13'

POINT NO.	NORTHING	EASTING	DESCRIPTION
"A"	773561.1500	7324356.7810	5/8" I.R. W/YPC
"B"	773446.6210	7324535.3230	5/8" I.R. W/YPC

VERTICAL DATUM

NORTH AMERICAN VERTICAL DATUM OF 88 (NAVD88) (GEOID2012B)

SITE BENCHMARK

CP# 10, SPIKE, ELEVAVATION = 480.42

NOTES

1) CONTOURS ARE AT 1' INTERVALS AND ARE COMPUTER GENERATED.

2) UTILITIES SHOWN ON THE SURVEY HEREON WERE BASED UPON GROUND/VISUAL OBSERVATIONS ONLY. THERE MAY BE UTILITIES ON THE SITE THAT WERE NOT VISIBLE THEREFORE, THEY ARE NOT SHOWN. THE ACTUAL LOCATION OF THE UNDERGROUND UTILITIES MAY VARY.

3) NO BOUNDARY ANALYSIS WITH THIS MAPPING.

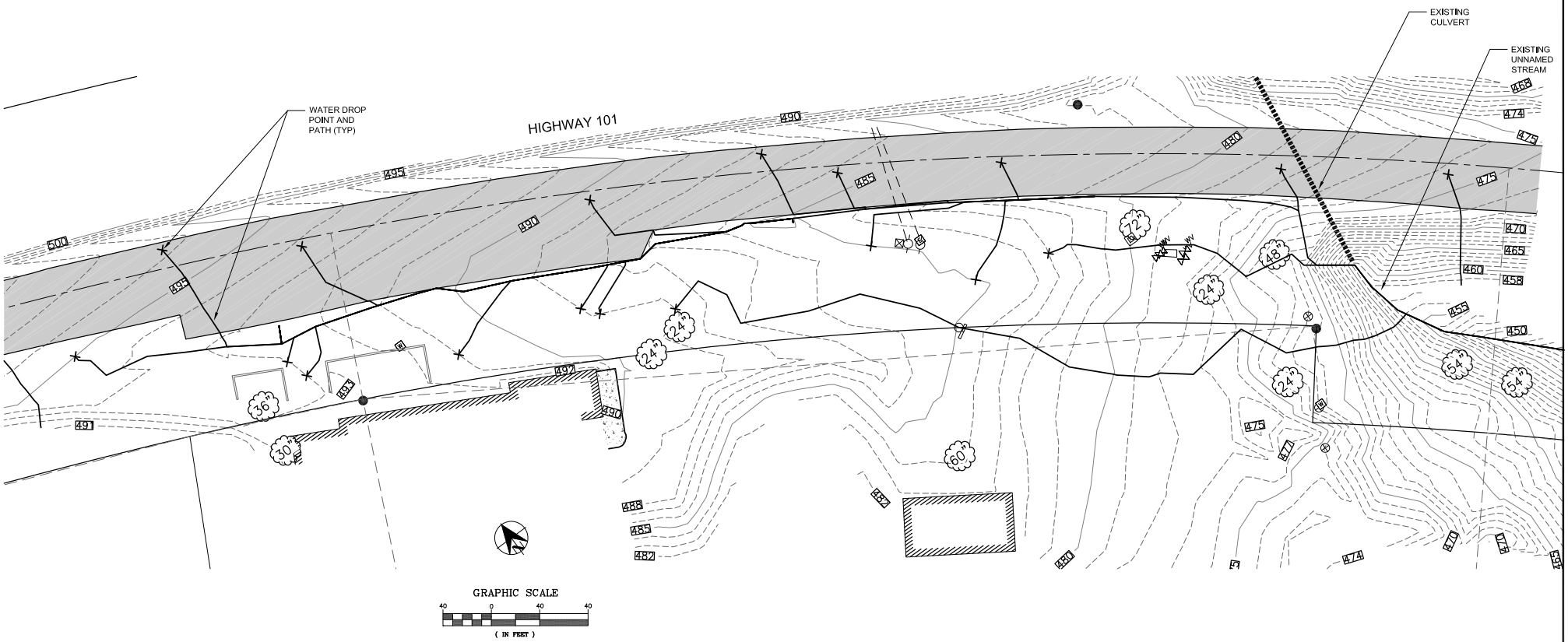
JOB NUMBER: 2017-112	SCALE: 1" = 50'
DRAWN: K.D.C.	DRAWN DATE: 6/15/2017
REVIEWED: G.D.S.	REVIEW DATE: 6/15/2017
SHEET: 1 OF 1	SURVEY DATE: 6/2/2017
REVISION:	
REVISION:	
REVISION:	
REVISION:	

CLIENT: NEAH-KAH-NIE WATER DISTRICT

STATEWIDE LAND SURVEYING INC.
43 NW AVA AVE. GRESHAM, OR 97030
O: 503-665-7777 F: 503-665-7988
EMAIL: SURVEY@STATEWIDESURVEYING.COM
WEB: WWW.STATEWIDESURVEYING.COM

APPENDIX B

"WATER DROP" DRAINAGE ANALYSIS



NOT FOR CONSTRUCTION

BAR IS ONE INCH ON ORIGINAL DRAWING. IF NOT ONE INCH ON THIS SHEET ADJUST SCALES ACCORDINGLY

AKANA
6400 SE Lake Road, Ste 270
Portland, Oregon 97222
Voice (503) 652-9090

OWNER

NEAH KAH NIE WATER DISTRICT

9155 NEHALEM ROAD
NEHALEM, OR 97131

RPK — DESIGNED BY
DAN — DRAWN BY
RPK — CHECKED BY
7-25-17 — DRAWING DATE

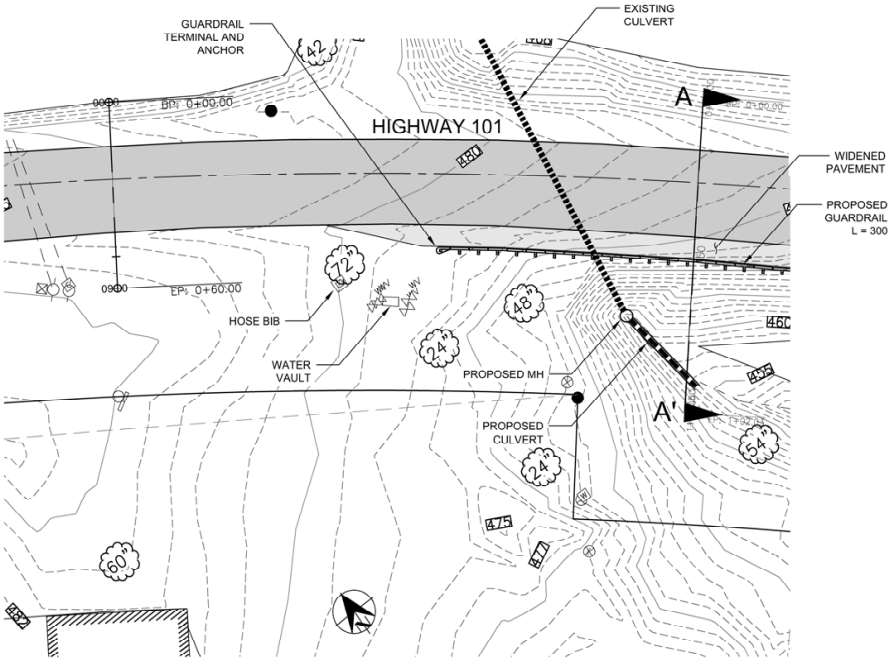
SUBMITTAL

SPRING 3 WATER QUALITY PROTECTION
APPENDIX B- "WATER DROP" DRAINAGE ANALYSIS

17-026

APPENDIX C

ALTERNATIVE NO. 1
PLANS, SECTION, AND COST ESTIMATE

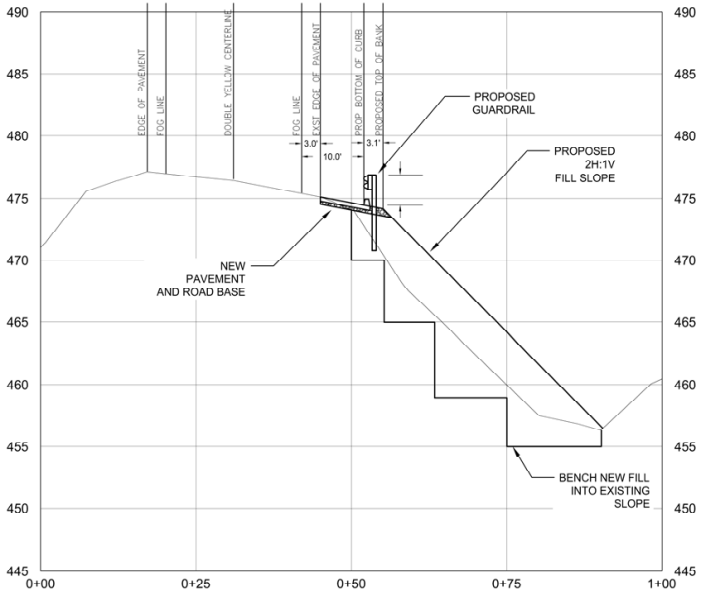


PLAN VIEW - GUARDRAIL AND CURB

GRAPHIC SCALE

20 0 20 40

(IN FEET)



SECTION A-A' - GUARDRAIL AND CURB

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OWNER

NEAH KAH NIE WATER DISTRICT

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NEHALEM, OR 97131

RPK DESIGNED BY
DAN DRAWN BY
RPK CHECKED BY
7-25-17 DRAWING DATE

SUBMITTAL

SPRING 3 WATER QUALITY PROTECTION
ALTERNATIVE 1: GUARDRAIL AND CURB

17-026

ALT. 1

ENGINEER'S OPINION OF PROBABLE CONSTRUCTION COST

PROJECT NEAH KAH NIE WATER DISTRICT - SPRING 3 WATER QUALITY PROTECTION

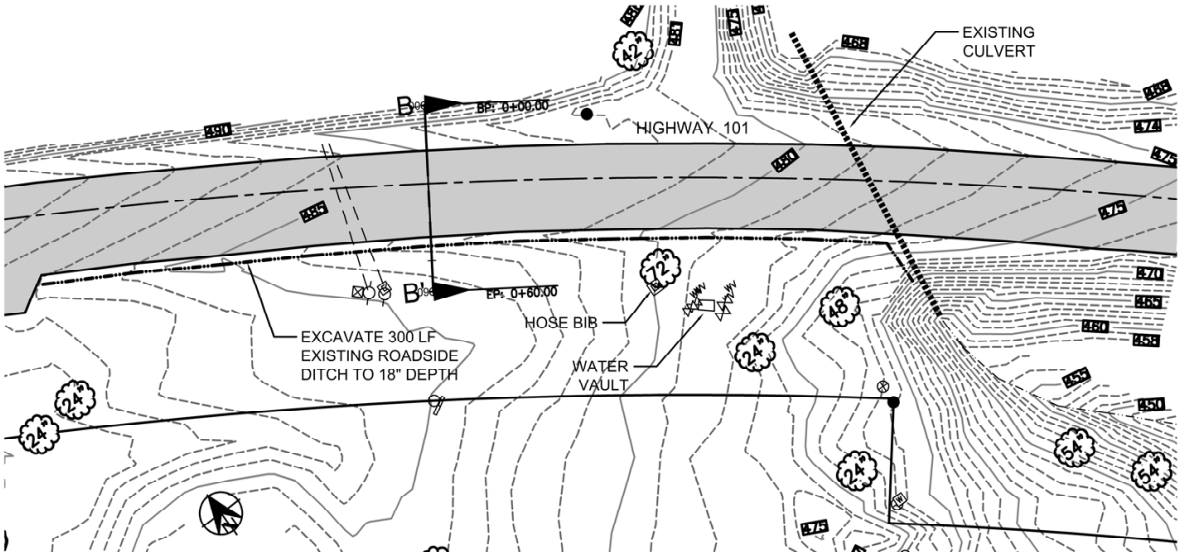
DATE: July 25, 2017 BY: RPK

Alternative No. 1 - Guardrail & Drainage Curb Along Highway

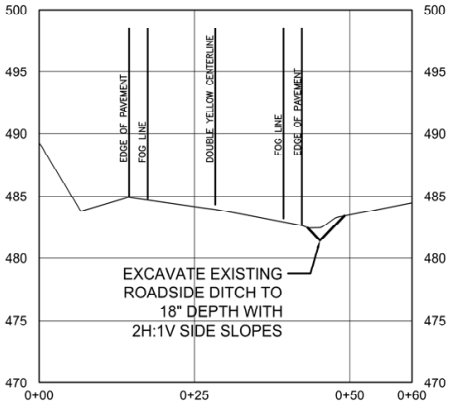
NO.	ITEM	UNIT	UNIT PRICE	AMOUNT	TOTAL PRICE
A1.	Mobilization	L.S.	$8,000.00	All Req'd	$8,000.00
A2.	Construction Survey	L.S.	$7,500.00	All Req'd	$7,500.00
A3.	Traffic Control	L.S.	$15,000.00	All Req'd	$15,000.00
A4.	Erosion Control	L.S.	$1,500.00	All Req'd	$1,500.00
A5.	Clearing and Grubbing	Acre	$5,000.00	0.15	$750.00
A6.	General Excavation	C.Y.	$25.00	1300	$32,500.00
A7.	Embankment, In Place	C.Y	$30.00	1550	$46,500.00
A8.	Crushed Aggregate Base Course	Ton	$35.00	220	$7,700.00
A9.	Asphaltic Concrete	Ton	$110.00	85	$9,350.00
A10.	Concrete Drainage Curb	L.F.	$25.00	300	$7,500.00
A11.	Guardrail, Type III	L.F.	$90.00	300	$27,000.00
A12.	Guardrail Terminal - Non Flared	L.F.	$2,500.00	2	$5,000.00
A13.	18" Dia. Culvert, HDPE	L.F.	$50.00	35	$1,750.00
A14.	48" Dia. Standard Storm Manhole	Each	$2,200.00	1	$2,200.00
A15.	Rip-Rap Outfall Protection	Each	$1,000.00	1	$1,000.00
				Subtotal-Part A:	**$173,250.00**
				25% Contingency:	**$43,312.50**
				Subtotal Construction	**$216,562.50**
				Design, Permitting,Construction Services	**$64,968.75**
				TOTAL:	**$281,531.25**

APPENDIX D

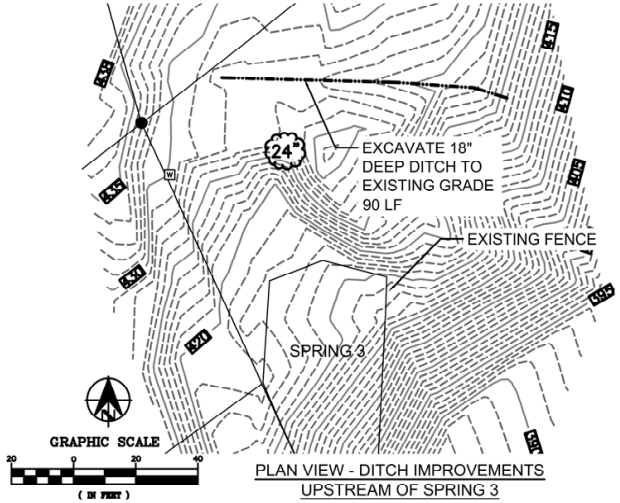
ALTERNATIVE NO. 2
PLANS, SECTION, AND COST ESTIMATE



PLAN VIEW - DITCH IMPROVEMENTS ALONG HIGHWAY



SECTION B-B' - DITCH IMPROVEMENTS ALONG HIGHWAY



PLAN VIEW - DITCH IMPROVEMENTS
UPSTREAM OF SPRING 3

NOT FOR CONSTRUCTION

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AKANA
6400 SE Lake Road, Ste 270
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OWNER
NEAH KAH NIE WATER DISTRICT
9155 NEHALEM ROAD
NEHALEM, OR 97131

RPK DESIGNED BY
DAN DRAWN BY
RPK CHECKED BY
7-25-17 DRAWING DATE

SUBMITTAL

SPRING 3 WATER QUALITY PROTECTION
ALTERNATIVE 2: OPEN CHANNEL IMPROVEMENTS

17-026

ALT. 2

ENGINEER'S OPINION OF PROBABLE CONSTRUCTION COST

PROJECT NEAH KAH NIE WATER DISTRICT - SPRING 3 WATER QUALITY PROTECTION

DATE: July 25, 2017 BY: RPK

Alternative No. 2 - Open Channel Drainage Improvements

NO.	ITEM	UNIT	UNIT PRICE	AMOUNT	TOTAL PRICE
B1.	Mobilization	L.S.	$2,000.00	All Req'd	$2,000.00
B2.	Construction Survey	L.S.	$2,500.00	All Req'd	$2,500.00
B3.	Traffic Control	L.S.	$5,000.00	All Req'd	$5,000.00
B4.	Erosion Control	L.S.	$1,000.00	All Req'd	$1,000.00
B5.	Clearing and Grubbing	Acre	$5,000.00	0.1	$500.00
B6.	Ditch Excavation	C.Y.	$50.00	40	$2,000.00
B7.	Rip-Rap Outfall Protection	Each	$1,000.00	2	$2,000.00
				Subtotal-Part A:	**$15,000.00**
				25% Contingency:	**$3,750.00**
				Subtotal Construction	**$18,750.00**
				Design, Permitting,Construction Services	**$5,625.00**
				TOTAL:	**$24,375.00**

Neah-Kah-Nie Water District
Water Master Plan Update and Water Management and Conservation Plan Update
Nehalem, Oregon

Appendix L
2018-2019 Budget
Adopted June 12, 2019

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NEAH KAH NIE WATER DISTRICT 2019-2020 ADOPTED BUDGET

	FORM LB 20 GENERAL FUND					BUDGET YEAR 2019-2020			
	RESOURCES				GENERAL FUND				
	* HISTORICAL DATA				RESOURCE DESCRIPTION	BUDGET FOR NEXT YEAR			
	Second Preceding YEAR 16-17	First Preceding YEAR 17-18	Adopted Budget YEAR 18-19			Proposed By Budget Officer	Approved by Budget Committee	Adopted by Board of Directors	
1	$ 54,136	$ 83,126	$ 78,100	1	Available Funds carried over from prior year	$ 90,420	$ 90,420	$ 90,420	1
2				2					2
3	$ 2,920	$ 4,872	$ 4,000	3	Previously Levied Taxes	$ 4,000	$ 4,000	$ 4,000	3
4	$ 73	$ 35	$ 45	4	Interest	$ 100	$ 100	$ 100	4
5				5	OTHER RESOURCES				5
6				6	Water Revenue:				6
7	$ 109,806	$ 112,054	$ 116,000	7	Base Rate=25.00/month x 394 services	$ 118,200	$ 118,200	$ 118,200	7
8	$ 33,031	$ 31,444	$ 38,000	8	Water=16,000,000 gals x $.00275 per gal	$ 44,000	$ 44,000	$ 44,000	8
9		$ 30,000		9	OHA Grant				9
10				10					10
11	$ 495	$ -	$ 2,000	11	Miscellaneous Revenue	$ 2,000	$ 2,000	$ 2,000	11
12				12					12
13				13					13
14	$ 2,500	$ 1,300	$ 5,000	14	Connection Fees @ $500 each	$ 5,000	$ 5,000	$ 5,000	14
15				15					15
16				16					16
17	**$ 202,961**	**$ 262,831**	**$ 243,145**	17	**TOTAL RESOURCES EXCEPT TAXES**	**$ 263,720**	**$ 263,720**	**$ 263,720**	17
18			$ 119,500	18	Taxes estimated to be received	$ 125,130	$ 125,130	$ 125,130	18
19	$ 112,972	$ 116,434		19	Taxes Collected in Year Levied				19
20	**$ 315,933**	**$ 379,265**	**$ 362,645**	20	**TOTAL RESOURCES**	**$ 388,850**	**$ 388,850**	**$ 388,850**	20
	** Preceding First and Second year data are actual figures taken from audit reports as required by law (not the proposed figures for those years)*								

Adopted By Board
June 12, 2019

NEAH KAH NIE WATER DISTRICT 2019-2020 ADOPTED BUDGET

	FORM LB 30 GENERAL FUND					BUDGET YEAR 2019-2020			
	REQUIREMENTS				GENERAL FUND				
	* HISTORICAL DATA					BUDGET FOR NEXT YEAR			
	Second	First	**Adopted		EXPENDITURE DESCRIPTION	Proposed	Approved by	Adopted by	
	Preceding	Preceding	Budget			By Budget	Budget	Board of	
	YEAR 16-17	YEAR 17-18	YEAR 18-19			Officer	Committee	Directors	
					PERSONAL SERVICES				
1	$ 46,574	$ 48,100	$ 49,543	1	General Manager	$ 51,000	$ 51,000	$ 51,000	1
2	$ 52,092	$ 48,418	$ 43,025	2	System Operator	$ 44,500	$ 44,500	$ 44,500	2
3	$ 7,642	$ 7,444	$ 7,627	3	Payroll Taxes	$ 8,000	$ 8,000	$ 8,000	3
4	$ 1,504	$ 1,882	$ 2,000	4	Workers Compensation Coverage	$ 2,200	$ 2,200	$ 2,200	4
5	$ 1,635	$ 14,400	$ 43,200	5	Health Insurance	$ 43,200	$ 43,200	$ 43,200	5
6	$ 2,830	$ 2,898	$ 3,000	6	SIMPLE IRA	$ 3,200	$ 3,200	$ 3,200	6
7				7	General Manager trainee	$ 10,000	$ 10,000	$ 10,000	7
8	$ 112,277	$ 123,142	$ 148,395	8	TOTAL PERSONAL SERVICES	$ 162,100	$ 162,100	$ 162,100	8
9				9	MATERIALS AND SERVICES				9
10	$ 94,530	$ 146,456	$ 178,250	10	SCHEDULE ATTACHED	$ 172,750	$ 179,750	$ 179,750	10
11				11					11
12	$ 94,530	$ 146,456	$ 178,250	12	TOTAL MATERIALS AND SERVICES	$ 172,750	$ 179,750	$ 179,750	12
13				13	CAPITAL OUTLAY				13
14				14					14
15				15					15
16				16	TOTAL CAPITAL OUTLAY	$ -	$ -	$ -	16
17				17	TRANSFERS TO OTHER FUNDS				17
18	$ -	$ -	$ -	18	Transfer to Capital Improvement Fund	$ -	$ -	$ -	18
19				19					19
20	$ 26,000	$ 26,100	$ 2,000	20	Transfer to Capital Imprv Reserve Fund	$ -			20
21			$ 5,000	21	General Operating Contingency	$ 25,000	$ 18,000	$ 18,000	21
22				22					22
23				23					23
24				24					24
25	$ 26,000	$ 26,100	$ 7,000	25	TOTAL TRANSFERS AND CONTINGENCIES	$ 25,000	$ 18,000	$ 18,000	25
26	**$ 232,807**	**$ 295,698**	**$ 333,645**	26	**TOTAL EXPENDITURES**	**$ 359,850**	**$ 359,850**	**$ 359,850**	26
27	$ 83,126	$ 83,567	$ 29,000	27	UNAPPROPRIATED ENDING FUND BALANCE	$ 29,000	$ 29,000	$ 29,000	27
28	**$ 315,933**	**$ 379,265**	**$ 362,645**	28	**TOTAL REQUIREMENTS**	**$ 388,850**	**$ 388,850**	**$ 388,850**	28
	** Preceding First and Second year data are actual figures taken from audit reports as required by law (not the proposed figures for those years)*								
	*** Adopted 2018-2019 Budget amounts include any transfers of appropriations made up to the date of publication of this proposed budget*								

Adopted By Board
June 12, 2019

NEAH KAH NIE WATER DISTRICT 2019-2020 ADOPTED BUDGET

	FORM LB 31 GENERAL FUND					BUDGET YEAR 2019-2020			
	REQUIREMENTS				GENERAL FUND				
	* HISTORICAL DATA					BUDGET FOR NEXT YEAR			
	Second	First	**Adopted		DETAILED REQUIREMENTS DESC	Proposed	Approved by	Adopted by	
	Preceding	Preceding	Budget			By Budget	Budget	Board of	
	YEAR 16-17	YEAR 17-18	YEAR 18-19			Officer	Committee	Directors	
					MATERIALS and SERVICES				
1	$ 12,727	$ 13,597	$ 13,000	1	Materials and Supplies	$ 10,000	$ 10,000	$ 10,000	1
2	$ 2,506	$ 494	$ 5,000	2	Engineering	$ 2,000	$ 2,000	$ 2,000	2
3	$ 5,000	$ 5,000	$ 4,500	3	Audit	$ 4,600	$ 4,600	$ 4,600	3
4	$ 4,755	$ 5,266	$ 5,400	4	Treasurer Bond & Insurance	$ 5,600	$ 5,600	$ 5,600	4
5	$ 17,945	$ 21,553	$ 20,100	5	Office Supplies, Utilities, Travel	$ 20,000	$ 20,000	$ 20,000	5
6	$ 4,997	$ 2,879	$ 2,600	6	Water Testing	$ 4,500	$ 4,500	$ 4,500	6
7	$ 1,713	$ 1,835	$ 2,000	7	Chlorine and Soda Ash	$ 3,400	$ 3,400	$ 3,400	7
8	$ 4,467	$ 2,036	$ 3,000	8	Schooling & Training	$ 2,000	$ 2,000	$ 2,000	8
9	$ 150	$ 150	$ 150	9	Permit & Filing	$ 150	$ 150	$ 150	9
10	$ 11,292	$ 13,474	$ 60,000	10	Legal	$ 65,000	$ 65,000	$ 65,000	10
11	$ 2,639	$ 2,239	$ 2,500	11	Service Vehicle	$ 2,500	$ 2,500	$ 2,500	11
12	$ 15,443	$ 14,246	$ 20,000	12	Repair	$ 20,000	$ 20,000	$ 20,000	12
13	$ 10,897	$ 63,687	$ 40,000	13	Contract Labor	$ 33,000	$ 40,000	$ 40,000	13
14	**$ 94,531**	**$ 146,456**	**$ 178,250**	**14**	**TOTAL MATERIALS & SERVICES**	**$ 172,750**	**$ 179,750**	**$ 179,750**	14

** Preceding First and Second year data are actual figures taken from audit reports as required by law (not the proposed figures for those years)*

Adopted By Board
June 12, 2019

NEAH KAH NIE WATER DISTRICT 2020-2021 ADOPTED BUDGET

	FORM LB 20 GENERAL FUND					BUDGET YEAR 2020-2021			
	RESOURCES				GENERAL FUND				
	* HISTORICAL DATA				RESOURCE DESCRIPTION	BUDGET FOR NEXT YEAR			
	Second Preceding YEAR 17-18	First Preceding YEAR 18-19	Adopted Budget YEAR 19-20			Proposed By Budget Officer	Approved by Budget Committee	Adopted by Board of Directors	
1	$ 83,126	$ 83,270	$ 90,420	1	Available Funds carried over from prior year	$ 53,000	$ 53,000	$ 53,000	1
2				2					2
3	$ 4,872	$ 4,524	$ 4,000	3	Previously Levied Taxes	$ 4,000	$ 4,000	$ 4,000	3
4	$ 35	$ 98	$ 100	4	Interest	$ 100	$ 100	$ 100	4
5				5	OTHER RESOURCES				5
6				6	Water Revenue:				6
7	$ 112,054	$ 113,553	$ 118,200	7	Base Rate=25.00/month x 390 services	$ 117,000	$ 117,000	$ 117,000	7
8	$ 31,144	$ 33,398	$ 44,000	8	Water=16,000,000 gals x $.00275 per gal	$ 44,000	$ 44,000	$ 44,000	8
9	$ 30,000			9	OHA Grant				9
10				10					10
11	$ -	$ 4	$ 2,000	11	Miscellaneous Revenue	$ 14,500	$ 14,500	$ 14,500	11
12				12					12
13				13					13
14	$ 1,300	$ 3,000	$ 5,000	14	Connection Fees @ $500 each	$ 3,000	$ 2,000	$ 2,000	14
15				15					15
16				16					16
17	**$ 262,533**	**$ 237,847**	**$ 263,720**	17	**TOTAL RESOURCES EXCEPT TAXES**	**$ 235,600**	**$ 234,600**	**$ 234,600**	17
18			$ 125,130	18	Taxes estimated to be received	$ 130,700	$ 130,700	$ 130,700	18
19	$ 116,434	$ 121,421		19	Taxes Collected in Year Levied				19
20	**$ 378,967**	**$ 359,268**	**$ 388,850**	20	**TOTAL RESOURCES**	**$ 366,300**	**$ 365,300**	**$ 365,300**	20
	** Preceding First and Second year data are actual figures taken from audit reports as required by law (not the proposed figures for those years)*								

Adopted By Board
June 9, 2020

NEAH KAH NIE WATER DISTRICT 2020-2021 ADOPTED BUDGET

	FORM LB 30 GENERAL FUND					BUDGET YEAR 2019-2020			
	REQUIREMENTS				GENERAL FUND				
	* HISTORICAL DATA					BUDGET FOR NEXT YEAR			
	Second	First	**Adopted		EXPENDITURE DESCRIPTION	Proposed	Approved by	Adopted by	
	Preceding	Preceding	Budget			By Budget	Budget	Board of	
	YEAR 17-18	YEAR 18-19	YEAR 19-20			Officer	Committee	Directors	
					PERSONAL SERVICES				
1	$ 48,100	$ 49,543	$ 51,000	1	General Manager	$ 61,000	$ 61,000	$ 61,000	1
2	$ 48,418	$ 43,025	$ 44,500	2	System Operator	$ 50,000	$ 50,000	$ 50,000	2
3	$ 7,444	$ 7,627	$ 8,000	3	Payroll Taxes	$ 8,100	$ 8,100	$ 8,100	3
4	$ 1,882	$ 2,000	$ 2,200	4	Workers Compensation Coverage	$ 1,500	$ 1,500	$ 1,500	4
5	$ 14,400	$ 43,200	$ 43,200	5	Health Insurance	$ 43,200	$ 43,200	$ 43,200	5
6	$ 2,898	$ 3,000	$ 3,200	6	SIMPLE IRA	$ 3,000	$ 3,000	$ 3,000	6
7			$ 10,000	7	General Manager trainee				7
8	$ 123,142	$ 148,395	$ 162,100	8	TOTAL PERSONAL SERVICES	$ 166,800	$ 166,800	$ 166,800	8
9				9	MATERIALS AND SERVICES				9
10	$ 146,456	$ 178,250	$ 179,750	10	SCHEDULE ATTACHED	$ 129,500	$ 128,500	$ 128,500	10
11				11					11
12	$ 146,456	$ 178,250	$ 179,750	12	TOTAL MATERIALS AND SERVICES	$ 129,500	$ 128,500	$ 128,500	12
13				13	CAPITAL OUTLAY				13
14				14	Replace service truck	$ 31,000	$ 31,000	$ 31,000	14
15				15					15
16				16	TOTAL CAPITAL OUTLAY	$ 31,000	$ 31,000	$ 31,000	16
17				17	TRANSFERS TO OTHER FUNDS				17
18	$ -	$ -	$ -	18	Transfer to Capital Improvement Fund	$ -	$ -	$ -	18
19				19					19
20	$ 26,100	$ 2,000	$ -	20	Transfer to Capital Imprv Reserve Fund	$ -			20
21		$ 5,000	$ 18,000	21	General Operating Contingency	$ 10,000	$ 10,000	$ 10,000	21
22				22					22
23				23					23
24				24					24
25	$ 26,100	$ 7,000	$ 18,000	25	TOTAL TRANSFERS AND CONTINGENCIES	$ 10,000	$ 10,000	$ 10,000	25
26	**$ 295,698**	**$ 333,645**	**$ 359,850**	26	**TOTAL EXPENDITURES**	**$ 337,300**	**$ 336,300**	**$ 336,300**	26
27	$ 83,567	$ 29,000	$ 29,000	27	UNAPPROPRIATED ENDING FUND BAL.	$ 29,000	$ 29,000	$ 29,000	27
28	**$ 379,265**	**$ 362,645**	**$ 388,850**	28	**TOTAL REQUIREMENTS**	**$ 366,300**	**$ 365,300**	**$ 365,300**	28
	** Preceding First and Second year data are actual figures taken from audit reports as required by law (not the proposed figures for those years)*								
	*** Adopted 2019-2020 Budget amounts include any transfers of appropriations made up to the date of publication of this proposed budget*								

Adopted By Board
June 9, 2020

Approved by Budget Committee
April 28, 2020

NEAH KAH NIE WATER DISTRICT 2020-2021 ADOPTED BUDGET

	FORM LB 31 GENERAL FUND					BUDGET YEAR 2020-2021			
	REQUIREMENTS				GENERAL FUND				
	* HISTORICAL DATA					BUDGET FOR NEXT YEAR			
	Second	First	**Adopted		DETAILED REQUIREMENTS DESC	Proposed	Approved by	Adopted by	
	Preceding	Preceding	Budget			By Budget	Budget	Board of	
	YEAR 17-18	YEAR 18-19	YEAR 19-20			Officer	Committee	Directors	
					MATERIALS & SERVICES				
1	$ 13,597	$ 13,000	$ 10,000	1	Materials and Supplies	$ 13,500	$ 13,500	$ 13,500	1
2	$ 494	$ 5,000	$ 2,000	2	Engineering	$ 2,000	$ 2,000	$ 2,000	2
3	$ 5,000	$ 4,500	$ 4,600	3	Audit	$ 4,700	$ 4,700	$ 4,700	3
4	$ 5,266	$ 5,400	$ 5,600	4	Treasurer Bond & Insurance	$ 5,900	$ 5,900	$ 5,900	4
5	$ 21,553	$ 20,100	$ 20,000	5	Office Supplies, Utilities, Travel	$ 18,800	$ 17,800	$ 17,800	5
6	$ 2,879	$ 2,600	$ 4,500	6	Water Testing	$ 2,400	$ 2,400	$ 2,400	6
7	$ 1,835	$ 2,000	$ 3,400	7	Chlorine and Soda Ash	$ 3,550	$ 3,550	$ 3,550	7
8	$ 2,036	$ 3,000	$ 2,000	8	Schooling & Training	$ 1,000	$ 1,000	$ 1,000	8
9	$ 150	$ 150	$ 150	9	Permit & Filing	$ 150	$ 150	$ 150	9
10	$ 13,474	$ 60,000	$ 65,000	10	Legal	$ 45,000	$ 45,000	$ 45,000	10
11	$ 2,239	$ 2,500	$ 2,500	11	Service Vehicle	$ 2,500	$ 2,500	$ 2,500	11
12	$ 14,246	$ 20,000	$ 20,000	12	Repair	$ 10,000	$ 10,000	$ 10,000	12
13	$ 63,687	$ 40,000	$ 40,000	13	Contract Labor	$ 20,000	$ 20,000	$ 20,000	13
14	**$ 146,456**	**$ 178,250**	**$ 179,750**	**14**	**TOTAL MATERIALS & SERVICES**	**$ 129,500**	**$ 128,500**	**$ 128,500**	14

** Preceding First and Second year data are actual figures taken from audit reports as required by law (not the proposed figures for those years)*

Adopted By Board
June 9, 2020

Approved by Budget Committee
April 28, 2020

NEAH KAH NIE WATER DISTRICT 2020-2021 ADOPTED BUDGET

	FORM LB 20 CAPITAL IMPROVEMENT					BUDGET YEAR 2020-2021			
	RESOURCES				CAPITAL IMPROVEMENT FUND				
	* HISTORICAL DATA				RESOURCE DESCRIPTION	BUDGET FOR NEXT YEAR			
	Second Preceding YEAR 17-18	First Preceding YEAR 18-19	Adopted Budget YEAR 19-20			Proposed By Budget Officer	Approved by Budget Committee	Adopted by Board of Directors	
1	$ 49,113	$ 44,000	$ 46,010	1	Available Cash	$ 46,150	$ 46,150	$ 46,150	1
2				2					2
3				3					3
4	$ 6	$ 10	$ 10	4	Interest	$ 10	$ 10	$ 10	4
5				5	OTHER RESOURCES				5
6				6					6
7		$ 9,600	$ 100	7	Transfer from Capital Improvement Reserve Fund	$ 100	$ 100	$ 100	7
8	$ 4,696	$ 53,000	$ 64,280	8	Individual SDC Charges 10 homes	$ 25,716	$ 25,716	$ 25,716	8
9			$ 20,000	9	SIPP Grant	$ 20,000	$ 20,000	$ 20,000	9
10				10		$ 1,000,000	$ 1,000,000	$ 1,000,000	10
11	$ 89,674	$ 92,640	$ 93,600	11	System Enhancement Fees (*raised from $20 to $35*	$ 163,800	$ 163,800	$ 163,800	11
12				12	*$80,600 committed for debt service*				12
13				13	Watershed Protection Loan				13
14				14	*$70,000 committed for debt service*				14
15				15					15
16				16					16
17				17					17
18				18					18
19				19					19
20	**$ 143,489**	**$ 199,250**	**$ 224,000**	**20**	**TOTAL RESOURCES**	**$ 1,255,776**	**$ 1,255,776**	**$ 1,255,776**	20
	** Preceding First and Second year data are actual figures taken from audit reports as required by law (not the proposed figures for those years)*								

Adopted By Board
June 9, 2020

NEAH KAH NIE WATER DISTRICT 2020-2021 ADOPTED BUDGET

	FORM LB 30 CAPITAL IMPROVEMENT REQUIREMENTS				CAPITAL IMPROVEMENT FUND	BUDGET YEAR 2020-2021			
	* HISTORICAL DATA				EXPENDITURE DESCRIPTION	BUDGET FOR NEXT YEAR			
	Second Preceding YEAR 17-18	First Preceding YEAR 18-19	**Adopted Budget YEAR 19-20			Proposed By Budget Officer	Approved by Budget Committee	Adopted by Board of Directors	
					PERSONAL SERVICES				
1	$ 897	$ 4,409	$ 4,600	1	Sys. Oper. Wages & Payroll Expenses	$ 4,204	$ 4,204	$ 4,204	1
2				2					2
3	$ 897	$ 4,409	$ 4,600	3	TOTAL PERSONAL SERVICES	$ 4,204	$ 4,204	$ 4,204	3
4				4	MATERIALS AND SERVICES				4
5	$ 94	$ 15,000	$ 19,500	5	Engineering				5
6				6					6
7				7	Materials & Services				7
8	$ 94	$ 15,000	$ 19,500	8	TOTAL MATERIALS AND SERVICES	$ -	$ -	$ -	8
9				9	CAPITAL OUTLAY				9
10	$ 9,854	$ 23,000	$ 60,000	10	Capital Improvement Proj per Master Plan	$ 41,000	$ 41,000	$ 41,000	10
11	$ 5,293	$ 19,000	$ 6,296	11	Misc. System Upgrades	$ 6,822	$ 6,822	$ 6,822	11
12				12	Land purchase	$ 1,000,000	$ 1,000,000	$ 1,000,000	12
13				13					13
14	$ 15,147	$ 42,000	$ 66,296	14	TOTAL CAPITAL OUTLAY	$ 1,047,822	$ 1,047,822	$ 1,047,822	14
15				15	FINANCING REPAYMENTS				15
16	$ 6,684	$ 6,684	$ 6,684	16	OBDD Financing Repayment (SDWARLF)	$ 6,684	$ 6,684	$ 6,684	16
17	$ 78,441	$ 68,657	$ 73,920	17	OBDD Financing Repayment (SPWF)	$ 73,916	$ 73,916	$ 73,916	17
18				18	Watershed Protection Loan	$ 70,150	$ 70,150	$ 70,150	18
19	$ 85,125	$ 75,341	$ 80,604	19	TOTAL FINANCING REPAYMENTS	$ 150,750	$ 150,750	$ 150,750	19
20	$ (1)	$ 19,499	$ 10,000	20	Contingency	$ 10,000	$ 10,000	$ 10,000	20
21	$ 85,124	$ 94,840	$ 90,604	21	TOTAL REPAYMENTS AND CONTINGENCY	$ 160,750	$ 160,750	$ 160,750	21
22	$ -	$ -	$ -	22	Transfer to Capital Imp Reserve Fund	$ -	$ -	$ -	22
23	**$ 101,262**	**$ 156,249**	**$ 181,000**	23	**TOTAL EXPENDITURES**	**$ 1,212,776**	**$ 1,212,776**	**$ 1,212,776**	23
24	$ 42,226	$ 43,000	$ 43,000	24	UNAPPROPRIATED ENDING FUND BALANCE	$ 43,000	$ 43,000	$ 43,000	24
25	**$ 143,488**	**$ 199,249**	**$ 224,000**	25	**TOTAL REQUIREMENTS**	**$ 1,255,776**	**$ 1,255,776**	**$ 1,255,776**	25

** Preceding First and Second year data are actual figures taken from audit reports as required by law (not the proposed figures for those years)*

*** Adopted 2019-2020 Budget amounts include any transfers of appropriations made up to the date of publication of this proposed budget*

Adopted By Board
June 9, 2020

NEAH KAH NIE WATER DISTRICT 2020-2021 ADOPTED BUDGET

	LB 11 - CAPITAL IMPROVEMENT RESERVE FUND					BUDGET YEAR 2020-2021			
	This fund authorized and established by Resolution 2006-2007-3 on May 8, 2007 to accumulate funds for future improvements					This reserve fund will be reviewed to be continued or abolished in 2027			
					CAPITAL IMPROVEMENT RESERVE FUND				
	* HISTORICAL DATA					BUDGET FOR NEXT YEAR			
	Second Preceding YEAR 17-18	First Preceding YEAR 18-19	Adopted Budget YEAR 19-20		RESOURCE DESCRIPTION	Proposed By Budget Officer	Approved by Budget Committee	Adopted by Board of Directors	
					Beginning Fund Balance				
1	$ 527,089	$ 576,600	$ 577,500	1	Available Cash	$ 595,000	$ 595,000	$ 595,000	1
2				2					2
3				3					3
4	$ 10,483	$ 9,500	$ 14,000	4	Interest	$ 12,000	$ 12,000	$ 12,000	4
5	$ 26,100	$ 2,000	$ -	5	Transfer from General Fund	$ -			5
6	$ -	$ -	$ -	6	Transfer from Capital Improvement Fund	$ -			6
7				7					7
8				8					8
9				9					9
10	**$ 563,672**	**$ 588,100**	**$ 591,500**	**10**	**TOTAL RESOURCES**	**$ 607,000**	**$ 607,000**	**$ 607,000**	10
11				11					11
12				12	**EXPENDITURE DESCRIPTION**				12
13		$ 50,000	$ -	13	Water Storage				13
14		$ 9,600	$ 100	14	Transfer to CI Fund	$ 100	$ 100	$ 100	14
15	$ 563,672	$ 528,500	$ 591,400	15	RESERVED FOR FUTURE EXPENDITURE	$ 606,900	$ 606,900	$ 606,900	15
16	**$ 563,672**	**$ 588,100**	**$ 591,500**	16	**TOTAL REQUIREMENTS**	**$ 607,000**	**$ 607,000**	**$ 607,000**	16
	** Preceding First and Second year data are actual figures taken from audit reports as required by law (not the proposed figures for those years)*								

Adopted By Board
June 9, 2020

Neah-Kah-Nie Water District
Water Master Plan Update and Water
Management and Conservation Plan Update
Nehalem, Oregon

Appendix M
Current Water Rate Schedule
Effective July 1, 2006

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Neahkahnie WATER DISTRICT

WATER RATES

effective JULY 1, 2006

Office Hours: 10:00AM to 1:00PM
Tuesday – Thursday
Other Times by Appointment
Ph: (503) 368-7309 FAX: (503) 368-6900
9155 Nehalem Road ◆ Nehalem Oregon 97131

SYSTEM DEVELOPMENT CHARGE: $6,429 (new service)

SERVICE CONNECTION FEE: $500 (new service)

Includes District-supplied materials (standard ¾" meter and associated valves) necessary for the connection, supervision and inspection of the installation. Owner must provide valid plumbing permit obtained from Tillamook County.
Labor and additional materials for installation to be paid for by the landowner directly to his/her contractor.

MONTHLY CHARGES: (billed bi-monthly)

Base Rate: $25.00 per month (zero gallons of water)

System Enhancement Fee: $20.00 per month

Water Charge: $2.75 per 1,000 gallons water used from zero to 20,000 gallons
$3.50 per 1,000 gallons water used over 20,000 gallons.

OTHER: District rules require a pressure reducing valve and hand shutoff valve near the entry point of the house.

In conformance with District policy on Cross Connections, customer may be required to install an approved backflow prevention device at their own cost.

Neah-Kah-Nie Water District
Water Master Plan Update and Water
Management and Conservation Plan Update
Nehalem, Oregon

Appendix N
Oregon Water and Wastewater Funding and Resource Guide

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2016

OREGON WATER & WASTEWATER FUNDING AND RESOURCE GUIDE

Compiled by:

RCAC
www.rcac.org

Oregon Water & Wastewater Funding and Resource Guide
March 2016

Background and Purpose

Rural Community Assistance Corporation (RCAC), a private nonprofit organization serving 13 states in the West and the Pacific islands, provides training, technical and financial resources and advocacy so rural communities can achieve their goals and visions. RCAC works with funding and regulatory agencies and partners to address utility compliance issues for lower income rural communities.

The RCAC Oregon Water Wastewater Funding and Resource Guide is an easy to use document that identifies water and wastewater funding programs, agencies and organizational resources. RCAC hopes that this guide will be used as a tool to help you move forward with water and wastewater infrastructure projects in your community**.**

Scope

The guide provides information on primary agency funding programs that support planning, predevelopment and construction of drinking water and wastewater infrastructure projects. It also includes information on resources available to help communities complete drinking water and wastewater projects, address regulatory compliance, protect drinking water, improve water quality and local public health. Additional resources may be available. Please contact RCAC to suggest a resource to include in this guide.

Contents

- Agencies serving water/wastewater needs for small Oregon communities
- Funding programs for water and wastewater projects

Key Project Stages

- Planning
- Predevelopment
- Engineering and Design
- Construction

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For more information on RCAC, visit: www.rcac.org

Agencies Serving Water/Wastewater Needs of Small Oregon Communities

U.S. Environmental Protection Agency
EPA Region 10 Oregon Operations Office
805 SW Broadway, Suite 500
Portland, OR 97205
Joel Salter Oregon Water Programs Coordinator
Phone: (503) 326-2653
Email: Salter.Joel@epa.gov

Drinking Water SRF Site:
http://yosemite.epa.gov/r10/water.nsf/Drinking+Water/State+Revolving+Fund

Clean Water SRF Site:
http://yosemite.epa.gov/R10/ecocomm.nsf/state+revolving+fund/cwsrf

U.S Department of Agriculture Rural Development (USDA RD)
1220 SW 3rd Avenue, Suite 1801
Portland, OR 97204
Sam Goldstein, Community Programs Director
Phone: (503) 414-3362
Email: Sam.goldstein@or.usda.gov

Website: http://www.rd.usda.gov/programs-services/water-waste-disposal-loan-grant-program/or

U.S. Department of Health and Human Services
Portland Area Indian Health Service
1414 NW Northrup Street, Suite 800
Portland, OR 97209
Phone**:** (503) 414-5555
Website: www.ihs.gov

U.S. Department of Commerce Economic Development Administration (EDA)
121 SW Salmon Street, Suite 244
Portland, OR 97204
David Porter, Economic Development Representative
Phone: (503) 326-3078
Email: dporter@eda.doc.gov

Oregon Health Authority (OHA)
Drinking Water Services
PO Box 14450
Portland, OR 97293-0450
Phone: (971) 673-0422
Website: http://healthoregon.org/dwp

Dave Leland, Program Manager, (971) 673-0415

Adam DeSemple, Safe Drinking Water Revolving Loan Fund, (971) 673-0422

Tony Fields, Planning Protection & Certification Manager, (971) 673-2269

Debra Lambeth, Environmental Review Coordinator, (971) 673-0414

Tom Pattee, Groundwater Protection, (541) 726-2587 x 24

Kari Salis, Technical Services Region 1, (971) 673-0423

Casey Lyon, Technical Services Region 2, (541) 726-2587 x 31

Julie Wray, Plan Review, (971) 673-0408

Oregon Business Development Department (OBDD)
Infrastructure Finance Authority (IFA)
775 Summer St. NE, Suite 200
Salem, OR 97301-1280
Phone: (503) 986-0123
Email: infrastruture.info@state.or.us

Website: www.orinfrastructure.org

Agencies Serving Water/Wastewater Needs of Small Oregon Communities *Continued*

Oregon Department of Environmental Quality (DEQ)
811 SW Sixth Avenue
Portland, OR 97204-1390
After October at:
700 NE Multnomah Street, Suite #600
Portland, OR 97232

Clean Water State Revolving Fund (CWSRF)
Phone: (503) 229-LOAN
Email: CWSRFinfo@deq.state.or.us
Website: www.deq.state.or.us/wq/loans/loans.htm

Rural Community Assistance Corporation (RCAC)
1020 S.W. Taylor Street Suite 450
Portland, OR 97205

Chris Marko, Rural Development Specialist
(503) 228-1780 cmarko@rcac.org

RosAnna Noval, Rural Development Specialist
(503) 308-0207 rnoval@rcac.org

Website: www.rcac.org

Additional Resources for Water and Wastewater Needs	
Association of Oregon Counties 1201 Court St NE Suite 300 Salem, OR 97301 Laura Cleland Phone: (503) 585-8351 Website: www.aocweb.org	**League of Oregon Cities** 1201 Court St. NE, Suite 200 Salem, OR 97301 Susan Muir Phone: (503) 588-6550 Website: www.orcities.org
Special Districts Association of Oregon PO Box 12613 Salem, OR 97309 Phone: (503) 371-8667 Website: www.sdao.com Luann Richey, (503) 371-8667 x 113	**Oregon Water Resources Department** 725 Summer Street NE, Suite A Salem, OR 97301 Phone: (503) 986-0900 Website: www.oregon.gov/owrd
Oregon Association of Water Utilities 935 N Main Street Independence, Oregon 97351 Phone: (503) 837-1212 Website: www.oawu.net	**Oregon Watershed Enhancement Board** 775 Summer St. NE Suite 360 Salem, OR 97301 Phone: (503) 986-0178 Website: www.oregon.gov/OWEB

Federal Regulatory Information:

Safe Drinking Water Act (SDWA): www.epa.gov/safewater/sdwa

Clean Water Act (CWA): http://www.epa.gov/oecaagct/lcwa.html

National Pollutant Discharge Elimination System (NPDES): http://cfpub.epa.gov/npdes/cwa.cfm?program_id=45

FUNDING PROGRAMS FOR WATER AND WASTEWATER PROJECTS IN OREGON

Planning and Predevelopment

Program	Eligible Projects	Eligible Applicants	Funding Available	How To Apply
OBDD Infrastructure Finance Authority (IFA) **Community Development Block Grant (CDBG)**	Preliminary engineering and planning – water master plans, wastewater facilities plans, water conservation and management plans, capital improvement plans, inflow and infiltration studies. Final engineering – preliminary engineering reports, studies	Projects must principally benefit low to moderate income people in non-entitlement cities and counties. Projects must serve primarily residential needs, not primarily for capacity building.	• Grants up to $175,000 for preliminary engineering and planning • Grants up to $3,000,000 for final design engineering and construction	Competitive applications are accepted year-round and reviewed quarterly. All awards are subject to funding availability. Contact the Oregon Business Development Department (OBDD) at (503) 986-0123 and ask for your regional coordinator, or view program details at: www.orinfrastructure.org
OBDD IFA **Special Public Works Fund (SPWF)**	Preliminary engineering studies; and economic investigations related to municipal utility projects (water, wastewater, stormwater)	Cities, counties, county service districts (ORS Chapter 451), Tribes, ports, & districts (ORS 198.010)	• Grants up to $60,000 or 85% of project costs. • Loans available at reduced interest rates/7-year term.	Apply year-round based on funding availability. Contact OBDD at (503) 986-0123 and ask for your regional coordinator or view program details at: www.orinfrastructure.org
OBDD IFA **Water Wastewater (WWF)**	Preliminary planning, engineering studies and economic investigations in preparation for construction projects that address an existing or pending compliance issue.	Cities, counties, county service districts (ORS Chapter 451), tribes, ports and districts (ORS 198.010). For a population of less than 15,000 with a Notice of Non-compliance or potential notice.	• Grants up to $20,000 • Loans up to $20,000	Apply year-round based on funding availability. Contact OBDD at (503) 986-0123 and ask for the regional coordinator or view program details at: www.orinfrastructure.org
Oregon Association of Water Utilities (OAWU) **National Rural Water Association Revolving Loan Fund**	Financing for predevelopment costs associated with proposed water and wastewater projects. RLF funds can also be used with existing water/wastewater systems and the short term costs incurred for replacement equipment, small scale extension of services or other small capital projects that are not part the utility's regular operations and maintenance.	Public entities, including municipalities, counties, special purpose districts, Native American Tribes and nonprofit corporations, including cooperatives, with up to 10,000 population and rural areas with no population limits.	• Loans up to $100,000 or 75% of the total project costs, whichever is less. Maximum repayment period of 10 years. Fidelity bond insurance is required of all applicants. • 5 year, % only, pre-development loans are available. • 90 day, no %, disaster area	Contact OAWU at office@oawu.net or by phone at (503) 837-1212, or applications, information and forms are available for download at www.nrwa.org. Applications can be emailed to nrwarlf@nrwa.org or mailed to: NRWA-RLF, 2915 S. 13th, Duncan, OK 73533.

Program	Eligible Projects	Eligible Applicants	Funding Available	How To Apply
			emergency loans with immediate turn around are also available. • Loans will be made at the lower of the poverty or market interest rate as published by RUS, with a minimum of 3% at the time of closing. Current RUS rates are available at www.usda.gov/rus/water/int-rate.htm • As a minimum, a promissory note or comparable document authorized by the governing body will be required.	
Oregon Water Resources Department (OWRD) **Feasibility Study Grants (Water Conservation, Reuse, and Storage Grant Program)**	Project planning studies performed to evaluate the feasibility of developing water conservation, reuse or storage projects. Eligible project elements include: • Water needs analyses; • Hydrological analyses; • Engineering and financial feasibility studies; • Geologic analyses; • Water exchange studies; • Analyses of by-pass, optimum peak, flushing and other ecological flows of the affected stream and the impact of a proposed project on those flows; • Analyses of environmental harm/impacts and/or public benefits	Persons, corporations, public and municipal corporations, political subdivisions, Indian tribes, and others as described in ORS 536.007.	• Grants up to $500,000 per project, depending on funding availability. • Grants require a dollar-for-dollar cost-match, which may include in-kind contributions.	Competitive applications accepted during open cycles announced at: http://www.oregon.gov/owrd/Pages/LAW/conservation_reuse_storage_grant_program.aspx All awards are subject to funding availability. OWRD contact: Jon Unger at (503) 986-0869 or email: fsgrants@wrd.state.or.us

Program	Eligible Projects	Eligible Applicants	Funding Available	How To Apply
USDA-Rural Development Pre-development Planning Grant (PPG)	Water and/or wastewater planning; preliminary engineering reports, environmental reports, and other work to assist in developing a project that is expected to be funded by RD in the next 12 – 18 months.	Public bodies (such as municipality, county, district or authority); nonprofit organizations, and Indian tribes. Priority given to the smallest and poorest communities and systems with limited resources.	• Maximum $30,000 grant or 75% of project costs, whichever is less.	Apply year-round based on funding availability. Contact USDA-Rural Development Oregon State Office at (503) 414-3360 and ask for your regional loan specialist or view program details at: http://www.rd.usda.gov/programs-services/water-waste-disposal-loan-grant-program/or
USDA-Rural Development Special Evaluation Assistance for Rural Communities and Households **(SEARCH)**	Water and/or wastewater planning, preliminary engineering reports, environmental reports, and other work to assist in developing a project that is expected to be funded by RD in the next 12-18 months.	Public bodies (such as municipality, county, district, or authority); non-profit organizations and Indian tribes serving financially distressed communities with service area populations <2,500.	• Maximum $30,000 grant or 100% of project costs, whichever is less	Apply year-round based on funding availability. Contact USDA-Rural Development Oregon State Office at (503) 414-3360 and ask for your regional loan specialist or view program details at: www.cfda.gov (Number 10.759)
USDA-Rural Development Emergency and Imminent Community Water Assistance Grant (ECWAG) CFDA 10.763	Projects may include emergency and permanent repairs, replacement or significant maintenance to water systems resulting from a sudden and unexpected event such as an act of nature resulting in a significant decline in water quality or quantity.	Applicants may include Public bodies, non-profit organizations and Indian tribes serving populations < 10,000.	• 100% grant ranging from $150,000-$500,000 often with minimal predevelopment expense.	Contact USDA-Rural Development, Oregon State Office at (503) 414-3360 and ask for your regional loan specialist or view program details at: http://www.rd.usda.gov/programs-services/water-waste-disposal-loan-grant-program/or
Rural Community Assistance Corp. Loan Fund Feasibility and Predevelopment	Water and/or wastewater planning; environmental work; and other work to assist in developing an application for infrastructure improvements	Nonprofit organizations, public agencies and tribal governments serving rural areas with a population of 50,000 or less; or 10,000 if guaranteed by RD financing	• Max $50,000 for feasibility loan • Max $350,000 for predevelopment loan • 1 year term • Interest rate @ 5.5%	Applications accepted anytime Contact: Chuck Miller at (360) 253-7683 or cmiller@rcac.org. Applications available on-line at www.rcac.org

Program	Eligible Projects	Eligible Applicants	Funding Available	How To Apply
EDA Technical Assistance Grants Feasibility Studies	EDA's mission is to help economically distressed communities in ways that help them build long-term economic development capacity. Projects must foster the creation or retention of higher-skilled, higher-wage employment opportunities for local displaced workers and attract private-sector capital investment.	Indian Tribes; state, county, city or other political subdivisions of a state; institutions of higher education; public or private non-profit organizations or associations	• $50,000 to $75,000 • Local match required • Grant funds received from other Federal Agencies may **not** be used to satisfy local share match.	Visit agency website at www.eda.gov and review latest "Federal Funds Announcement" (FFO). Submit application through www.grants.gov
Clean Water State Revolving Fund (CWSRF)	Loans are available for planning and design projects associated with: publicly owned wastewater treatment and stormwater facilities and systems, non-point source water quality improvement projects and estuary management projects.	Federally recognized tribal governments, cities, counties, sanitary districts, soil and water conservation districts, irrigation districts, various special districts and certain intergovernmental entities.	• Loan only • Up to 5 years • Substantially discounted interest rate • No annual fee	Applications accepted year round with scheduled review and ranking in February, June and October. Contact the Oregon Department of Environmental Quality (DEQ); call Katie Foreman at (503) 229-5622.

FUNDING PROGRAMS FOR WATER AND WASTEWATER PROJECTS IN OREGON
Construction

Program	Eligible Projects	Eligible Applicants	Funding Available	How To Apply
OBDD IFA **Community Development Block Grant (CDBG)**	All projects must be in accordance with an approved water plan or wastewater plan. Eligible activities include: construction engineering; acquisition of property (including easements); grant administration; and audits. Projects addressing an existing or pending compliance issue will score higher.	Projects must principally benefit low to moderate income people in non-entitlement cities and counties. Projects must serve primarily residential needs and not be for capacity building.	• Maximum Grant of $3 million, subject to the maximum $3 million per project limitation during a five-year period. • Single grant may be awarded to cover final engineering and construction.	Competitive applications accepted year-round and reviewed quarterly. All awards are subject to funding availability. Contact OBDD at (503) 986-0123 and ask for your regional coordinator or view program information at www.orinfrastructure.org
OBDD IFA **Special Public Works Fund (SPWF)**	Planning for raising and managing funds, pre-construction and construction of water, wastewater, stormwater projects. Projects must be publically owned and support economic and community development in Oregon.	Cities, counties, county service districts (ORS Chapter 451), tribes, ports and districts (ORS 198.010)	• Primarily a loan program • Maximum $10 million loan • 25 year term maximum. • Grants based on retention or creation of jobs, up to max. of $5,000 per job • Grants cannot exceed $500,000 or 85% of the project cost, whichever is less	Apply year-round, based on funding availability. Contact OBDD at (503) 986-0123 and ask for your regional coordinator or view program details at www.orinfrastructure.org
OBDD IFA **Water Wastewater Financing (WWF)**	Planning, pre-construction, and construction improvements of drinking water, wastewater, or stormwater projects. Projects must be publically owned and address an existing or pending compliance issue.	Cities, counties, county service districts (ORS Chapter 451), tribes, ports, & districts (ORS 198.010)	• Maximum $10 million loan • 25 year term maximum • Grant eligibility based on median household income • Maximum $750,000 grant	Competitive applications are accepted year-round and reviewed quarterly. All awards are subject to funding availability. Contact OBDD at (503) 986-0123 and ask for your regional coordinator, or view program details at www.orinfrastructure.org

Program	Eligible Projects	Eligible Applicants	Funding Available	How To Apply
Oregon Association of Water Utilities (OAWU) **National Rural Water Association Revolving Loan Fund**	Financing for predevelopment costs associated with proposed water and wastewater projects. RLF funds can also be used with existing water/wastewater systems and the short term costs incurred for replacement equipment, small scale extension of services or other small capital projects that are not part the utility's regular operations and maintenance.	Public entities, including municipalities, counties, special purpose districts, Native American Tribes and nonprofit corporations, including cooperatives, with up to 10,000 population and rural areas with no population limits.	• Loans up to $100,000 or 75% of the total project costs, whichever is less. Maximum repayment period of 10 years. Fidelity bond insurance is required of all applicants. • 5 year, % only, pre-development loans are available. • 90 day, no %, disaster area emergency loans with immediate turn around are also available. • Loans will be made at the lower of the poverty or market interest rate as published by RUS, with a minimum of 3% at the time of closing. Current RUS rates are available at www.usda.gov/rus/water/int-rate.htm • As a minimum, a promissory note or comparable document authorized by the governing body will be required. •	Contact OAWU at office@oawu.net or by phone at (503) 837-1212, or applications, information and forms are available for download at www.nrwa.org. Applications can be emailed to nrwarlf@nrwa.org or mailed to: NRWA-RLF, 2915 S. 13th, Duncan, OK 73533.

Program	Eligible Projects	Eligible Applicants	Funding Available	How To Apply
Oregon Health Authority **Safe Drinking Water Revolving Loan Fund (SDWRLF)**	Drinking water system projects must resolve *existing* or *future* non-compliance with *current* or *future* state and federal drinking water standards, that addresses the most serious human health risks, or that is essential to create a new drinking water system improvement that will substantially benefit public health. *Eligible Activities:* Planning, engineering, design, water source construction, land or easement acquisition, treatment, storage, transmission/distribution, system purchase, system consolidation, system creation, system security, restructuring	Public and privately owned community and non-profit non-community public water systems. Federally owned systems are not eligible. *Ineligible Activities:* Dams or rehabilitation of dams, water rights, raw water reservoirs or rehab of raw water reservoirs, projects primarily needed to address fire protection, and projects primarily needed to serve future population growth.	• Projects requesting $3 million or more require additional review and approval from the Drinking Water Advisory Committee • Interest rate fluctuates quarterly (set at 80% of the previous quarters municipal bond rate) • 20-year term maximum • 30-year term maximum for disadvantaged communities • Principal Forgiveness • Green Project Reserve (GPR) financial incentive • Circuit Rider assistance for eligible systems under 10,000 in population	A Letter of Interest (LOI) may be submitted anytime to be eligible for funding consideration. Contact Oregon Health Authority's Drinking Water Services at (971) 673-0405 or go to the OHA website: http://healthoregon.org/srf You may also contact Business Oregon's Infrastructure Finance Authority (IFA) at (503) 986-0123 or visit their website at: http://www.orinfrastructure.org/LOI-Form/ to take you directly to the LOI.
Oregon Health Authority **Drinking Water Source Protection Fund (DWSPF)**	Drinking Water Source Protection projects that lead to risk reduction within a delineated source water area or that would contribute to a reduction in contaminant concentration within the drinking water source.	Any public and privately owned community and non-profit non-community water systems with a completed Source Water assessment. Federally owned systems are not eligible.	• Max $30,000 Grant • Max $100,000 loan • Interest rate fluctuates quarterly (set at 80% of previous quarter's municipal bond rate). • 20 year term • 30-year term maximum for disadvantaged communities	A letter of interest must be submitted to be eligible for funding consideration. Check with OHA on submittal schedule. Contact Oregon OHA Drinking Water Services at (971) 673-0405 or visit http://healthoregon.org/srf or contact OBDD at (503) 986-0123 or visit www.orinfrastructure.org
Oregon Health Authority (OHA) **Sustainable Infrastructure Planning Projects (SIPP)**	Drinking water system projects that include planning activities that promote sustainable water infrastructure. Priority will be given to those systems serving fewer than 300 service connections and/or are considered disadvantaged communities.	Public and privately owned community and non-profit non-community public water systems. Federally owned systems are not eligible.	• Funding up to $20,000 per project (above $20,000 is based on approval and availability of funds) • 100% Forgivable Loan • Total funds available for all projects $300,000 • No more than one award per	A letter of interest must be submitted to be eligible for funding consideration. Check with OHA on submittal schedule. Contact Oregon OHA Drinking Water Services at (971) 673-0405 or visit

Program	Eligible Projects	Eligible Applicants	Funding Available	How To Apply
	Eligible Activities: Feasibility studies, asset management plans, system partnership studies, resilience plans, water rate analysis, leak detection studies, and water system master plans for for systems with fewer than 300 connections. *Ineligible Activities:* Construction or engineering/design.		community / water system • Water system must complete project within 1 year • 25% of the awarded funds can go towards the required community engagement & AM requirements set by IFA.	http://public.health.oregon.gov/HealthyEnvironments/DrinkingWater/SRF/Pages/index.aspx or contact Infrastructure Finance Authority (IFA) at (503) 986-0123 or visit http://www.orinfrastructure.org/
Oregon Water Resources Department (OWRD) **Water Projects Grants and Loans (Water Supply Development Account)**	Grants and loans to evaluate, plan, and develop water resource projects with economic, environmental, AND community (social/cultural) benefits. Eligible projects include but are not limited to those water resource projects that: • Increase water use efficiency • Develop new or expanded storage • Promote water reuse or conservation • Protect or restore stream flows • Determine seasonally varying flows	Persons, corporations, public and municipal corporations, political subdivisions, Indian tribes, nonprofit organizations and others as described in ORS 536.007.	• Applicants may apply for a grant or loan. • Grants require a minimum 25% cost-match, which may include cash or in-kind contributions. • Interest on loans shall be at reasonable rates as determined by the Water Resources Commission. Loan terms are a maximum of 50 years but cannot exceed the estimated life span of the project.	Competitive applications accepted year-round and reviewed annually. All awards are subject to funding availability. View program details at: http://www.oregon.gov/owrd/Pages/LAW/conservation_reuse_storage_grant_program.aspx OWRD contact: Jon Unger at (503) 986-0869 or email: Jon.J.Unger@wrd.state.or.us.
Clean Water State Revolving Fund (CWSRF)	Loans and bond purchase agreements are available for planning, design, and construction projects associated with: publicly owned wastewater treatment and stormwater facilities and systems, non-point source water quality improvement projects and estuary management projects. Interim financing is also available.	Indian tribal governments, cities, counties, sanitary districts, soil and water conservation districts, irrigation districts, various special districts and certain intergovernmental entities.	• Lower than market interest rates • Fixed interest rates • Terms up to 30 years • Up to 100% of eligible costs covered • No match required • Repayment begins after project is constructed • No pre-payment penalty • Additional financial incentives, including principle forgiveness	Applications accepted year round with scheduled review and ranking in the first week of January, May and September. Contact the Oregon Department of Environmental Quality (DEQ): call (503) 229-LOAN; email CWSRFinfo@deq.state.or.us or contact your local project officer http://www.deq.state.or.us/wq/loans/contacts.htm

Program	Eligible Projects	Eligible Applicants	Funding Available	How To Apply
USDA-Rural Development Water Environmental Programs (WEP) Direct Loan & Grant Program	Pre-construction & construction associated with constructing, repairing, or improving water, sewer, solid waste or storm wastewater disposal facilities.	Public bodies (such as municipality, county, district, or authority); nonprofit organizations and Indian tribes serving communities with service area populations<10,000.	• Primarily loan program • Grants based on need • Interest rates track AA rated 20 yr. muni. bonds and fixed for life of loan • Lower income communities receive an interest rate subsidy • Up to 40-year loan term	Apply year-round based on funding availability. Contact USDA-Rural Development, Oregon State Office at (503) 414-3360 and ask for your regional loan specialist or view program details at: http://www.rd.usda.gov/programs-services/water-waste-disposal-loan-grant-program/or
RCAC Loan Fund **Construction**	Water, wastewater, solid waste and storm facilities that primarily serve low income rural communities. Includes predevelopment costs	Non-profit organizations, public agencies, and tribal governments rural areas with populations of 50,000 or less, or 10,000 if using RD financing as the takeout	• Max $2 million with commitment letter for permanent financing • Security in permanent loan letter of conditions • 1-3 year term • 1% loan fee • Interest rate 5.5%	Applications accepted anytime Contact: Chuck Miller at (360) 253-7683 or cmiller@rcac.org. Applications available on-line at www.rcac.org
RCAC Loan Fund **Intermediate Term Loans**	Water, wastewater, solid waste and storm facilities that primarily serve low income rural communities. Includes predevelopment costs	Non-profit organizations, public agencies, and tribal governments rural areas with populations of 50,000 or less; or 10,000 if using RD financing as the takeout	• For smaller capital needs projects • Normally not to exceed $100,000 • Up to 20 year term • Interest rate 5.0%	Applications accepted anytime Contact: Chuck Miller at (360) 253-7683 or cmiller@rcac.org. Applications available on-line at www.rcac.org
US Economic Development Administration **Public Works Grants**	EDA's mission is to help economically distressed communities in ways that help them build long-term economic development capacity. Projects must foster the creation or retention of higher-skilled, higher-wage employment opportunities for local displaced workers and attract private-sector capital investment.	Indian Tribes; state, county, city or other political subdivisions of a state; institutions of higher education; public or private non-profit organizations or associations	• Public Works grant awards are in the range of $500,000 – $2,500,000 with 50% local matching funds required. • Grant funds received from other Federal Agencies may not be used to satisfy local share match.	Visit agency website at www.eda.gov and review latest "Federal Funds Opportunities" (FFO). Submit application through www.grants.gov