Kilchis Regional Water District

Tillamook County, Oregon

Water System Master Plan Update

October 2009

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Prepared By:

H B H
Consulting Engineers

20015 SW Pacific Hwy
Suite 101
Sherwood, Oregon 97140
503.625.8065
fax 503.625.1531

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HBH
Consulting
Engineers

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Introduction

Section 1

1.1 Purpose and Need

The purpose of this *Water Master Plan Update* is to review the existing water system of the Kilchis Regional Water District. This includes the supply, treatment, transmission, and storage systems. Each component must be assessed on its condition and ability to meet projected demands through the design year 2029. Based on these assessments, improvement recommendations have been developed for the Regional District's water system facilities and infrastructure.

Per the requirements of OAR 333-061-0060(5), any system serving over 300 connections must maintain a current *Water Master Plan*. The purpose of this Plan is to comply with these requirements. A copy of this OAR is included as an appendix.

1.2 Study Objectives

The objective of this *Water System Master Plan Update* is to augment the previous planning efforts. Principal objectives of this Plan include:

- Evaluation of existing water system components
- Evaluate and project water demand
- Evaluation of the capability of the existing system to meet future needs and regulations
- Recommendations for improvements needed to meet future needs and/or address deficiencies
- Discussion of financing options and impacts to water rates

This Plan details infrastructure improvements required to maintain compliance with State and Federal standards as well as provide for anticipated growth. Capital improvements are presented as projects with estimated costs to allow the Regional District to plan and budget as needed. Supporting technical documentation is included to aid in grant and loan funding applications.

1.3 Previous Studies

Master plans for Bay City's distribution system and the Kilchis River water rransmission system were completed by HLB & Associates, Inc in 1990 and 1992, respectively. The purpose of these studies was to analyze the existing water system and to make recommendation for water delivery in quantitiy and quality for fire, domestic and other uses. This included the supply, treatment, transmission and storage of water. The planning periods for these studies extended through the years 2000 and 2001.

In 2006, HLB supplemented these reports with the Kilchis Region Water District Water Master Plan Update. The specific objectives of this plan were to evaluate the existing water system with particular respect to the basic changes since 1992; give an estimate for future water service connections for a 20-year period (through 2024); review changes in water demand since 1992; and develop an updated

Capital Improvement Plan (CIP). This study did not include a detailed evaluation of the distribtuion system within the City of Bay City or any of the purchasing districts.

1.4 Scope of Engineering Services

1.4.1 Work Tasks

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

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

1.4.2 Planning Period

The planning period for this *Water System Master Plan Update* is 20 years, ending in the year 2029. The period must be short enough for current users to benefit from system improvements, yet long enough to provide reserve capacity for future growth and increased demand. Existing residents should not pay an unfair portion for improvements sized for future growth, yet it is not economical to build improvements that will be undersized in a relatively short period of time. OAR 690-086-0140 suggests that demands be projected a minimum of 20 years, which is a typical planning period for water master plans.

1.4.3 Planning Area

The primary planning area is includes the approximated boundary for the Kilchis Regional Water System as well as each of the individual service districts boundaries. Adjacent lands and waters that are affected by the system, or will be affected by proposed improvements, will also be included.

1.5 Plan Implementation

The implementation of any portion of this plan must be consistent with OAR 33-061 (Public Drinking Water Systems) and OAR 660-011 (Public Facilities Planning, Department of Land Conservation and Development).

The actural schedule for implementing improvement projects will be dictated by the availability of financing and actual growth in water demands compared to future projections established by this Plan. Futhermore, it is very possible that a project that is not currently considered a high priority can become one due to a catastrophic system failure or, perhaps, due to unanticipated development

pressure. For these reasons the District must consider this Master Plan as a "living-document" that should be updated whenever there are changes to the underlying assumptions of this study (i.e. land use, development, fire flow requirements, demands).

Many of the projects recommend by this plan are related to growht and their implementation timetable has been based on projected growth of the system. However, growth in water demands may vary from the projected values. As noted in the 2006 Water Master Plan update, monitoring of actual pumping at the wellheads and storage tanks, accurate record keeping, and precise billing records of water usage for individual customers and districts will provide important data necessary for the timing of future imporvement needs.

1.6 Authorization

The City of Bay City authorized the firm of HBH Consulting Engineers, Inc. to develop a *Water System Master Plan Update* by a contract dated December 9, 2008. Services are in accordance with this professional services contract and the HBH proposal for the project which was presented to the City in June 2008.

1.7 Acknowledgment

This Plan is the result of contributions made by a number of individuals and agencies. In particular, the following persons should be acknowledged for the important roles they played in the preparation, review, and development of this plan:

David Pace ..... City of Bay City
Linda Dvorak ..... City of Bay City
Gayle Ridderbusch..... Cole Creek Water District
Clarence Boquist..... Juno Hill Water Company
Bob Fabre..... Latimer Road Water Association
Norm Brennan ..... Northwood Water District

In addition to these key personnel, we wish to thank the City of Bay City Council and management staff for providing support and input on this project.

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Section 2

Study Area

2.1 Service Area

The Kilchis Regional Water District is located in Tillamook County along the Oregon coast, just north of the city of Tillamook. The system is bounded on the west by Tillamook Bay then extends easterly approximately two miles up the Kilchis River drainage basin and approximately two miles up the north side of the Wilson River. In general, the system is bounded on the north side by the norther border of the Bay City's urban growth boundary (UGB) and bordered on the south by the Wilson River. The general vicinity of the Kilchis regional Water District is depicted in Figure 2-1.

The Kilchis River Water District is a cooperative agreement for the supply and transmission of water between the City of Bay City and six separate water districts, associations, and corporate users, including:

- Cole Creek Water District (ID# 4105362)
- Juno Hill Water Company (ID# 4100889)
- Latimer Road Water Association (ID# 4100881)
- Northwood Water District (ID# 4100885)
- Tillamook County Creamery Association (TCCA)
- Wilson River Water District (ID# 4100896)

The terrain of the system varies between wooded hillside to rolling hills and fertile bottom land. Approxiamte elevations range from a low of 8 feet to a high of over 400 feet. The individual water districts served by the Kilchis Regional Water District are generally characterized as rural or semi-rural in nature. Even the City of Bay City, which is the most consolidated service district, has large areas of wooded or undeveloped tracts within its city limits.

There is a wide variation is the size of the individual service districts. A summary of the areas served by each district is presented in Table 2-1.

Table 2-1 – Areas of Individual Service Districts

Service District	Approximate Area(acres)
Bay City (city limits)	1,225
Bay City (UGB)	1,330
Cole Creek	30
Juno Hill	450
Latimer Road	280
Northwood	50
TCCA	40
Total	2,180

Additionally, the Kilchis Regional Water District also supplies domestic water to a number of residents that do not reside within the above listed boundaries.

2.2 Population

The demographic trends within the Kilchis Regional Water District are atypical compared to many other coastal communities in the area. Since this region does not lie directly on the coastline, there is not the high fluctuation in seasonal populations that is observed in many of the nearby coastal communities. This greatly simplifies population analysis for each of the individual districts.

2.2.1 City of Bay City

Population data for the City of Bay City, obtained from the US Census and Portland State Population Research Center (PRC), are presented in the following table (Table 2-2). As of 2008, PRC estimates the full-time population of Bay City at 1,265 persons. The average annual growth rate (AAGR) experienced in the City of Bay City between 1970 and 2008 was 0.91%. The AAGR between 2000 and 2008 was slightly higher at 1.21%.

Table 2-2 - City of Bay City Historic Population

Year	City Population	AARG
1970	898	---
1980	986	0.94%
1990	1,027	0.41%
2000	1,149	1.13%
2001	1,160	0.96%
2002	1,160	0.00%
2003	1,150	-0.86%
2004	1,150	0.00%
2005	1,170	1.74%
2006	1,195	2.14%
2007	1,230	2.93%
2008	1,265	2.85%

1970-2000 – US Census
2001-2008 – Portland State Population Research Center

2.2.2 Other Municipal Service Districts

The populations for the four remaining municipal service districts were determined via a water system survey completed by each service district. The smallest population served is found in the Cole Creek Water District with an estimated population of 20 persons. The largest of these districts is Juno Hill Water Company, which provides service to approximately 180 residents. A summary of the populations found in the Cole Creek, Juno Hill, Latimer Road, and Northwood service districts is found in Table 2-3.

Table 2-3 – Cole Creek, Juno Hill, Latimer Road, & Northwood Water District Population

Year	Cole Creek	Juno Hill[1]	Latimer Road	Northwood
2006	20		136	50
2007	20		138	60
2008	20	180	140	60
AAGR	0.0%	N/A	1.5%	9.5%

[1] 2006 & 2007 population data not available for Juno Hill

Over the past three years the rate of growth within these districts has varied drastically. The Cole Creek service district is completely built out and has no reported growth. Conversely, the Northwood district's population has increased dramatically over the past three years, with an AAGR of nearly ten-percent.

2.2.3 Total District Population

Table 2-4 summarizes the total 2008 population for the entire Kilchis Regional Water District, which is estimated to be 1,795. This includes approximately 130 people who do not reside within the boundaries of any of the individual water districts, but are served by the Region District. As previously noted, Bay City represents the largest portion, accounting for 70% of the total population served by the Kilchis Regional Water District.

Table 2-4 – Estimated 2008 Population

Service District	Estimated 2008 Population
Bay City	1,265
Cole Creek	20
Juno Hill	180
Latimer Road	140
Northwood	60
Outside Users	130
Total	1,795

2.2.4 Population Projections

The potential for growth in the individual service districts varies in degree due to the varying availability of building sites, temporary building restrictions, and other factors. By far, the City of Bay City has the largest potential for future growth. Due to limited available land in other districts, the number of future growth is relatively small.

The adopted coordinated population for the City of Bay City, as adopted by Tillamook County is also 1.1%. Also, as shown in Table 2-2, the long term growth in Bay City has averaged near 1.1% annually. Therefore, it appears reasonable to use an AAGR of 1.1% to project the 20-year population for the City of Bay City.

Reliable long-term population data is not available for the municipal service districts outside of Bay City. Therefore, population projections will be based on each district's own assessment of the potential for growth within their system as reported in the abovementioned water survey, with the exception of Juno Hill which did not provide information. However, Juno Hill has the largest potential for future development, therefore, an AAGR of 1.5 % was assumed. Although some of the individual districts have recently experienced high rates of growth, all systems believe their long term growth will stagger as the availability of land in the area diminishes. For these districts the following long term AAGRs have used for population projections:

- Cole Creek Water District – 0.5% AAGR
- Juno Hill – 1.5%
- Latimer Road – 1.5 % AAGR
- Northwood – 1.0%
- Outside Users – 1.0%

A summary of the projected population in each service district is provided in Table 2-5. It is estimated that an additional 491 people will be added to the total service area in the next 20 years.

Table 2-5 – Service Districts' Projected Population

Service District	2009	2014	2019	2024	2029
Bay City	1,279	1,351	1,427	1,507	1,592
Cole Creek	20	21	21	22	22
Juno Hill	183	197	212	228	246
Latimer Road	142	153	165	178	191
Northwood	61	64	67	70	74
Outside Users	131	138	145	152	160
Total	1,816	1,923	2,037	2,158	2,286

2.3 Water Customers

Most districts are predominately residential in nature with a small number of commercial users. The exception is TCCA which is completely an industrial user.

The service district of the City of Bay City is divided into two service areas based on elevation. The High-Level service is entirely residential, dominated by single-family residences. An estimated 305 service connections are located within the High-Level service area. The Low-Level service area provides water service to a mixture of residential, commercial, industrial, and municipal users. In addition to customers within the Bay City UGB, the Low-Level service area also includes those customers connected to the Kilchis Regional water system, but do not reside in one of the four purchasing districts. Due physical separation of the High- and Low-Level systems, they will often be evaluated individually throughout this Plan.

An inventory of current water accounts associated with each district is presented in Table 2-6. As this table shows, the vast majority (96%) of the system's 947 customers are residential.

Table 2-6 – 2008 Water Customer Account Inventory

Service District	Customers				
	Residential	Commercial	Industrial	Municipal	Total
Bay City:					
High Level	305	0	0	0	305
Low Level	410	16	3	5	434
Outside UGB	58	1	0	0	59
Cole Creek	10	0	0	0	10
Juno Hill	57	6	0	0	63
Latimer Road	50	4	0	0	54
Northwood	21	0	0	0	21
TCCA	0	0	1	0	1
Total	911	27	4	5	947

The average number of persons per residential account varies. The City of Bay City and the Cole Creek Water District both average around 2 persons per account. Latimer Road Water Association, Juno Hill Water Company, and Northwood Water District average around 3 persons per account. These demographic differences typically have an impact on water average residential usage rates. As

the number of people per account increases, so too should the average usage rate. The average number of persons per residential account for the entire Kilchis Region Water District is 1.97.

Table 2-7 – Average Number of Persons per Residential Account

Service District	Population	Residential Accounts	Ave Persons per Account
Bay City	1,265	715	1.77
Cole Creek	20	10	2.00
Juno Hill	180	57	3.16
Latimer Road	140	50	2.80
Northwood	60	21	2.86
Outside Account	130	58	2.24
Average	1,795	911	1.97

2.3.1 Water Account Projections

The number of future residential water accounts can be extrapolated using data on population projections (Table 2-5) for each service district and the average number of persons per account (Table 2-7). This method assumes that the demographic characteristics of each district remain constant throughout the 20-year planning period. Based on this assumption, it is anticipated that an additional 215 residential accounts will be added to Kilchis Regional Water District in the upcoming planning period.

Table 2-8 – Projected Number of Residential Account

Service District	2029 Population	Projected No. of Residential Accts.
Bay City	1,559	881
Cole Creek	22	10
Juno Hill	246	78
Latimer Road	164	59
Northwood	74	26
Outside Account	160	71
Total	2,225	1,126

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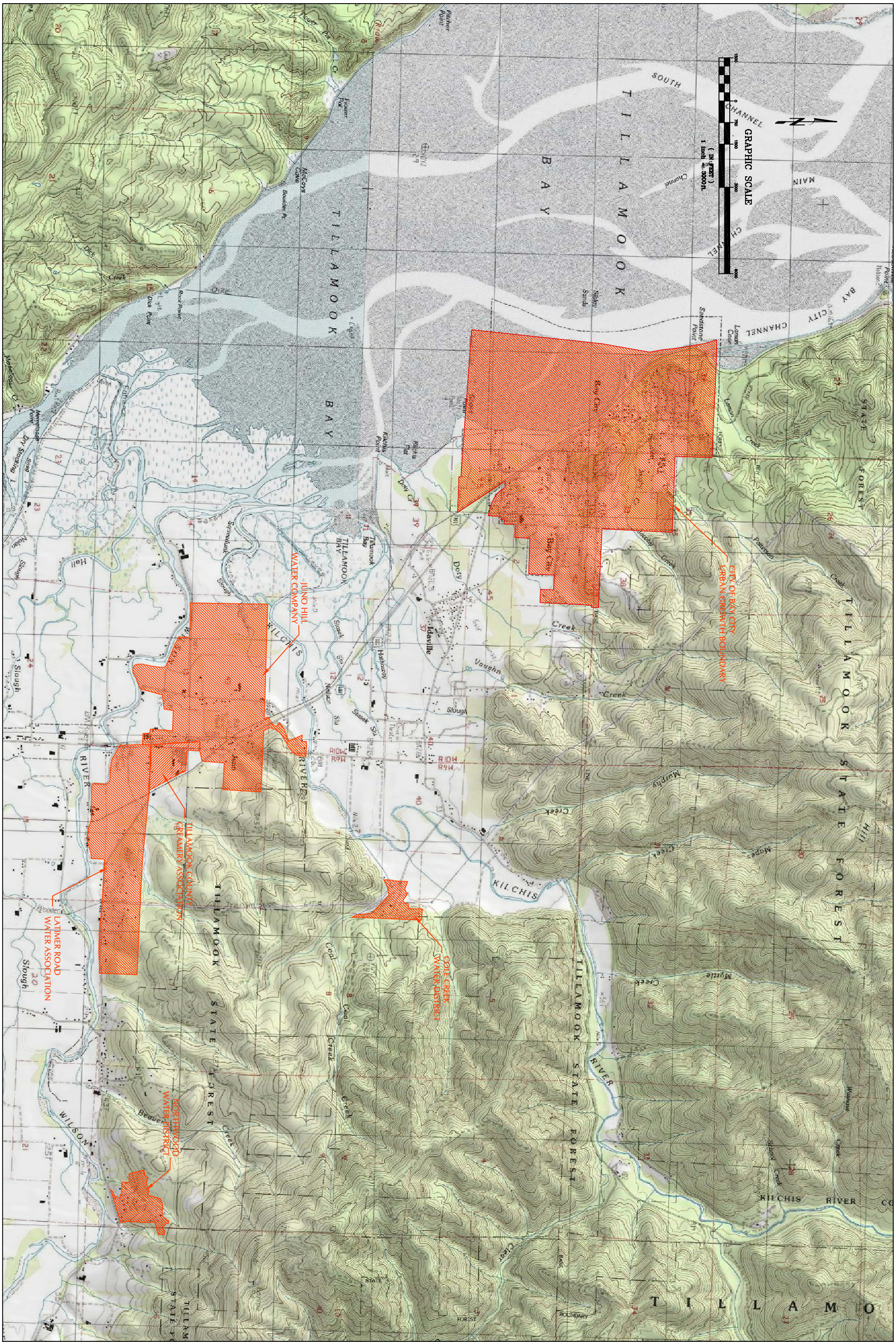


FIG. 2-1	DRAWN BY: CLB DATE: JULY 2009	VICINITY MAP	Kilchis Regional Water District *WATER SYSTEM MASTER PLAN UPDATE*	H B H Consulting Engineers

Water Use & Projected Demand

Section 3

This section is intended to provide a summary of the existing water demands in the Kilchis Regional Water District and formulate demand projections through the year 2029. The *2006 Water Master Plan* provided an extensive analysis of water demands in each water district. Records were reviewed to ensure that no major changes in water use patterns have occurred since this document was adopted.

3.1 Description and Definitions

Water demand is the quantity of water delivered to the system over a period of time to meet the needs of consumers and to supply the needs of fire fighting and system flushing. Additionally, virtually all systems have a small amount of leakage that cannot be economically removed and total demand usually includes some leakage. The difference between the amount of water sold and the amount delivered to the system is attributed to flushing, leakage, fire fighting and other non-metered usage. Demand varies seasonally with the lowest usage in winter months and the highest usage during summer months. Variations in demand also occur with respect to time of day (diurnal) with higher usage occurring during the morning breakfast and early evening periods and lowest usage during nighttime hours.

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

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

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

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

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

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

Peak Hourly Demand (PHD) - The maximum volume of water delivered to the system in a single hour expressed in gpd. Distribution systems should be designed to adequately handle the peak hourly demand. During this peak usage, storage reservoirs supply the demand in excess of the maximum day demand.

Demands described above, expressed in gallons per day (gpd), can be divided by the population served to come up with a demand per person or a per capita demand which is expressed in gallons per capita per day (gpcd). Per capita demands can be multiplied by future population projections to determine future water demands. In a similar manner, future water demand can also be projected based on EDU unit demand and projections. In the case of the Kilchis Regional Water District, the method using EDUs is preferable since such a large portion of water produced is sold to non-residential customers.

3.2 Historical Water Demands

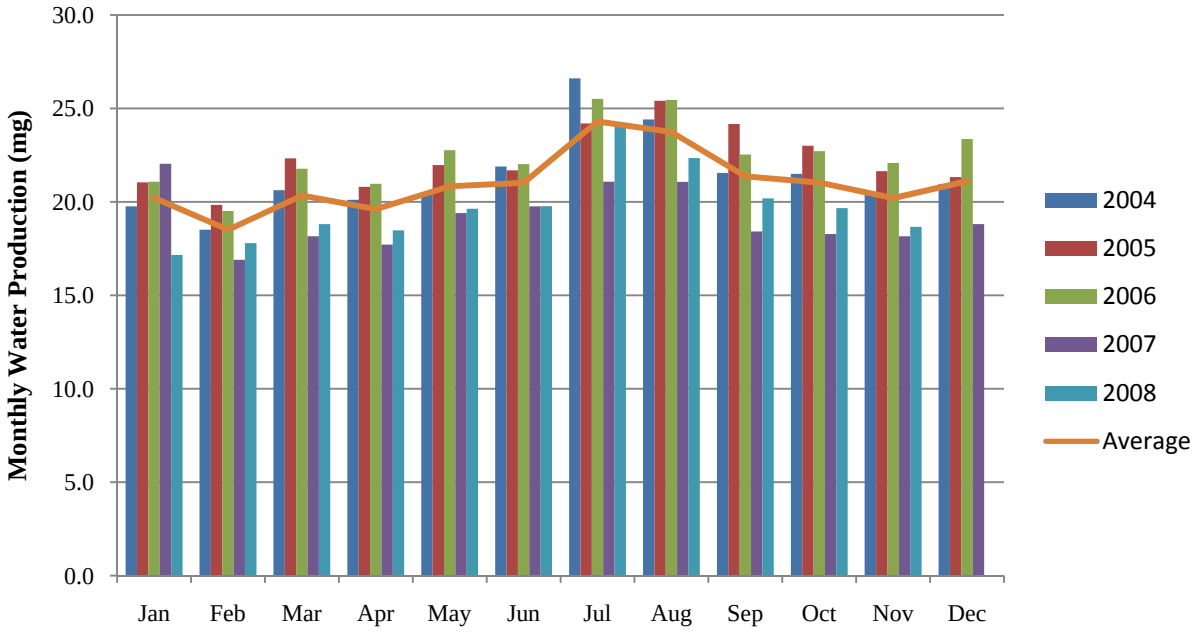
Generally water usage among the various small districts and associations, other than TCCA, is residential in nature. Several districts supply dairy farms and/or small commercial accounts such as a restaurant or nursery. The City of Bay City is primarily residential but also maintains several large commercial accounts. The largest water user of the Kilchis Regional System is the TCCA, which is a cooperative commercial endeavor involved in the production of cheese and other dairy products.

3.2.1 Water Production

The volume of water produced (i.e. diverted and treated) indicates the total system demands. System leaks, distribution flushing, meter inaccuracies, and other unmetered water uses cause production quantities to be higher than consumption quantities, however, portions of these unmetered flows that cannot be eliminated must still be provided for.

Water production records were obtained from Bay City for January 2004 through December 2008. Monthly water production volumes are presented in Figure 3-1. The average monthly production over the last five years is 21.0 million gallons. Lowest monthly production of 16.9 million gallons occurred in February 2007 and highest monthly production of 26.6 million gallons occurred in July 2004.

Figure 3-1 – Monthly Water Production (2004-2008)



Water production over the last five years is summarized in Table 3-1.

Table 3-1 – Water Production Summary

Year	Water Demand (mgd)			Peaking Factor	
	Average Daily	Maximum Monthly	Maximum Daily	MMD	MDD
2004	0.702	0.858	1.121	1.22	1.60
2005	0.733	0.820	1.238	1.12	1.69
2006	0.739	0.823	1.202	1.11	1.63
2007	0.630	0.711	0.985	1.13	1.56
2008	0.647	0.778	1.331	1.20	2.06
Average	0.690	0.798	1.175	1.16	1.71

As shown in the above table, the ADD over the past five years has averaged 0.690 million gallons per day (mgd). The average MMD and the MDD have equaled 0.798 mgd and 1.175 mgd, respectively, correlating to peaking factors of 1.16 and 1.71. These peaking factors are slightly lower than normal, especially the MDD peaking factor, which typically ranges from 2.0 to 3.5 and in Oregon averages 2.5.

It is interesting to note that recent trends show that the ADD and MMD in the system have generally decreased over the past 5 years, however, MDD spiked in 2008.

3.2.2 Individual District Historic Demands

Water demand within each of the individual districts varies due to differences in demographics, land uses, and commercial services. Therefore, a review of historical water demand data is required for each of the individual purchasing districts in the Kilchis Regional Water District.

The City of Bay City reads the master meters for each of the individual districts on a monthly basis. This information is used to form the basis of the individual water demands for each of the six purchasing districts. The 3-year water demand history for each individual district has been compiled in Table 3-2. During this period, master meters for several of the districts have been out of operation. These districts include Bay City, Latimer Road, and Northwood. As a result of meter malfunctions, some data in the following table is either missing or based on approximated figures.

The recent water demand history provided in Table 3-2 has been compared to those demands developed in the *2006 Water Master Plan.* The degree to which demands have increased over the past few years varies considerably between the various communities. In the case of Cole Creek there has been very little change in water usage characteristics. Juno Hill, TCCA, and Northwood all show a general decline in water usage. Bay City has experienced a decline in average daily demands, but an increase in maximum monthly demands. The estimated usage for Latimer Road is considerably higher, however, without actual meter data, it is impossible to draw an accurate conclusion on recent water demand trends.

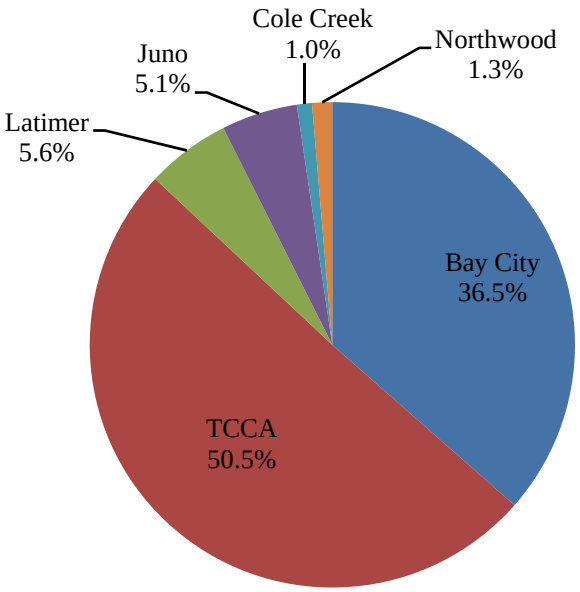
Table 3-2 – Summary of Individual District's Historic Water Demand

	2006	2007	2008	06/08 Average	2006 Master Plan
City of Bay City[1]					
ADD		226,046	232,579	229,312	240,597
MMD		251,806	319,516	285,661	252,926
Cole Creek Water District					
ADD	6,989	5,895	6,531	6,472	5,764
MMD	14,252	9,737	15,800	13,263	13,580
Juno Hill Water Company					
ADD	32,610	27,449	37,141	32,400	30,605
MMD	37,675	34,759	53,412	41,948	55,935
TCCA					
ADD	328,848	309,501	329,098	322,483	334,160
MMD	359,387	370,800	431,300	387,162	402,613
Latimer Road Water Association[2]					
ADD	35,796	35,796	35,698	35,764	23,334
Northwood Water Distric[3]					
ADD	9,205	8,186	8,164	8,518	10,435
MMD	17,236			17,236	20,613

[1] Master meter out of operation from 2006 to Feb 2007
[2] Master meter on east side of Latimer Road District out of operation. Annual water consumption based on an estimated monthly average consumption of 1,088,800 gallons.
[3] Master meter for Northwood District out of operation. Annual water consumption based on an estimated monthly average consumption of 249,000 gallons.

The percentage of usage for each district based on the 3-year average demand is presented in Figure 3-2. As this table shows, TCCA accounts for over half of the total water usage within the Kilchis Regional Water District. The City of Bay City also represents a significant portion of total usage. The remaining four purchasing districts combined for only 13.0% of the entire District's usage.

Figure 3-2 – Percent Usage for Each District



3.3 Water Sold

Water uses within the districts includes agricultural, residential, commercial, and some light industrial. Most districts are predominately residential in nature with a small number of commercial and farm users. The exception is TCCA which is completely commercial, and requires large quantities of water in its manufacturing processes.

3.3.1 Residential

Table 3-3 presents an estimate of annual residential water sales for each of the individual service districts. Actual water sales billing information was not available for the majority of these districts, with the exception of Latimer Road and Juno Hill. For this reason the data shown in Table 3-3 should be used only to provide a general comparison of residential usage within each district.

In Cole Creek and Northwood water districts, customers are charged a flat fee thus the districts do not read individual customers meters. In both of these cases total residential water sales are assumed to equal total water usage of each district based on master meter readings (see Table 3-2). However, the meter for Northwood Water District has not been in operation since 2006.

In Bay City meters are read monthly, however, the City's existing billing system does not allow historical information to be accessed and compiled easily. Therefore, the residential usages for both the high- and low-level systems were also estimated. Total residential sales in the City were assumed equal to the total water usage less commercial sales. As a result, municipal usage and system water loss is included with residential sales and as a result are likely to be higher that actual residential consumption. Residential usage in the high-level system was assumed equal to the quantity of water pumped into the system from the Doughty Street pump station. The accuracy of these estimates is further decreased by the fact that the City's master meter on Vaughn Road was out of commission until 2007.

Table 3-3 – Annual Residential Water Sales per Individual District (gallons)[1]

Water District	2006	2007	2008	Average
Bay City (High-Level)			28,016,100	28,016,100
Bay City (Low-Level)			31,808,107	31,808,107
Cole Creek		2,461,000	1,601,500	2,031,250
Juno	9,507,900	12,007,800	11,527,800	11,014,500
Latimer Road	5,387,370	3,597,910	3,762,430	4,249,237
Northwood	1,460,000			1,460,000
Total				78,579,194

[1] Most of the information is inferred based on master meter readings and not necessarily actual billing records.

Although Table 3-3 does not necessarily provide accurate information on residential water usage within each district, it does provide a basis to make comparisons between the districts. By far, the City of Bay City represents the majority of residential sales, supplying approximately 5.4 times more than the second largest service district, Juno Hill. Residential sales for the four remaining service districts range 1.5 to 11.0 million gallons annually.

Average residential usage rates for each district are shown in Table 3-4. This includes average residential usage on a per capita and account basis. Average usage is simply the average day residential use divided by the number of residential accounts. Per capita usage rates range from a low

of 80 gpcd in the Northwood area to a high of 278 gpcd in Cole Creek. In Bay City, the per capita rates range between 118 to 139 gpcd. With the exception of Cole Creek, per capita usages throughout the district appear to be fairly normal. The average per capita consumption in Oregon is about 111 gpcd[1].

Table 3-4 – Annual Residential Water Usage per Individual District[1]

Water District	Average Residential Usage	
	Per Capita	Per Account
Bay City (High-Level)	139	251
Bay City (Low-Level)	118	212
Cole Creek	278	556
Juno	168	529
Latimer Road	84	236
Northwood	80	200
Average	145	331

[1] Since data is not based on water sales (except Latimer Road and Juno Hill), average residential usage includes water loss within the distribution systems.

It should be noted that the usage rates listed in Table 3-4 are likely to be higher than actual rates. Since most of the service districts could not provide actual customer account data, residential sales had to be estimated based on the master meter readings for the entire district and therefore water loss within the distribution system is included with residential consumption. For this reason, the extremely high usage rates, such as those observed in Cole Creek, may be indicative of severe water loss occurring within its distribution system.

The information on residential usage per account will be used to determine the number of equivalent dwelling units (EDUs) within the system (See Section 3.4).

3.3.2 Non-Residential

Non-residential users include commercial and industrial customers. Information on non-residential sales was supplied by the individual service districts' billing records. Table 3-5 presents annual non-residential water sales for each district served by the Kilchis Regional Water District. As this table shows, the Tillamook County Creamery Association (TCCA) represents the largest non-residential user. In general, non-residential usage has increased in over the past three years in each of the districts.

Table 3-5 – Annual Commercial Water Sales per Individual District (gallons)

Water District	2006	2007	2008	Average
Bay City	20,253,880	24,107,900	25,299,793	23,220,524
Juno	622,000	750,000	1,230,000	867,333
TCCA	120,029,518	112,968,000	120,450,000	117,815,839
Latimer Road	5,420,960	5,633,980	5,878,350	5,644,430
Total	146,326,358	143,459,880	152,858,143	147,548,127

As previously stated, the Bay City system supplies water to 17 commercial and 3 industrial clients. The 3 industrial customers include the Pacific Oyster (oyster processing and restaurant), Tillamook County Smoker (meat processing and packaging plant) and McRae & Sons (wood processing plant). These three users combined to account for nearly 95% of the total non-residential water usage within

[1] AWWA Water Distribution Systems Handbook, Larry W. Mays, 2000. Table 3.1

Bay City. Table 3-6 presents the annual water sales to each of the City's industrial users. As this table shows, water consumption by the Tillamook County Smoker has had the highest increase in the past few years.

Table 3-6 – Bay City's Industrial Usage (gallons)

	2006	2007	2008	Average
Pacific Oyster	6,711,000	9,619,000	8,773,000	8,367,667
Tillamook County Smoker	11,524,200	12,636,400	14,716,800	12,959,133
McRae & Sons	516,300	807,500	513,100	612,300
Total	18,751,500	23,062,900	24,002,900	21,939,100
% of Non-Residential Use	91.4%	95.7%	94.9%	94.5%

3.4 Equivalent Dwelling Units (EDUs)

A dwelling unit is defined as one typical single-family residential dwelling. Non-residential users (commercial, industrial, public facility, etc.) can be described as a number of equivalent residential units based on their water consumption compared to the consumption of a residential unit. The number of equivalent dwelling units (EDU's) that a commercial or other non-residential user has can be used as a basis for rate structure. Capacity of a system can be defined based on the ability to serve a certain number of EDU's and future checks can be made on system capacity at any time regardless of the growth patterns that have occurred in residential, commercial and industrial users.

Based on the residential analysis (Table 3-4), it was determined that the average single-family dwelling (single EDU) in the Kilchis Regional Water District uses approximately 331 gpd. This consumption per single EDU can be used to calculate the number of EDUs for other users based on average water consumption.

For example, the Tillamook County Smoker used an average of 40,210 gpd in 2008. This consumption is 122 times greater than the average single-family residence, thus is equivalent to 122 EDUs.

The number of EDUs within the Kilchis Regional Water District is presented in Table 3-7. The total number of EDUs equals 2,179.3. With a service population of 1,795, this equates to 1.21 people per EDU.

Table 3-7 –EDUs per Individual District (2008)

Water District	EDUs				
	Residential	Commercial	Industrial	Municipal	Total
Bay City (High Level)	305.0	0.0	0.0	0.0	305.0
Bay City (Low Level)	468.0	16.6	198.4	5.0	682.1
Cole Creek	10.0	0.0	0.0	0.0	10.0
Juno	57.0	10.2	0.0	0.0	67.2
Latimer Road	50.0	48.6	0.0	0.0	98.6
Northwood	21.0	0.0	0.0	0.0	21.0
TCCA	0.0	0.0	995.4	0.0	995.4
Total	911.0	69.5	1,193.7	5.0	2,179.3

EDU projections are necessary to estimate future water demand and assess the systems' capacity to meet future demands. Since uses, potential growth, and land use vary greatly between the various districts, a single average annual growth rate (AAGR) could not easily be applied to all individual districts. The AAGR for residential accounts was assumed equal to the AAGR developed for population projections (See Section 2.2). No change was assumed for municipal water accounts. The following AAGRs were used for commercial and industrial EDU projections:

- **Commercial**
  - Bay City – 1.0% AAGR
  - Juno Hill – 1.5% AAGR
  - Latimer Road – 1.0% AAGR

- **Industrial**
  - Bay City – 2.0% AAGR
  - TCCA – 1.5% AAGR

The projected inventory of EDU is presented in Table 3-8. Based on this analysis, a total of 2851.5 EDUs are expected to be serviced within the Kilchis Regional Water Districts by the year 2029. This equates to an increase of 672.3 EDUs within the 20-year planning period with an average AAGR of 1.35% for the entire Regional District.

Table 3-8 – Projected EDUs per Individual District

	EDUs					
Water District	**Residential**	**Comm.**	**Industrial**	**Municipal**	**Total**	**AAGR**
Bay City (High Level)	380.0	0.0	0.0	0.0	380.0	1.11%
Bay City (Low Level)	572.0	13.1	294.7	5.0	884.8	1.31%
Cole Creek	10.0	0.0	0.0	0.0	10.0	0.00%
Juno	78.0	13.7	0.0	0.0	91.7	1.57%
Latimer Road	59.0	59.3	0.0	0.0	118.3	0.91%
Northwood	26.0	0.0	0.0	0.0	26.0	1.07%
TCCA	0.0	0.0	1,340.6	0.0	1,340.6	1.50%
Total	1,125.0	86.1	1,635.4	5.0	2,851.5	1.35%

3.5 Unaccounted Water

Unaccounted water is the quantity of water that is produced, but not accounted for by water sales. This quantity includes authorized unmetered uses and water loss. Authorized unmetered water uses include system flushing, backwashing, and construction. Water loss may be through physical sources, such as system leaks, or non-physical sources including water theft or meter inaccuracies. System leaks, distribution flushing, meter inaccuracies, backwash water, other unmetered water uses, and meter inaccuracies cause production quantities to be higher than consumption quantities.

Typically, unaccounted water is determined through a water audit of a system. In its most simple form, a water audit consists of comparing monthly water production and water sales records. The difference between these quantities equals the unaccounted water in the system, usually expressed as a percentage of total water production. Water audits become more detailed as more information is obtained and recorded. For example, estimates for water used during system flushing, production, construction, or loss during breaks provide important information.

Currently it is not possible to estimate water loss in the Kilchis Regional Water District, or in many of the individual water districts. Due to dysfunctional water meters, an accurate account of water sold to each district is not available. These meters are scheduled to be replaced this year. Once this is completed, the District should begin implementation of an on-going water auditing system.

Additionally, individual districts should be more proactive in maintaining water usage data. Each district should be encouraged to collect water usage data from each customer meter and maintain accurate records of this data. The frequency of collection could be monthly, bimonthly or semi-annually depending on the resources of each district. This information is important to determine the amount of water loss occurring within each service area. If significant water loss is determined to exists, the district should proceed with necessary correction.

Municipalities should take efforts to reduce water loss to 15% or less according to State standards. If 15% loss is easily achieved, the municipality should strive to reduce loss to 10%. Due to the age and size of the piping system, and the lack of location records for some pipelines, it may be unlikely that the Kilchis Regional Water District will be able to maintain water loss less than 15%. However, the District should strive to reduce water loss, identify any unmetered users and to replace meters wherever possible. If all the meters are made accurate, municipal usage (i.e. system flushing, fire fighting, etc.) is quantified and all unmetered users are eliminated, a much more accurate picture of water loss could be formed.

3.6 Projected Water Demand

The goal of projecting future water demand is not to build larger facilities to accommodate excessive water consumption, but rather to evaluate the capability of existing systems and to size new facilities for reasonable demand rates.

3.6.1 Design Unit Values

Design unit values are used to project future water demands. These values will be used in conjunction with EDUs projections to calculate the future water demands for the entire Kilchis Regional Water District and each of the individual service districts.

Typically unit demands are simply calculated by dividing water demands for the total number of EDUs served by the system. However, due to the complex nature of the District and a general lack of accurate water data for each of the single districts, this method did not produce satisfactory results. As a consequence an alternative method has been established. The method used in this plan heavily relies on peaking factors.

The design ADD for each district was determined as the percentage of each district's portion of annual water production (see Figure 3-2 and Table 3-1). MMD, MDD, and PHD were developed based on appropriate peaking factors for each service district.

The estimated ADD and the various peaking factors utilized by this analysis are shown in Table 3-9.

Table 3-9 – Design Criteria

	ADD (gpd)	Percent Total Usage	Peaking Factors		
			MMD	MDD	PHD
Kilchis Regional	690,000	100.0%	1.2	2.0	4.1
Bay City (Upper)	82,900	12.0%	1.2	1.8	4.0
Bay City (lower)	168,900	24.5%	1.3	2.4	4.0
Cole Creek	7,000	1.0%	2.0	3.3	5.0
Juno	35,000	5.1%	1.3	2.7	4.5
TCCA	348,400	50.5%	1.1	1.7	4.0
Latimer	38,600	5.6%	1.2	2.7	4.5
Northwood	9,200	1.3%	1.7	3.0	5.0

The design criteria presented in the previous table and system EDU calculations (Table 3-8) were used to develop current unit water demand values for the entire Kilchis Regional water system as well as for each of the individual purchasing districts. These unit demands are listed in Table 3-10.

Table 3-10 – Unit Water Demands

	Unit Demands (gpd/EDU)			
	ADD	MMD	MDD	PHD
Kilchis Regional System	315	380	640	1,290
Bay City (High-Level)	270	325	490	1,080
Bay City (Low-Level)	250	325	595	990
Cole Creek	700	1,400	2,310	3,490
Juno	520	680	1,410	2,345
TCCA	345	385	600	1,400
Latimer	390	470	1,060	1,760
Northwood	440	745	1,310	2,190

3.6.2 Projected Demand

The projected 20-year water demand for the Kilchis Regional Water District is presented in the following table. This table also lists the forecasted demands for each of the purchasing water systems within the District.

Table 3-11 – Projected 20-Year Water Demand

	Future EDUs	Future Water Demands (gpd)			
		ADD	MMD	MDD	PHD
Kilchis Regional System	2,851.5	898,200	1,083,500	1,824,900	3,678,400
Bay City (High-Level)	380.0	102,600	123,500	186,200	410,400
Bay City (Low-Level)	884.8	221,200	287,600	526,500	876,000
Cole Creek	10.0	7,000	14,000	23,100	34,900
Juno	91.7	47,700	62,375	129,300	215,100
TCCA	1,340.6	462,500	516,100	797,700	1,876,900
Latimer	118.3	46,100	55,600	125,400	208,200
Northwood	26.0	11,400	19,400	34,200	56,900

It should be again restated that due to lack of accurate meter information, the above demands have been developed based on limited data requiring numerous assumptions and estimates to be made. As the City repairs and/or replaces master meters these demands should be updated.

Section 4 Existing System

4.1 Introduction

The Kilchis Regional Water District (PWS #4100079) is operated by the City of Bay City. As previously noted, the Regional District sells water in bulk to six separate water districts, associations, and corporate users, including the City of Bay City, Cole Creek Water District (PWS #4105362), Juno Hill Water Company (PWS #4100889), Latimer Road Water Association (PWS #4100881), Northwood Water District (PWS #4100885), and the Tillamook County Creamery Association (TCCA). The Wilson River Water District (PWS #410896) also purchases water from the Kilchis Regional Water District as an emergency source. The Regional District manages the supply and transmission of water for each of these bulk customers.

The purpose of this section is to detail the existing facilities of the Kilchis Regional Water District water system. In addition to the system descriptions, the condition and capacity of each component will be assessed. Information in this section was obtained from the City staff, field investigations, individual district water surveys, project drawings and as-builts, and from previous planning documents.

4.2 Water Supply

The Kilchis Regional Water District utilizes two wells that are located at Dill Bar on the Kilchis River in Township 1S Range 9W Section 33. The water from these wells is directly influenced by the Kilchis River. This has resulted in extremely good well yields, but also may put the source at risk for surface water contamination.

The District's two wells were drilled in 1975 (Well #1) and 1980 (Well #2). Each well is 12 inches in diameter and 60 feet deep. During well tests, the yield of Well #1 was 1200 gallons per minute (gpm) with a 3-ft drawdown after 24 hours and Well #2 yielded 1000 gpm with a 3.5-ft drawdown after 24 hours. Recovery for both wells was within 30 seconds. Copies of the well logs can be found in the appendix.

Since the creation of the Kilchis Regional Water District, the reliability of the wells has been consistently good, resulting in an adequate supply for the District, even during low flow years on the Kilchis River. A detailed Source Water Assessment Report for the District was completed in May of 2003 by the Oregon Association of Water Utilities, Groundwater Specialist.

4.2.1 Water Rights

The water used by the Kilchis Regional Water District is permitted by the Oregon Department of Water Resources (OWRD). The water right to withdraw water from the Regional District's two wells on the Kilchis River is owned by the City of Bay City. This right allows for withdrawals up to 20.0

cfs (12.9 MGD), which is more than sufficient to support the District's water demand well into the future.

The City of Bay City has a total three water right permits, which include two surface rights and one reservoir right. A summary of these water rights is presented in Table 4-1. Copies of water right permits, certificates, and orders are found in appendices.

Table 4-1 – City of Bay City's Water Rights Summary

Source	Permit	Cert.	Priority Date	Permitted Rate
Kilchis River	S 4385	---	8/10/1973	20.0 cfs (8,977 gpm)
Patterson Creek	R 1287	21584	12/6/1951	3.3 af (1.1 mg)
Patterson Creek	S 20895	21585	5/9/1991	1.0 cfs (449 gpm)

It is assumed that the Kilchis Regional Water District could utilize any of the above water rights if proper infrastructure was available. Currently the Regional District only utilizes the right on the Kilchis River, however, this main water right has not been certified by the OWRD. In order to certify a water right, it must be put to full beneficial use. Permits for water right include a deadline for full application of water use.

The Kilchis River water right permit originally had an October 1, 1981 deadline for full beneficial use; however, this deadline has been extended several times. The last extension extended the deadline to October 1, 1995, which has long expired, and City needs to apply for an additional extension to certify the permit. New State rules allow for extensions of 40 years or longer. It is very likely that as a condition to extend the City's water right permit, the OWRD will require the development and approval of a Water Management and Conservation Plan (WMCP).

4.2.2 Intake

The Kilchis Regional Water District utilizes two wells with a natural gravel collection bed system. Although this source has been shown to be under influence of surface water, no filtration is required to meet treatment compliance. The treatment of the raw source water includes pH control and disinfection.

Pumps

Each well is equipped with a vertical turbine pump rated at 500 gpm. These pumps have a combined capacity of approximately 900 gpm. The pumps have been in place since the wells were originally drilled, although both were rebuilt around 1996. The pumps are operated with a 40Hp, 230/460 V, 60 Hz, 3-phase, 1780 rpm US Electrical Motor. Well pump #1 is located in the main control building, adjacent to the chlorine building. Well pump #2 is located in a separate building. Each pump is metered with a magnetic meter. The meter for Well #2 was replaced in 2008.

Raw water pumping equipment should be sized to provide the design maximum daily demand (MDD) with 18 hours or less of operation. To meet this criterion, the existing system would require a minimum capacity of 1,280 gpm, which is 42% higher than the existing intake pumps combined capacity. The projected MDD will require a minimum capacity of 1,690 gpm. As a result of the

insufficient capacity of its well pumps, the Regional system is heavily reliant on stored water to meet peak demands.

Operation of the pumps is controlled by a telemetry system that activates the pumps based on the water level in the Willowbrook Reservoir near Bay City (see Section 4.4). The pumps can also be controlled by the SCADA system located at Bay City's wastewater treatment plant or manually at the well site.

There are no alarms or autodialer system to alert operators of the presence of or potential for problems occurring in the water system (i.e. loss of power, rapid water level drop, etc.). The City has indicated that these items have already been budgeted for and will be installed in the current fiscal year.

Auxiliary power for the pumps is provided with a 27 kW diesel fueled backup generator installed in 1997, which also operates the system's chemical injection pumps (see below). The generator is regularly maintained and automatically exercised each week and is in good working condition.

Treatment

Water treatment for the Kilchis Regional Water District is limited to disinfection using chlorine gas and acid-alkaline (pH) balance with sodium carbonate (soda ash).

As the well pumps start-up, chlorine is injected directly into the supply well using a vacuum system. Approximately 1 lb of chlorine is used per day to attain an average chlorine residual of 0.24 mg/L. In the event of a power failure, the backup generator at the well pump also powers the injection system.

In 1999 the Regional District began adding sodium hydroxide (caustic soda) to the water at the wellheads in order to balance the pH of the water to reduce lead and copper concentrations in the system's drinking water. However, the caustic soda was not able to consistently maintain pH and as a result the 2008 lead & copper testing showed copper levels were exceeded. In 2009 the caustic soda was replaced with soda ash. Lead and copper concentrations will be retested in the summer of 2009. As with the chlorine, the soda ash is injected into the water at the wellheads once the pumps turn on.

4.2.3 Conditions & Deficiencies

The Kilchis Regional Water District has sufficient source capacity to meets its water needs through the 20-year planning period and beyond. The existing intake and treatment components have been well maintained and are in good operating condition. However, based on the above analysis of the Kilchis Regional water supply, the following deficiencies have been noted:

- Water Right Permit for the Kilchis River water right needs to be extended.
- Extending water right permit will likely require the District to develop a Water Management & Conservation Plan (WMCP).
- Existing intake pumps appear to be in good condition, however do not have adequate capacity to meet current or future sizing requirements.
- Additional alarms and controls for the system should to be installed including a chlorine alarm, constant pH probe, and autodialer.

4.3 Transmission System

The transmission system includes those sections of pipe that deliver water from the well source to the various storage facilities as well as to each of the individual service districts. Figure 4-1 provides a schematic map of the existing Kilchis Regional Water District transmission system. This map is based on information from previous planning documents, as-built drawings, and Bay City staff.

A general description of the Kilchis Regional Water District's transmission system is provided in the 2006 Water Master Plan Update:

> Water is pumped from the well house through approximately 1,300 feet of 18-inch ductile iron water main. This main runs along the southerly edge of the Kilchis River Forest Road to Kilchis River Road. The Cole Creek Water District taps the 18-inch main at Curl Road with a 4-inch diameter PVC main and a master meter. At the intersection of Kilchis River Road and Alderbrook Road, the 18-inch main ends and wyes to two 10-inch PVC mains. One 10-inch main runs westerly along Alderbrook Road to Vaughn Road, northwesterly on Vaughn Road to the Bay City master meter at the intersection of Vaughn Road and Bewley Road. This main continues within the Bay City water service area to feed the 200,000-gallon Willowbrook Reservoir off of Doughty Road.
>
> The second 10-inch main at the intersection of Kilchis River Road and Alderbrook Road continues southerly along Alderbrook Road to Highway 101. Continuing south on the east side of Highway 101 the 10-inch main supplies water to the 500,000-gallon reservoir on Juno Hill. It then continues on to supply Juno Water Company and the Tillamook County Creamery Association, ending at the intersection of Highway 101 and Latimer Road. From this point, the waterline changes to an 8-inch diameter PVC. The 8-inch main extends east on Latimer Road, serving the Latimer Road Water Association and ending at the master meter and booster pump for the Northwood Water District.

Since the completion of the District's *2006 Water Master Plan*, several improvements to the transmission system have been made. These improvements include:

- Replacing 570 feet of 10-inch mainline on Highway 101
- Replacing 1,600 feet of 8-inch mainline on the west end of Latimer Road

Over the past few years the Kilchis Regional Water District and the City of Tillamook Bay have been in the process of developing an intertie between the two systems. This intertie would provide an emergency source of water to both water systems. The cities of Bay City and Tillamook are currently in the process of securing funding for this project. It is expected that the intertie project will be completed within the next few years.

4.3.1 Piping Network

The Kilchis Regional Water District transmission system includes approximately 9.4 miles of pipeline ranging in size from 18-inch diameter to 8-inch diameter. An inventory of the existing transmission pipelines is provided in Table 4-2.

Table 4-2 – Transmission Pipeline Inventory

Pipe Size & Material	Approx. Length
18-in DI	13,000
10-in PVC	21,100
8-in PVC	15,500
Total	49,600

Much of the existing transmission system has been in place since its construction 1980 and is in relatively good condition. The major exception is the section along Alderbrook Road between Kilchis River Road and Highway 101. This section of pipeline was constructed using thin-walled PVC material and installed within the designated 100-year flood plain. The soil often experiences period of prolong saturation and there is evidence of flooding in the area, which has likely contributed to breaks in the area.

The 10-inch section of pipeline feeding the Juno Hill Reservoir has also experienced frequent breaks. These breaks have been associated with localized washouts of the roadway.

Fire hydrants are located sporadically throughout the Regional District's transmission system. The largest concentration of fire hydrants is along Latimer Road. Aside from this area and within the Bay City's distribution system, the presence of fire hydrants is severely limited. Based upon the 2007 Oregon Fire Code Appendix C - Fire Hydrants Location and Distribution, average hydrant spacing for a fire demand of 1,750 gpm or less is 500 ft., for 2,000 gpm is 450 ft., and for 3,000 gpm is 400 ft.

4.3.2 Metering System

Master meters were installed for each of the purchasing districts by September of 1988. The number of meters associated with each purchasing district and a description of their general location are provided in Table 4-3. Master meters are also shown on existing transmission system map (Figure 4-1).

Table 4-3 – Metering Location for Each Purchasing District

Service District	Meter Location
Bay City	Two master meters: Alderbrook Road and Vaughn Road
Cole Creek Water District	Kilchis River Road connection
Latimer Road Water Association	Two meters on either side of the service district
Juno Hill Water Company	Eight meters at various locations on 10-in main between 18-in transmission line to Juno Hill
Northwood Water District	Northwood pump station
Wilson River Water District	Intersection of Latimer Road & Wilson River Loop Road
TCCA	West side of property

Over the past several years, several of the master meters have not been operational for prolonged periods of time. The meters on Vaughn Road and on the west side of Latimer Road service area have been recently replaced. Currently the east meter on Latimer Road and the Northwood master meters are out of service. New replacement meters have been purchased and are planned to be installed in the summer of 2009.

The City of Bay City is charged with maintaining master meters. Currently there is no meter inspection program that regularly tests and calibrates master meters to ensure they are functioning properly.

4.3.3 Conditions & Deficiencies

In general the transmission system for the Kilchis Regional Water System appears to be in good operating conditions with the exception of the following:

- Several sections of pipeline that have been prone to breaks. These sections include the pipeline along Alderbrook Loop Road and the section serving the Juno Hill Reservoir. These sections should be replaced.

- Due to lack of fire hydrants, fire protection criteria are not met within most of the transmission system. This item will be addressed in more detail in Section 4.5, which discusses each of the service districts' distribution systems.

- Faulty master meters have been an ongoing problem for the Kilchis Regional Water District. Currently there are two meters that are not functioning, which are planned to be replaced in this year. However, the ongoing problems indicate that the system should implement a metering program that regularly tests and calibrates master meters. This will provide the Regional District with a proactive approach to identify and repair or replace troublesome meters before the meter fails entirely.

4.4 Water Storage

Two water storage reservoirs are utilized for general use in the Kilchis Regional Water District. Several of the individual districts also own and operate their own storage reservoirs. This includes the City of Bay City and Northwood, which require additional storage for their high-level pressure systems and TCCA, which maintains storage for fire suppression.

4.4.1 General Storage

The two general use reservoirs in the Regional District include the Juno Hill Reservoir and the Willowbrook Reservoir. Both are steel reservoirs that were constructed in 1980 at an elevation of 212.5 feet. The Juno Hill reservoir is situated off of Highway 101 on Juno Hill, just north of the Tillamook County Creamery. The Willowbrook reservoir is located off of Willowbrook Drive, east of Bay City. Both reservoirs are fed directly from the well intake pumps. Information regarding these reservoirs is provided in Table 4-4.

Table 4-4 – Specifications for General Use Reservoirs

Juno Hill Reservoir	
Year Constructed	1980
Capacity	500,000 gallons
Material	Fabricated Steel
Diameter	52 feet
Height	32 feet
Base Elevation	212.5 feet
Willowbrook Reservoir	
Year Constructed	1980
Capacity	200,000 gallons
Material	Fabricated Steel
Diameter	33 feet
Height	32 feet
Base Elevation	212.5 feet

The Willowbrook Reservoir has a transducer to sense the water level. Based on the water level at this reservoir, the Kilchis River well pumps are activated via the master radio at the Bay City wastewater treatment plant.

Both reservoirs were inspected by divers during the 2000/2001 budget year and were found to be in good condition with no visible problems.

4.4.2 Individual Districts' Storage

Bay City High-Level System

Storage for the high-level service area in Bay City is provided by the Baseline Reservoir and the Pennsylvania Ave Reservoir. A booster station on Doughty Road pumps water from the Kilchis Regional (low-level) system to the Baseline Reservoir. The Baseline Reservoir is a steel tank located east of Bay City off of Baseline Road. The Pennsylvania Ave Reservoir, located on Pennsylvania Avenue northeast of the city limits. Construction on the Pennsylvania Ave Reservoir was completed in February 2009. This reservoir is fed through the distribution system from the Baseline Reservoir. The general specifications for the high-level reservoir are provided in the following table:

Table 4-5 – Specifications for Bay City's High-Level Reservoirs

Baseline Reservoir	
Year Constructed	1980
Capacity	100,000 gallons
Material	Fabricated Steel
Diameter	27 feet
Height	24 feet
Base Elevation	302 feet
Pennsylvania Ave Reservoir	
Year Constructed	2008
Capacity	500,000 gallons
Material	Glass-Fused Steel
Diameter	59 feet
Height	28 feet
Base Elevation	298 feet

The Baseline Reservoir was also inspected by divers during the 2000/2001 budget year and found to be in good condition with no visible problems. No problems have been reported with the Pennsylvania Ave Reservoir since it has been in operation.

Northwood Water District

The general elevation of the Northwood Water District is higher than can be severed by the reservoirs (Juno Hill and Willowbrook) in the Regional System. In order to maintain sufficient water pressure throughout its distribution system, Northwood utilizes a pump station which pumps water from the Kilchis Regional system to a 15,000-gallon steel reservoir at an elevation of approximately 400 feet. Information on this reservoir is limited, but no known structural or operational deficiencies have been reported.

Tillamook County Creamery Association

The TCCA fire reservoir is on a separate distribution system which is dedicated to fire fighting for TCCA only. The fire tank has a volume of 220,000 gallons. No deficiencies with this tank have been reported.

4.4.3 Storage Requirements

Storage requirements for a community water system must meet both domestic and fire protection storage sizing criteria.

Domestic Storage Required: Equalization and emergency storage amounts are typically referred to as "domestic storage."

Equalization storage is typically set at 25% of the MDD to balance out the difference between peak hourly demand and supply capacity so that these variations in demand are not imposed on the water supply source.

Emergency storage is required to protect against a total loss of water supply such as would occur with a broken transmission line, an electrical outage, equipment breakdown, or natural disaster. This is determined by the larger of two methods:

1. Emergency storage should be equal to 100% of the maximum daily demand (MDD) assuming that water use would be restricted during times of emergencies.

2. Emergency storage should be equal to 3 times the average daily demand (ADD).

For the Kilchis Regional Water District, the second method results in the larger storage requirements and will therefore be used to determine storage needs.

Fire Protection: Fire reserve storage is needed to supply fire flow throughout the water system to fight a major fire. The fire reserve storage is based on the maximum flow and duration of flow required to confine a major fire. The guidelines published in "Fire Suppression Rating Schedule" by the Insurance Services Office (ISO) are typically used to determine the required fire flow and fire reserve storage.

Fire storage should be sufficient to provide at least 2 hours of the needed fire flow. Fire storage is typically based on providing a flow of 1,000 gpm for 2 hours in small communities. This results in a fire storage requirement of 120,000 gallons. Commercial, industrial and institutional buildings require higher flows. Determination of these flows is unique to each building under consideration and involves detailed surveys of construction (type and area), occupancy (combustibility), exposure (construction type, distance, length/height of wall) and communications (openings). However, for the purpose of this planning effort, it is assumed that a fire flow of 2,500 gpm for 2 hours is sufficient for commercial and industrial buildings.

4.4.4 Storage Capacity Assessment

Kilchis Regional Water District – General Storage Requirements

The Kilchis Regional District has approximately 700,000 gallons of treated water storage available for its general system provided by the Juno Hill and Willowbrook reservoirs. Storage requirements for this system are presented in the following table:

Table 4-6 – Current and Projected Storage Needs for the Kilchis Regional Water District[1]

	Current Conditions	2029 Conditions
ADD (gpd)	607,100	795,600
MDD (gpd)	1,247,200	1,638,700
Storage Requirements:		
Emergency Storage	1,821,300	2,386,800
Equalization Storage	311,800	409,700
Fire Protection	300,000	300,000
Total Storage Requirements	2,433,100	3,096,500
Existing Storage Available	700,000	700,000
Storage Deficiency	**1,733,100**	**2,396,500**

[1] Current and future demand conditions do not include the ADD or MDD for Bay City's high-level System. It is assumed that storage for the high-level system will be solely provided by the high-level reservoirs on Baseline and Pennsylvania Ave.

As Table 4-6 shows, the current and future storage requirements greatly exceed what is available from the two existing reservoirs. In fact current storage capacity provides only 28.8% of current needs and only 22.6% of projected future needs. The problem of insufficient storage is further compounded by the fact that the existing intake pumps are undersized which puts a heavier burden on the storage reservoirs to meet typical peak demands.

The lack of adequate storage has been repeatedly identified in previous planning efforts dating back to the *1992 Water Distribution Study for Kilchis Regional Water System.* Since this initial plan, the storage deficiency in the Regional District has nearly doubled, however no new storage reservoir serving the entire Regional system has been constructed.

Bay City High-Level System

Bay City's high-level water system has 600,000 gallons of available storage. Since this system is isolated from the rest of the Regional system, none of this storage is available for general use by the

other service districts. Storage requirements for the Bay City high level system are presented in the following table:

Table 4-7 – Current and Projected Storage Needs for Bay City's High-Level System

	Current Conditions	2029 Conditions
ADD (gpd)	82,900	102,600
MDD (gpd)	149,100	186,200
Storage Requirements:		
Emergency Storage	248,700	307,800
Equalization Storage	37,300	46,600
Fire Protection	120,000	120,000
Total Storage Requirements	406,000	474,400
Existing Storage Available	600,000	600,000
Storage Surplus	**194,000**	**125,600**

As Table 4-7 shows, the existing available storage in Bay City's high-level system is more than sufficient to meet the system's storage demand through the 20-year planning period.

Northwood System

Due to its elevation, the Northwood Water District is hydraulically separated from the general Kilchis Regional system and as a result Northwood must maintain and operate its own reservoir to provide adequate water pressure to its customers. Ideally, separated water systems (like the Bay City high-level system) should be able to provide adequate storage to meet domestic and fire protection storage requirements. This would provide the service area with adequate storage in the case of a major pump failure or break in transmission line.

The Northwood Water District owns and maintains a 15,000-gallon reservoir as part of its individual distribution system. Storage requirements for this system are presented in the following table:

Table 4-8 – Current and Projected Storage Needs for Northwood System

	Current Conditions	2029 Conditions
ADD (gpd)	9,200	11,400
MDD (gpd)	27,600	34,200
Storage Requirements:		
Emergency Storage	27,600	34,200
Equalization Storage	6,900	8,600
Fire Protection	120,000	120,000
Total Storage Requirements	154,500	162,800
Existing Storage Available	15,000	15,000
Storage Deficiency	**139,500**	**147,800**

As Table 4-7 shows, the existing storage provided by the Northwood district is not sufficient to meet its current or future storage needs. In order to meet these needs, the district would need to construct an additional 150,000 gallons of storage, the majority of which is due to fire protection requirements. Because this reservoir would solely serve the Northwood district, this project would be ineligible for funds from the Kilchis Regional Water District.

Constructing such a large reservoir would likely be cost prohibitive for the small service district. If a new reservoir cannot be constructed, then the district should ensure that its pump station has sufficient backup capabilities including pump redundancy and auxiliary power. The district may also consider installing fire flow pumps at its pump station to meet fire protection requirements.

4.4.5 Conditions & Deficiencies

All the reservoirs which serve the Kilchis Regional Water System and the individual service districts are in reportedly good operating conditions. The major deficiency is associated with a severe lack of storage capacity in the general Kilchis Regional water system. Currently, required storage needs exceed capacity by over 1.7 million gallons. This deficiency is expected to increase to nearly 2.4 million gallons by the end of the 20-year planning period.

4.5 Distribution Systems

Each of the distribution systems are owned and maintained by the individual service districts, separately from the Kilchis Regional system. Information on each of the service district's distribution system is based on information obtained from each district and shown in Figure 4-2 through Figure 4-6. This information depicted on these figures and described below is accurate to the best knowledge available at this time of this report. As additional information is obtained, this Plan should be updated accordingly.

4.5.1 City of Bay City

The distribution system for the City of Bay City is presented in Figure 4-2. The City constructed major improvements to its distribution system in 1980, which included increasing the size of many pipelines and replacing some of the older steel lines with PVC material pipelines. As previously noted, the Bay City distribution system is separated into two pressure zones based on the area's topography.

The low-level system serves those areas in an approximate elevation range of 8-feet to 100-feet and includes all commercial water users. The Juno Hill and Willowbrook reservoirs provide storage for this area. Water use in the area includes a mixture of residential, commercial, and industrial. The general limits for the area include the downtown corridor between Pacific Street and 'D' Street and the area south of Seattle Street.

The high-level system serves those areas above 100-feet in elevation. The limits for this zone include the area north of Pacific Street and the region between 'D' Street and Seattle Street. This area is entirely residential with a mixture of single- and multi-family dwellings. The storage for the high level pressure zone is provided by the Baseline Reservoir and the new Pennsylvania Ave Reservoir. The system is fed using the booster pump station located on Doughty Road.

The City of Bay City's distribution system includes approximately 19 miles of pipeline ranging in size from 2-inch to 10-inch. The majority of the pipelines are 6- and 8-inch PVC material.

Table 4-9 - Bay City Distribution Piping Inventory

Pipe Size & Material	Pipeline Length (ft)		Total
	Low-Level	High-Level	
2-in PVC	6,900	900	7,800
4-in PVC	1,800	---	1,800
6-in Steel	2,500	---	2,500
6-in PVC	27,800	16,000	43,800
8- in PVC	12,000	18,100	30,100
10-in PVC	9,700	4,500	14,200
Total	60,700	39,500	100,200

The system also includes 35 fire hydrants in the high-level area and 47 hydrants in the low-level region. Typically hydrant spacing is less than 500 feet, which meets the International Fire Code hydrant spacing requirements. However, there are still some areas that do not meet this requirement.

As noted previously, the City of Bay City owns and operates a booster pump station as part of its distribution system. This station pumps water from the low-level system to the Baseline Reservoir, which feeds the high-level system. The booster station is located on Doughty Road midway between Bewley Street and Willowbrook Drive. That station was constructed in 1980 and consists of two submersible single-phase pumps that were replaced in 2002. Each of the 5-hp pumps is rated at 100 gpm. Auxiliary power to the booster station is provided by a 23-kW propane generator.

As noted *2006 Water Master Plan Update,* this booster station is in good condition. However, the station is slightly undersized to meet current MDD with 18 hours of operation with only one pump operating. To do so would require each pump to have a minimum pump capacity of 140 gpm. To meet future pumping requirements, the pumps would need a minimum capacity of 175 gpm.

The existing distribution system is a collection of pipes of differing materials and diameters with many dead ends and redundant lines, particularly in the low-level system. Some areas experience low pressures and low flows due to inadequately sized service lines.

All service to the downtown area, and the areas between ‘D’ street and Main street, is fed though a single 10-inch diameter PVC line that runs on the west side of Hwy 101. At ‘B’ Street, a 6-in line crosses the highway to serve the low level system between Pacific Street and ‘D’. This is the only pipeline that runs from the lower system to the business district (including Pacific Oyster). Similarly to the low-level high system, the high-level system includes a single straight run with no redundancy or looping.

4.5.2 Cole Creek Water District

Prior to the 1980 intertie with Kilchis Regional Water District, the Cole Creek Water District was supplied by wells operated by the Tillamook County Creamery Association. The existing distribution system for the Cole Creek Water District includes approximately 4,600 feet of PVC pipelines which extends along Curl from the districts connection point on Kilchis River Road and is presented in

Figure 4-3. The majority of these lines (84.5%) are 4-inch diameter pipe. An inventory of the existing piping within the district is provided in Table 4-10.

Table 4-10 – Cole Creek Distribution Piping Inventory

Pipe Size & Material	Pipeline Length (ft)
2-in PVC	710
4-in PVC	3,870
Total	4,580

There are no fire hydrants in the proximity of the Cole Creek region. However, even if hydrants were present, the 4-inch service main is inadequately sized to supply the need flows for fire protection.

Cole Creek has the highest unit water use of any of the other purchasing districts. This may be an indicator of high water loss due to leaks in this system.

4.5.3 Juno Hill Water Company

The Juno Hill distribution system is shown in Figure 4-4. Juno Hill's system was originally constructed in 1949 and is composed of primarily plastic pipes. The following table provides an inventory of the piping in the distribution system. Juno Hill Water Company is responsible for maintaining nearly 14,300 linear feet of piping. This includes approximately 6,100 feet of 10-inch diameter piping that is part of the Kilchis Regional transmission system.

Table 4-11 – Juno Hill Distribution Piping Inventory

Pipe Size & Material	Pipeline Length (ft)
1-in PVC	700
1.5-in PVC	1,840
2-in PVC	2,250
4-in PVC	3,380
10-in PVC	6,100
Total	14,270

The Juno Hill Water Company also operates a small booster pump station to service customers at higher elevations. The station is located on Juno Hill Road and situated on the edge of a steep hillside. It appears the area surrounding the station is not stable and there is some evidence that the station may be sliding down the hill. Furthermore, due to its elevation, minimum pressure at the station nears 20 psi, which makes it difficult for the system to maintain minimum pressure requirements at high service elevations.

There are no fire hydrants in the Juno Hill service area. Furthermore, small service lines in much of the service are inadequately sized to supply the need flows for fire protection.

The Juno Hill area has a high potential for future growth, especially along Boquist Road. Currently, this area is served by a 1- and 1.5-inch service line. The existing pipelines in this area should be upgraded in order to support new growth.

4.5.4 Latimer Road Water Association

The distribution system for the Latimer Road Water Association was constructed in 1980 and presented in Figure 4-5. An inventory of the Latimer Road distribution system is provided in the following table.

Table 4-12 – Latimer Road Distribution Piping Inventory

Pipe Size & Material	Pipeline Length (ft)
1-in PVC	5,250
2-in PVC	970
8-in PVC	8,800
Total	15,020

This district is bisected by the 8-in Regional transmission line. The Latimer Road Water Association is responsible for maintaining the transmission line within its district borders. Latimer Road's distribution network also consists of 1- and 2-inch PVC service lines, which are used to provide service to its customers north of Latimer Road.

The Latimer Road district also has 4 fire hydrants located along Latimer Road. Average hydrant spacing is estimated to be 2,000 feet, which exceeds the 500-ft requirement by the Oregon Fire Code

This is also good potential for future growth in this area, especially north of Latimer Road. Currently, this area is served by 1- and 2-inch service lines. These lines should be upgraded to accommodate future development.

4.5.5 Northwood Water District

The Northwood Water District's distribution system is shown in Figure 4-6. The system was originally constructed in 1975. Due to the area's topography, it operates at a different pressure zone than the general Kilchis Regional Water District transmission system.

Northwood's distribution system includes approximately 6,400 feet of pipeline ranging size from 1.5- to 6-inch diameter. As shown in Table 4-13, the majority of the system is constructed with PVC pipe material, although there are still some sections of steel line in the system. There is also one fire hydrant in the system located across the street from the Northwood booster station.

Table 4-13 – Northwood Distribution Piping Inventory

Pipe Size & Material	Pipeline Length (ft)
1.5-in PVC	700
2-in PVC	1,500
4-in Steel	350
4-in PVC	2,350
6-in PVC	1,500
Total	6,400

As previously noted, the Northwood owns and operates a booster pump station located on Sollie Smith Road at the east end of the Regional District's 8-inch transmission line. No problems have been reported concerning this station.

There is a single fire hydrant located across from the Northwood pump station. No other hydrants are located within the district. Small service lines are inadequately sized to supply the need flows for fire protection.

4.5.6 Conditions & Deficiencies

The condition of the various service districts' distribution system varies. The majority of the districts are able to provide the minimum service requirements with the exception of fire protection. A number of deficiencies have been identified in each of the service districts. The severity of these deficiencies also varies. The following list is provided as a general overview of system deficiencies based on currently available information:

City of Bay City

- Many undersized lines are present in the system reducing the flow capacity and water pressure to some areas.
- Redundant lines existing in some areas, as a result smaller diameter lines inefficiently service customers even when larger lines are present.
- Many unlooped, dead-end lines exist within the system, which limit the available water for fire hydrants and increase the potential for inconveniencing a large number of people if the line must be shut down for repair.
- Single pipe feeds large areas in both high and low-level systems creating the undesirable potential for cutting off water flow to large areas should the pipe be damaged.
- Pumps at Doughty Road pump station are undersized to meet current and future pumping requirements.

Cole Creek Water District

- High water usage rate may indicate significant water loss in system caused by leaks.
- Unable to provide fire protection due to lack of fire hydrants and small service lines.

Juno Hill Water Company

- Juno Hill booster station appears to be sliding off hillside. Also, due to station's elevation, it is difficult to maintain minimum pressure requirements at high elevation service connections.
- Service line on Boquist Road too small to support future development.
- Unable to provide fire protection due to lack of fire hydrants and small service lines.

Latimer Road Water Association

- Service lines are undersized to provide for new development in areas north of Latimer Road.

Northwood Water District

- Unable to provide fire protection due to lack of fire hydrants and small service lines.

4.6 Hydraulic Model

A hydraulic network analysis computer program was used to evaluate the performance of the existing transmission and distribution systems and to aid in the development of proposed system improvements. This analysis was performed using WaterCAD software. The purpose of the computer network modeling is to determine pressure and flow relationships throughout the entire system for a variety of critical hydraulic conditions. System performance and adequacy is then evaluated on the basis of water demand estimates developed in Section 3 and planning criteria presented in Section 5.

The hydraulic model used to complete the hydraulic analysis of this master plan was developed from the current transmission and distribution system's mapping (Figure 4-1 through Figure 4-6). The hydraulic model developed includes all system piping, supply sources, pump stations, and reservoirs. The hydraulic model was then used to perform the system analysis and to illustrate recommended improvements, which will be presented in Section 6.

The computer analysis was performed with all pressure zones simultaneously in operation. In order to use the computerized hydraulic model of the water system to assess system adequacy, several system conditions were examined. The adequacy of the system's major transmission piping and the system's ability to provide recommended fire flows throughout the system were analyzed. All fire flow modeling was performed assuming that the system must be capable of providing the recommended fire flows while maintaining a minimum system pressure of approximately 20 psi to all services within the pressure zone of the flow test.

The scope of the work for this *Water Master Plan* does not include the calibration of the hydraulic model. Therefore, results from the hydraulic model may be different than actual conditions. The Regional District may wish to budget for and have the hydraulic model calibrated to provide more accurate results. If the hydraulic model is calibrated, revisions to this master plan may be required.

The results of the Water CAD model are found in the appendix.

4.6.1 Model Results

Entire Water System (including service districts' distribution systems)

Initially, the reservoir level was set at the bottom to evaluate if the entire reservoir level range would be usable during a fire flow event. Under this condition, nearly all service areas maintained water pressure of at least 20 psi. The only areas that did not meet the minimum pressure requirement were in the general low-level pressure zone on Pike Road and Allen Lane where service elevations exceed 100 feet. The majority of the system has pressures within the recommended range of 30 psi to 80 psi.

The projected increase in future peak flows will further reduce pressure in the system. The hydraulic model predicts that 2.5% of the service nodes analyzed will not meet minimum pressure requirements unless improvements are made. Low pressure is expected to occur throughout the low-level system where service elevations exceed 80 feet.

Table 4-14 lists the percent of analyzed service nodes that fall within specified pressure ranges for current and future flow demands.

Table 4-14 – Existing & Future Service Area Pressures[1]

Service Pressure (psi)	Percent of Analyzed Service Nodes	
	Existing	Future
< 20	0.8%	2.5%
20-30	1.2%	7.9%
30-80	79.3%	74.3%
> 80	18.7%	15.4%

[1] Pressures resulting from peak hour demand with reservoir levels near bottom.

Ideally a system should be able to provide the needed fire flows for the full level range of the reservoir and still provide system pressures greater than 20 psi. However, under the initial condition (reservoir levels at bottom), fire flow conditions were not met. This is partially due to the fact that the existing well pumps are undersized to meet peak conditions. A second scenario was therefore assessed with reservoir levels near the top. Under this scenario, all system nodes reported pressures greater than 20 psi.

The percentage of analyzed nodes meeting various fire flow criteria is shown in Table 4-15. This table also approximates the areas within the service area which fall within the various limits for available fire flows. The hydraulic model predicts only two areas in the Bay City high-level pressure zone meet fire flow criteria. This area encompasses approximately 140 acres or only 6.5% of the Regional District's service area. No areas within the other purchasing districts have available fire flows exceeding 500 gpm. This is largely due to the fact that these areas are predominately serviced by small diameter (≤ 4 inches) pipelines with many unlooped service lines.

Table 4-15 – Existing Available Fire Flows

Available Fire Flow (gpm)	Percent of Analyzed Service Nodes	Percent Service Area
< 500	64.6%	89.0%
500-1,000	15.2%	4.5%
>1,000	20.2%	6.5%

[1] Available fire flows with reservoirs nearly full.

Kilchis Regional Transmission System

The above analyses have been based on a hydraulic model of the entire system including the distribution networks within each of the individual service district. A more basic model was also analyzed which only looked at the Kilchis Regional transmission system.

The result of this model shows that minimum pressure requirements are met throughout the Regional transmission system under current and future peak demand conditions. Therefore it can be concluded that the low pressure areas noted in Table 4-14 are due to deficiencies within the associated service district.

During current peak demands, available fire flows to the districts of Bay City, Cole Creek, and Juno Hill exceed 1,000 gpm. However, fire flows to TCCA, Latimer Road, and Northwood are still relatively low. Under future peak flow conditions, available fire flows exceeding 1,000 gpm are found only in Bay City and Cole Creek areas when reservoirs are full. It should be noted that due to land uses in Bay City, the minimum available fire flow delivered should at least 2,500 gpm.

4.7 Operation and Maintenance

4.7.1 District Management

A chronological history of the development of the Kilchis Regional Water District has been provided in previous planning documents. A brief summary is provided below:

- November 1, 1980 - the City of Bay City enters into a regional water supply agreement with four other water user groups: Latimer Road Water Association, Juno Water Company, Cole Creek Water District, and Tillamook County Creamery Association.

- July 1, 1981 - the Northwood Water District enters into regional water agreements with the City of Bay City.

- February 1982 - the Wilson River Water District also enters into regional water agreements with the City of Bay City.

All of the user groups, except Wilson River Water District, rely solely on the water supplied by the Kilchis Regional Water District.

Each of these water supply agreements are valid for a period of 40 years with an option to renew the contract for an additional 20 years under the same terms and conditions of the original agreement. As a condition this agreement, each of the purchasing districts have agreed not to hold the City of Bay City liable for damages due to any interruption or failure to supply water.

The *Water Supply Agreement* also establishes the Kilchis Regional Water Board. Each purchasing district is entitled to elect one representative to the group. The Water Board meets regularly to communicate with, make recommendation to, and advise the City regarding matters relating to the Kilchis Regional Water District, such as annual budgets and capital improvement projects. However, *Water Supply Agreement* explicitly states that the Kilchis Regional Water Board shall have no power other than comment and make recommendations to the City with regards to the water supplied to users outside the City.

The water supply agreement also outlines the general responsibilities of the City and the purchasing agents in regards to connections, record keeping, operation and maintenance, payments and billings, and water quality. A summary of these responsibilities is provided below:

Purchasing Districts' Responsibilities

- May not allow outside connections outside its district without specific approval from the City.
- Maintain water consumption (sales) records.
- Cover all costs associated with repair, maintenance, and/or replacement of master meter(s).
- Provide deposits as required by City.
- Install backflow preventers as required.
- Sole responsibility for water quality beyond the transmission line.
- Must immediately notify the City of any emergency or condition which may affect the quality of the water in either party's system.

- Provide and maintain all service mains and valves within district. All cost associate with work are born by the individual district.
- Collection of all water bills from consumers located within district
- Maintenance and repair of water distribution system beyond the master meter

Kilchis Region District's Responsibilities

- Supply water meeting the Oregon Health Department and Federal Environmental Protection Agency (EPA) rules, standards, and regulations for public water supplies.
- Provide a comprehensive chemical analysis report upon request.
- Inspect, test, and repair master water meters as required. Cost associated with this work is born by purchasing district (see above).
- Financial accounting for Regional Water District.
- Bill purchasing district in accordance with adopted rates (see below).
- Maintenance and operation of the general (low-level) reservoirs.
- Maintenance and operation of water treatment.

In general, the responsibilities of the Kilchis Regional District are borne by the City of Bay City. The City maintains separate accounts for the Kilchis system and its own distribution system.

Copies of the service agreements are found it the *1992 Water Distribution Study for Kilchis River Water Transmission System*.

4.7.2 Current Water Rates

Regional District Billing Rate to Service Districts

Rates charged to purchasing districts are outlined in Section 6 of the *Water Supply Agreement*. Each district is billed monthly. Charges for water used are based on the sum of the following:

1. Operating expenses. This fee is based on the projected operating costs for the upcoming fiscal year and the percent of water usage by each district, which can be adjusted depending on the difference between total payments made and the actual operating expenses of the preceding year. This fee is calculated annually during Bay City's budgetary process.

2. Capital retirement. This fee covers the portion of the system capacity allocated to each purchaser. This rate was established in each of the *Water Supply Agreements* and has not been updated since the agreements adoption.

It should be noted that the City of Bay City's monthly payment does not include a capital retirement portion. The City's capital portion is paid by property taxes (general obligation bonds).

OAR 690-086-0150 requires municipal suppliers to have a rate structure that is based, at least in part, on water consumption. The Regional District meets this requirement. The following table lists the operating and capital retirement payments for each of the purchasing districts. Operating payments are based on an estimated operating expense of $248,270 for the 2009/2010 fiscal year.

Table 4-16 – 2009/2008 Monthly Payment by Service District

Service District	Water Usage Percentage	Annual Operating Payment[1]	Annual Capital Payment	Annual Total Annual Payment	Monthly Payment
Bay City	36.5%	$ 77,072	N/A	$ 77,072	$ 6,423
Cole Creek	0.7%	$ 1,42	$ 825	$ 2,246	$ 187
Juno Hill	5.0%	$ 10,296	$ 1,751	$ 12,047	$ 1,004
Latimer Rd	5.8%	$ 11,256	$ 2,851	$ 14,107	$ 1,176
Northwood	1.4%	$ 2,769	$ 1,624	$ 4,393	$ 366
TCCA	50.6%	$ 111,466	$ 13,890	$ 125,356	$ 10,446
Total	100.0%	$ 214,281	$ 20,941	$ 235,222	$ 19,602

[1] Estimated annual payment based on total estimated operating expenses of $ 248,270.00 adjusted by existing balance for each district.

Service Districts' Rate Structures

Each of the service districts has its own rate structure it uses to bill it customers. A summary of these various rate structures, as well as the billing frequency is presented in the following table:

Table 4-17 - Water Rate Structure for Each Purchasing District

Water District	Billing Frequency	Rate
Bay City	Monthly	Within City: 1. 3/4" Service: $24.55 for the first 6,000 gallons, plus $2.50 for each additional 1,000 gallons 2. 1" Service: $26.68 for the first 6,000 gallons, plus $2.50 for each additional 1,000 gallons 3. 2" Service: $28.81 for the first 6,000 gallons, plus $2.50 for each additional 1,000 gallons 4. 4" Service and over: To be negotiated. Outside City: 1. 3/4" Service: $34.68 for the first 6,000 gallons, plus $2.50 for each additional 1,000 gallons 2. 1" Service: $36.82 for the first 6,000 gallons, plus $2.50 for each additional 1,000 gallons 3. 2" Service: $38.94 for the first 6,000 gallons, plus $2.50 for each additional 1,000 gallons 4. 4" Service and over: To be negotiated.
Cole Creek	Monthly	Total district billed divided evenly among users
Juno Hill	Monthly	$30.00 for first 5,000 gallons, plus $0.50 for each additional 1,000 gallons
Latimer Road	Bi-Monthly	$44.00 for first 12,000 gallons, plus $1.50 for each additional 1,000 gallons
Northwood	Bi-Monthly	$40.00 (flat fee)

Funding agencies, including the Drinking Water Program (DWP) and Rural Development (RD), typically require water supplies to list the "average" residential monthly water bill for the system. The "average" monthly bill for a single-family dwelling is based on a consumption rate of 7,500 gallons per month. Using this criterion, the "average" monthly billing rate for each of the individual service districts is presented in Table 4-18.

Table 4-18 – Comparison of "Average" Monthly Water Bill

Water District	Average Monthly Water Bill[1]
Bay City (within City)	$ 28.30
Bay City (outside City)	$ 38.43
Cole Creek	$ 18.72
Juno Hill	$ 31.25
Latimer Road	$ 24.25
Northwood	$ 20.00

[1] Based on an average water usage of 7,500 gal/month or 15,000 gal/bi-monthly
[2] Average water rate based on ¾" service connection

4.7.3 Budget

The City of Bay City maintains the following funds for the Kilchis Region Water District: Operating Fund, Reserve Fund, Bonded Dept Fund, and Bond Reserve. Budgets over the past four years for these funds are shown in the tables below:

Table 4-19 – Kilchis Water Operating Fund

Fiscal Year	2005/2006	2006/2007	2007/2008	2008/2009
RESOURCES				
Available cash on hand	$ 105,877	$ 71,485	$ 23,000	$ 35,000
Earnings from temporary investments	$ 2,978	$ 3,443	$ 2,500	$ 1,000
Water Districts & TCCA	$ 119,656	$ 105,594	$ 136,624	$ 168,629
BAY CITY WATER OPERATING FUND	$ 46,045	$ 56,498	$ 67,592	$ 47,186
KILCHIS WATER BOND RESERVE FUND	$ 1,800	$ 0	$ 0	$ 0
TOTAL RESOURCES	**$ 276,356**	**$ 237,020**	**$ 229,716**	**$ 251,815**
REQUIREMENTS				
Personal Services	$ 40,715	$ 40,863	$ 48,241	$ 57,867
Materials & Services	$ 60,112	$ 54,559	$ 70,875	$ 72,100
Capital Outlay	$ 44,045	$ 3,339	$ 3,030	$ 15,000
KILCHIS WATER RESERVE	$ 60,000	$ 81,000	$ 100,000	$ 100,000
Contingencies	$ 0	$ 0	$ 7,570	$ 6,848
Reserved for future expenditure	$ 71,484	$ 57,259	$ 0	$ 0
TOTAL REQUIREMENTS	**$ 276,356**	**$ 237,020**	**$ 229,716**	**$ 251,815**

Years 2005/2006 and 2006/2007 are actual.
Years 2007/2008 and 2008/2009 are budget

Table 4-20 – Kilchis Water Reserve Fund

Fiscal Year	2005/2006	2006/2007	2007/2008	2008/2009
RESOURCES				
Available cash on hand	$ 64,590	$ 128,102	$ 207,500	$ 89,000
Earnings from temporary investments	$ 3,512	$ 8,117	$ 5,000	$ 3,000
KILCHIS WATER OPERATING FUND	$ 60,000	$ 81,000	$ 100,000	$ 100,000
KILCHIS WATER BOND RESERVE FUND	$ 0	$ 2,700	$ 3,500	$ 2,200
TOTAL RESOURCES	$ **128,102**	$ **219,919**	$ **316,000**	$ **194,200**
REQUIREMENTS				
Capital Outlay	$ 0	$ 34,016	$ 273,303	$ 32,500
Reserved for future expenditure	$ 128,102	$ 185,903	$ 42,697	$ 161,700
TOTAL REQUIREMENTS	$ **128,102**	$ **219,919**	$ **316,000**	$ **194,200**

Years 2005/2006 and 2006/2007 are actual.
Years 2007/2008 and 2008/2009 are budget

Table 4-21 – Kilchis Water Bonded Debt Fund

Fiscal Year	2005/2006	2006/2007	2007/2008	2008/2009
RESOURCES				
Available cash on hand	$ 28,660	$ 36,511	$ 28,000	$ 20,000
Previous Levied Taxes	$ 2,042	$ 1,426	$ 1,500	$ 1,500
Earnings from temporary investments	$ 1,568	$ 2,283	$ 1,500	$ 1,000
Water Districts & Bay City	$ 29,823	$ 2,1258	$ 20,940	$ 20,940
Taxes necessary to balance			$ 16,164	$ 24,104
Taxes collected in year levied	$ 27,311	$ 25,810		
TOTAL RESOURCES	$ **89,404**	$ **87,288**	$ **68,104**	$ **67,544**
REQUIREMENTS				
Bond principal payments	$ 24,264	$ 25,478	$ 26,751	$ 28,090
Bond interest payments	$ 28,629	$ 27,415	$ 26,142	$ 24,805
Unappropriated	$ 36,511	$ 34,395	$ 15,211	$ 14,649
TOTAL REQUIREMENTS	$ 89,404	$ 87,288	$ 68,104	$ 67,544

Years 2005/2006 and 2006/2007 are actual.
Years 2007/2008 and 2008/2009 are budget

Table 4-22 – Kilchis Water Bond Reserve

Fiscal Year	2005/2006	2006/2007	2007/2008	2008/2009
RESOURCES				
Available cash on hand	$ 54,224	$ 54,573	$ 54,000	$ 53,700
Earnings from temporary investments	$ 2,149	$ 2,724	$ 2,500	$ 1,500
TOTAL RESOURCES	$ **56,373**	$ **57,297**	$ **56,500**	$ **55,200**
REQUIREMENTS				
KILCHIS WATER OPERATING FUND	$ 1,800	$ 2,700	$ 0	$ 0
KILCHIS WATER RESERVE FUND	$ 0	$ 0	$ 3,500	$ 2,200
Reserved for future expenditure	$ 54,573	$ 54,597	$ 53,000	$ 53,000
TOTAL REQUIREMENTS	$ **56,373**	$ **57,297**	$ **56,500**	$ **55,200**

Years 2005/2006 and 2006/2007 are actual.
Years 2007/2008 and 2008/2009 are budget

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WILLLOWBROOK RESERVOIR

WELL HEADS

KILCHIS RIVER

COLE CREEK
WATER DISTRICT

CITY OF BAY CITY

TILLAMOOK BAY

GRAPHIC SCALE

1000 0 500 1000 2000 4000

(IN FEET)
1 inch = 2000ft.

WATER MASTER PLAN UPDATE

SCALE: 1" = 2000'

JUNO HILL RESERVOIR

JUNO HILL
WATER COMPANY

TILLAMOOK COUNTY
CREAMERY ASSOCIATION

LATIMER ROAD
WATER ASSOCIATION

NORTHWOOD
WATER
DISTRICT

WILSON RIVER

LEGEND

- 1-INCH PVC
- 1.5-INCH PVC
- 2-INCH PVC
- 4-INCH STEEL
- 4-INCH PVC
- 6-INCH STEEL
- 6-INCH PVC
- 8-INCH PVC
- 10-INCH PVC
- 18-INCH DUCTILE IRON

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KILCHIS REGIONAL WATER DISTRICT
WATER MASTER PLAN UPDATE

EXISTING REGIONAL WATER SYSTEM

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DATE: MARCH 2009

FIG
4-1

PENNSYLVANIA AVE
RESERVOIR
500,000 GALLON

N

PENNSYLVANIA ST.
WILLIAMS ST.
HENDRICKS ST.
HIGH ST.
SALEM ST.
OCEAN ST.
PACIFIC ST.
MAIN ST.
TRADE ST.
A ST.
BAY
MIAMI
CENTER
BAY RIDGE
1ST
2ND
3RD
4TH
5TH
6TH
7TH
8TH
9TH

HIGH LEVEL SERVICE AREA
LOW LEVEL SERVICE AREA

GRAPHIC SCALE
200 0 100 200 400 800
(IN FEET)
1 inch = 400 ft.

MATCHLINE FIG 4-2B

LEGEND

- 1-INCH PVC
- 1.5-INCH PVC
- 2-INCH PVC
- 4-INCH STEEL
- 4-INCH PVC
- 6-INCH STEEL
- 6-INCH PVC
- 8-INCH PVC
- 10-INCH PVC
- 18-INCH DUCTILE IRON
- WATER VALVE
- FIRE HYDRANT

WATER MASTER PLAN UPDATE

SCALE: 1" = 400'

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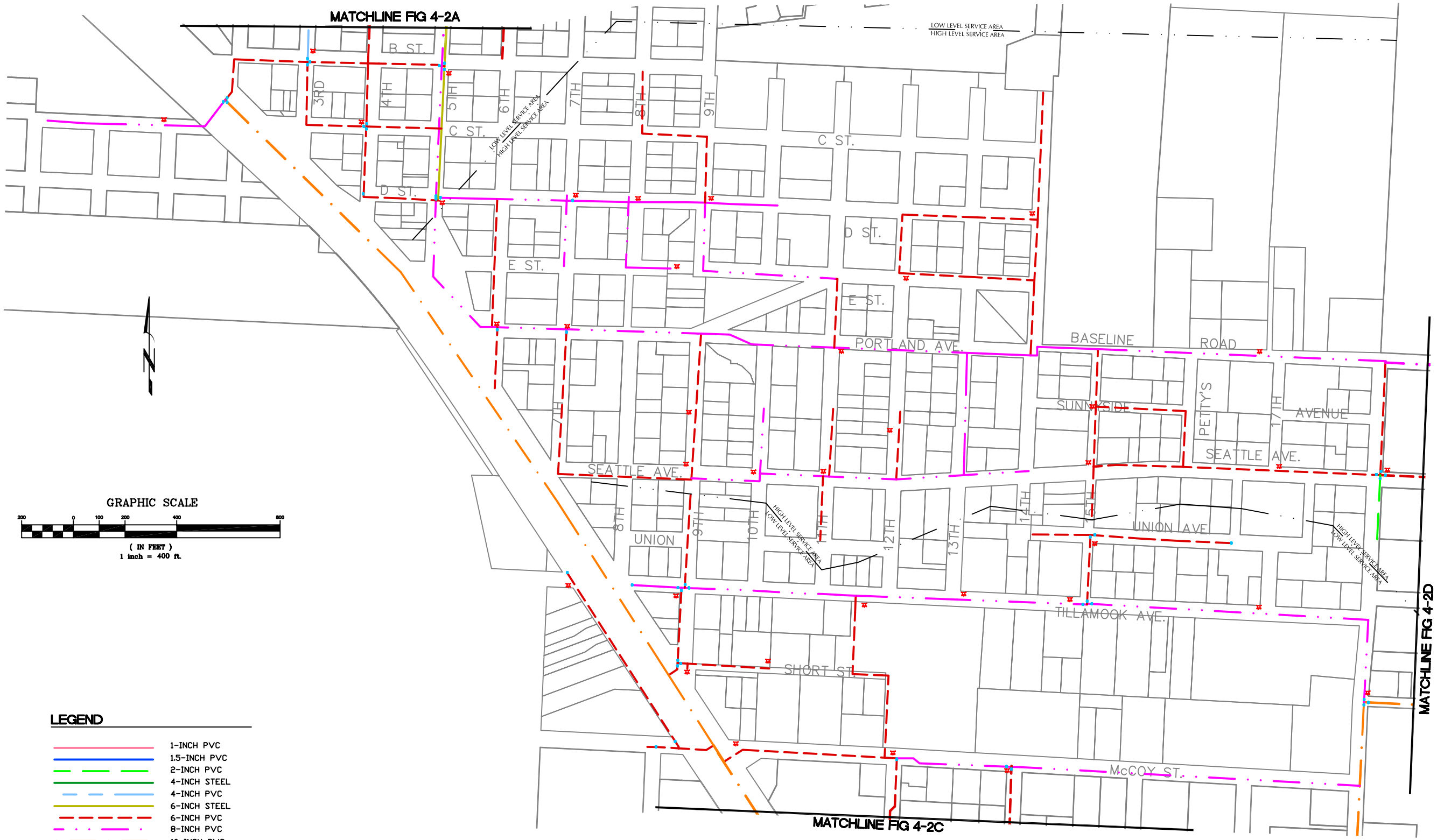
KILCHIS REGIONAL WATER DISTRICT
WATER SYSTEM MASTER PLAN

BAY CITY DISTRIBUTION SYSTEM

DRAWN BY: CLB
DATE: MARCH 2009

FIG
4-2A



GRAPHIC SCALE

200 0 100 200 400 800

(IN FEET)
1 inch = 400 ft.

LEGEND

- 1-INCH PVC
- 1.5-INCH PVC
- 2-INCH PVC
- 4-INCH STEEL
- 4-INCH PVC
- 6-INCH STEEL
- 6-INCH PVC
- 8-INCH PVC
- 10-INCH PVC
- 18-INCH DUCTILE IRON
- WATER VALVE
- FIRE HYDRANT

WATER MASTER PLAN UPDATE

SCALE: 1" = 400'

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KILCHIS REGIONAL WATER DISTRICT
WATER SYSTEM MASTER PLAN

EXISTING WATER DISTRIBUTION SYSTEM

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FIG 4-2B

MATCHLINE SEE SHEET 4-2B

WOODS ST.

14TH

WILLIAMS ST.

ELLIOT ST.

HARE ST.

WARREN AVE.

SPRUCE ST.

SALMON ST.

CLAM ST.

ALDER ST.

MALLARD ST.

VAUGHN ROAD WATER METER

GRAPHIC SCALE

200 0 100 200 400 800

(IN FEET)
1 inch = 400 ft.

VAUGHN ROAD

ALDERBROOK METER

VAUGHN ROAD

LEGEND

- 1-INCH PVC
- 1.5-INCH PVC
- 2-INCH PVC
- 4-INCH STEEL
- 4-INCH PVC
- 6-INCH STEEL
- 6-INCH PVC
- 8-INCH PVC
- 10-INCH PVC
- 18-INCH DUCTILE IRON
- WATER VALVE
- FIRE HYDRANT

WATER MASTER PLAN UPDATE

SCALE: 1" = 400'

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KILCHIS REGIONAL WATER DISTRICT
WATER SYSTEM MASTER PLAN

BAY CITY DISTRIBUTION SYSTEM

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FIG
4-2C

BASELINE RESERVOIR
100,000 GALLON

WILLOWBROOK RESERVOIR
200,000 GALLON

MORTON STREET

PARMER STREET

HIGH LEVEL SERVICE AREA
LOW LEVEL SERVICE AREA

DOUGHTY STREET

DOUGHTY STREET
PUMP STATION

MATCHLINE FIG 4-2B

N

GRAPHIC SCALE

200 0 100 200 400 800

(IN FEET)
1 inch = 400 ft.

LEGEND

- 1-INCH PVC
- 1.5-INCH PVC
- 2-INCH PVC
- 4-INCH STEEL
- 4-INCH PVC
- 6-INCH STEEL
- 6-INCH PVC
- 8-INCH PVC
- 10-INCH PVC
- 18-INCH DUCTILE IRON
- WATER VALVE
- FIRE HYDRANT

WATER MASTER PLAN UPDATE

SCALE: 1" = 400'

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KILCHIS REGIONAL WATER DISTRICT
WATER SYSTEM MASTER PLAN

BAY CITY DISTRIBUTION SYSTEM

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DATE: MARCH 2009

FIG
4-2D

COLE CREEK
MASTER WATER METER

GRAPHIC SCALE

200 0 100 200 400 800

(IN FEET)
1 inch = 400 ft.

LEGEND

- 1-INCH PVC
- 1.5-INCH PVC
- 2-INCH PVC
- 4-INCH STEEL
- 4-INCH PVC
- 6-INCH STEEL
- 6-INCH PVC
- 8-INCH PVC
- 10-INCH PVC
- 18-INCH DUCTILE IRON
- WATER VALVE
- FIRE HYDRANT

WATER MASTER PLAN UPDATE

SCALE: 1" = 400'

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KILCHIS REGIONAL WATER DISTRICT
WATER SYSTEM MASTER PLAN

COLE CREEK DISTRIBUTION SYSTEM

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FIG
4-3

JUNO HILL RESERVOIR
500,000 GALLON

JUNO HILL
MASTER METER

JUNO HILL
PUMP STATION

LATIMER ROAD
WEST MASTER METER

TCCA MASTER METER

FUTURE INTERTIE
W/ CITY OF TILLAMOOK

PORT TILLAMOOK RIGHT-OF-WAY

LATIMER ROAD

HIGHWAY 101

SUPPRESS ROAD

BOQUIST ROAD

KILCHIS RIVER

LEGEND

- 1-INCH PVC
- 1.5-INCH PVC
- 2-INCH PVC
- 4-INCH STEEL
- 4-INCH PVC
- 6-INCH STEEL
- 6-INCH PVC
- 8-INCH PVC
- 10-INCH PVC
- 18-INCH DUCTILE IRON
- WATER VALVE
- FIRE HYDRANT

GRAPHIC SCALE

200 0 100 200 400 800

(IN FEET)
1 inch = 400 ft.

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KILCHIS REGIONAL WATER DISTRICT
WATER SYSTEM MASTER PLAN

JUNO HILL DISTRIBUTION SYSTEM

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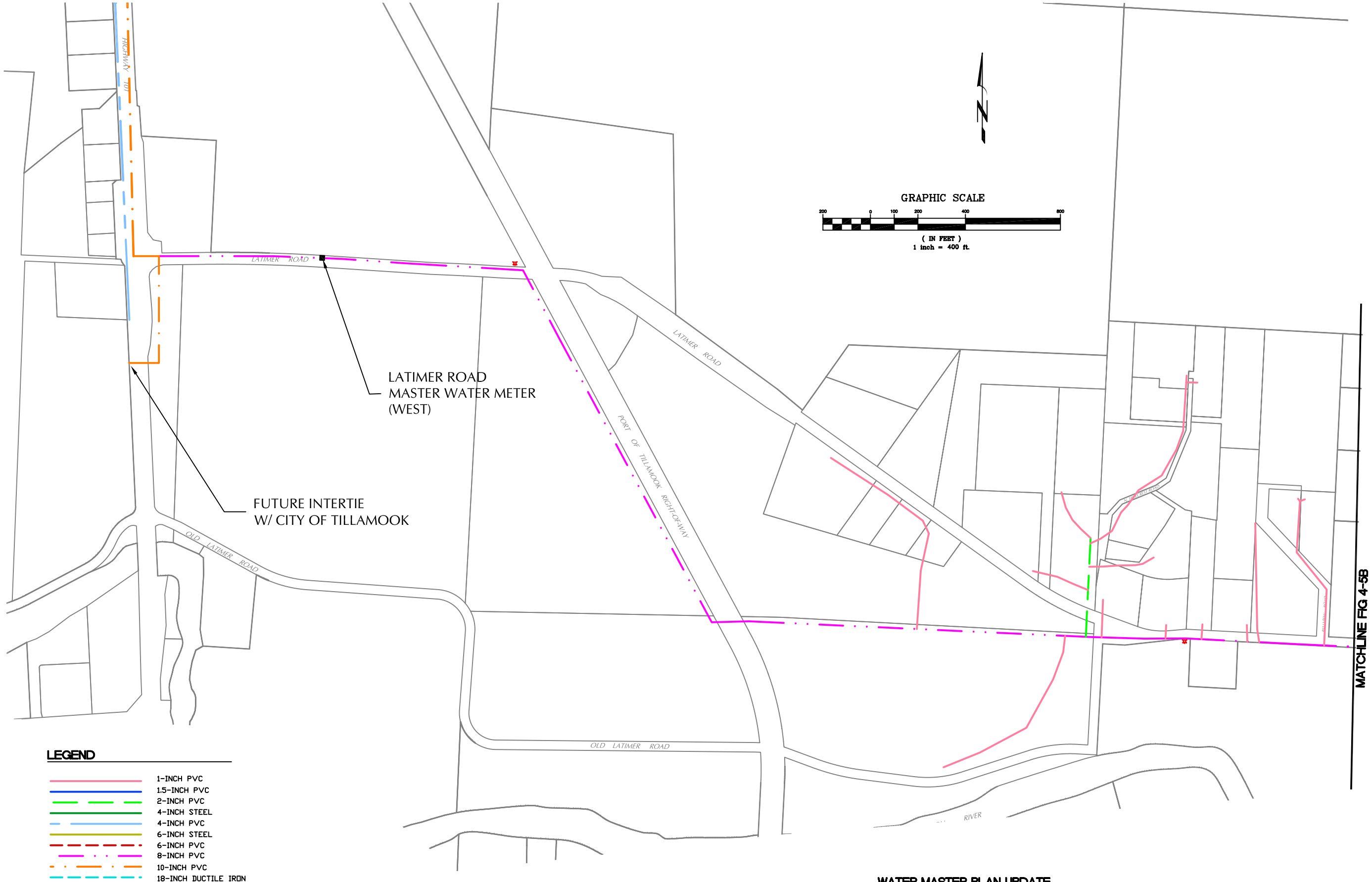
DATE: MARCH 2009

FIG
4-4



WATER MASTER PLAN UPDATE

SCALE: 1" = 400'

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KILCHIS REGIONAL WATER DISTRICT

WATER SYSTEM MASTER PLAN

LATIMER ROAD DISTRIBUTION SYSTEM

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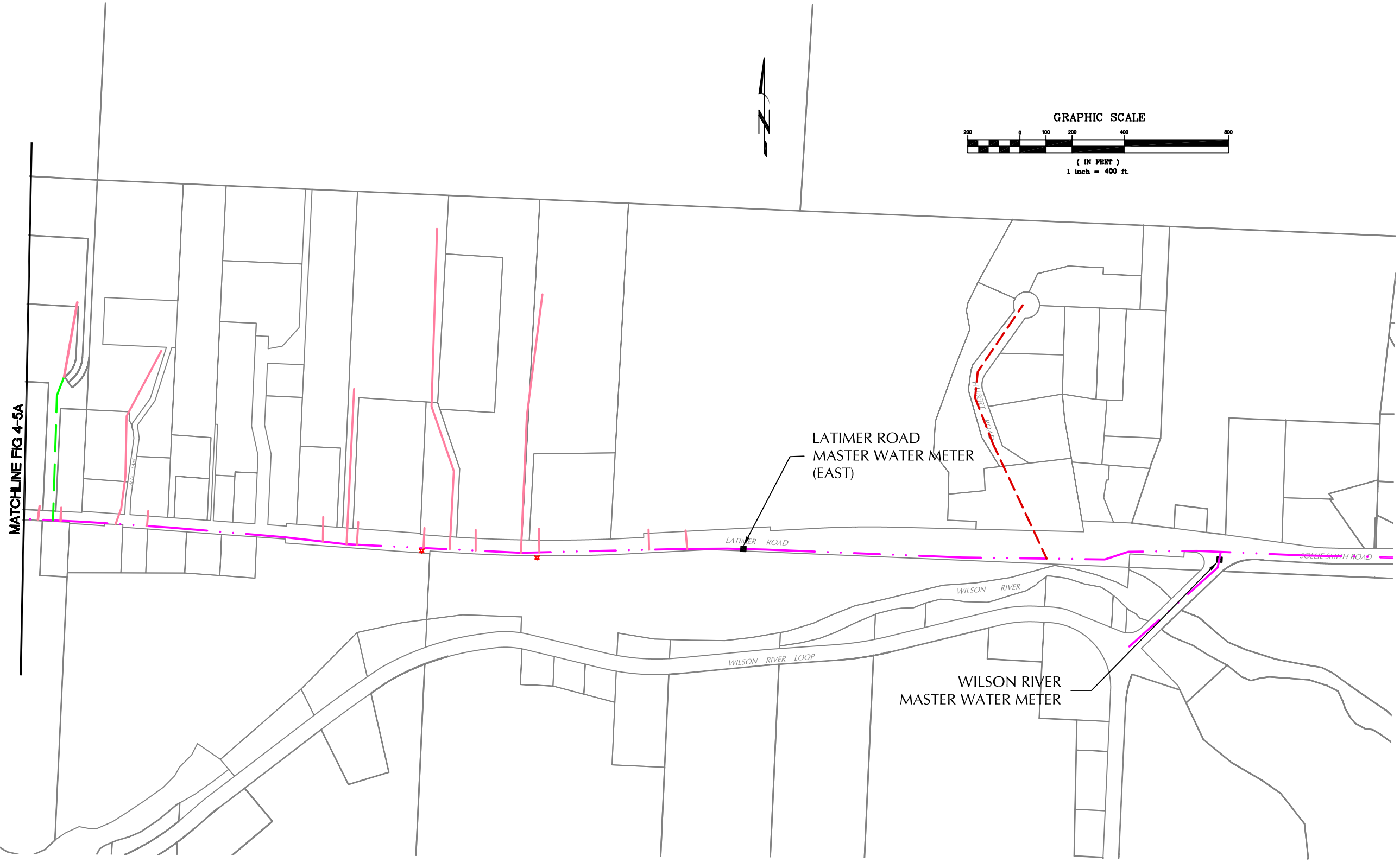
DATE: MARCH 2009

FIG 4-5A



LEGEND

- 1-INCH PVC
- 1.5-INCH PVC
- 2-INCH PVC
- 4-INCH STEEL
- 4-INCH PVC
- 6-INCH STEEL
- 6-INCH PVC
- 8-INCH PVC
- 10-INCH PVC
- 18-INCH DUCTILE IRON
- WATER VALVE
- FIRE HYDRANT

WATER MASTER PLAN UPDATE

SCALE: 1" = 400'

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KILCHIS REGIONAL WATER DISTRICT
WATER SYSTEM MASTER PLAN

LATIMER ROAD DISTRIBUTION SYSTEM

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FIG 4-5B

N

GRAPHIC SCALE

200 0 100 200 400 800

(IN FEET)
1 inch = 400 ft.

NORTHWOOD RESERVOIR
15,000 GALLON

NORTHWOOD
MASTER WATER
METER

NORTHWOOD BOOSTER
PUMP STATION

N. NORTHWOOD DRIVE

SOLLIE SMITH ROAD

LEGEND

- 1-INCH PVC
- 1.5-INCH PVC
- 2-INCH PVC
- 4-INCH STEEL
- 4-INCH PVC
- 6-INCH STEEL
- 6-INCH PVC
- 8-INCH PVC
- 10-INCH PVC
- 18-INCH DUCTILE IRON
- WATER VALVE
- FIRE HYDRANT

WATER MASTER PLAN UPDATE

SCALE: 1" = 400'

H B H Consulting Engineers

KILCHIS REGIONAL WATER DISTRICT
WATER SYSTEM MASTER PLAN

NORTHWOOD DISTRICT DISTRIBUTION SYSTEM

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DATE: MARCH 2009

FIG
4-6

Design Criteria & Level of Service

Section 5

5.1 Design Life of Improvements

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

As discussed in Section 1, the planning period for this *Water System Master Plan Update* is 20 years ending in the year 2029. The planning period is the time frame during which the recommended water system is expected to provide sufficient capacity to meet the needs of all anticipated users. The required system capacity is based on population, water demand projections, and land use considerations.

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

5.1.1 Treatment Plant Equipment

The design life of most motorized equipment and pumps is typically 20 years. Buildings and major structures should have a design life of 50 years. Steel components exposed to weather or submerged can deteriorate within 10 to 15 years if not properly maintained. Periodic maintenance and painting will provide a useful life of more than 20 years unless larger facilities are required. Flow meters typically have a design life of 10 to 15 years. Valves usually need to be replaced after 15 to 20 years of use.

5.1.2 Pumping Equipment and Structures

Major structures and buildings should have a design life of approximately 50 years. Pumps and equipment usually have a useful life of about 15 to 20 years. The useful life of some equipment can be extended, when properly maintained, if additional capacity is not required. Properly maintained pumps can sometimes last 30 years or longer.

5.1.3 Water Transmission and Distribution Piping

Water transmission and distribution piping should easily have a useful life of 40 to 60 years if quality materials and workmanship are incorporated into the construction and the pipes are adequately sized. Steel piping used in the 1950's and 60's that has been buried, commonly exhibits significant corrosion and leakage within 30 years. Cement mortar lined ductile iron piping can last up to 100 years when properly designed and installed.

5.1.4 Water Storage

Distribution storage tanks should have a design life of 60 years (painted steel construction) to 80 years (concrete construction). Steel tanks with a glass-fused coating can have a design life similar to concrete construction. Actual design life will depend on the quality of materials, the workmanship during installation, and the timely administration of maintenance activities. Several practices, such as the use of cathodic protection, regular cleaning and frequent painting can extend or assure the service life of steel reservoirs. Ground settlement, earthquakes, and inadequate quantities of reinforcing steel can all lead to a substantially reduced life for concrete structures.

5.2 Sizing and Capacity Criteria

Demand projections presented in Section 3.6 are used to size improvements. Various components of the system demand are used for sizing different improvements. Methods and demands used are discussed below.

5.2.1 Intake Pumps

The water source(s) must be capable of meeting the maximum daily demand (MDD) of the system over a period of many years. Typically, the 20-year MDD is used as the design flow. Raw water pumping equipment should be sized to provide the design MDD with 18 hours or less of operation.

5.2.2 Water Treatment Plant Capacity

Treatment plants must be able to successfully treat quantities of raw water equal to the MDD. The 20-year MDD is used as the design flow. A water treatment plant should produce this MDD with 18 hours or less operation time required.

5.2.3 Treated Water Storage

Total storage requirements were discussed in Section 4.4. Storage requirements for a community water system must meet both domestic and fire protection storage sizing criteria.

Equalization and emergency storage amounts are typically referred to as "domestic storage." Equalization storage is typically set at 25% of the MDD to balance out the difference between peak hourly demand and supply capacity so that these variations in demand are not imposed on the water supply source.

Emergency storage is determined by the larger of two methods: (1) equal to 100% of the MDD or (2) equal to 3 times the ADD. For the Kilchis Regional Water District, the second method results in the larger storage requirements and will therefore be used to determine storage needs.

Fire storage should be sufficient to provide at least 2 hours of the needed fire flow. Fire storage is typically based on providing a flow of 1,000 gpm for 2 hours in small communities. This results in a fire storage requirement of 120,000 gallons. Commercial, industrial and institutional buildings require higher flows. Determination of these flows is unique to each building under consideration and involves detailed surveys of construction (type and area), occupancy (combustibility), exposure (construction type, distance, length/height of wall), and communications (openings). However, for the purpose of this planning effort, it is assumed that a fire flow of 2,500 gpm for 2 hours is sufficient for commercial and industrial buildings.

Another important design parameter for reservoirs is elevation. Efforts should be made to locate all reservoirs at the same elevation when possible. As a consistent water surface is maintained in all reservoirs, the need for altitude valves, check valves, PRVs, booster pumps, and other control devices are eliminated. Distribution reservoirs should also be located at an elevation that maintains adequate water pressure throughout the system, sufficient water pressures at high elevations and reasonable pressures at lower elevations. The pressure range in the system should stay within the range of 30 to 80 psi. Pressures below 30 psi cause annoying flow reductions when more than one water-using device is in service. High pressures may cause faucets to leak, valve seats to wear out quickly, and system leakage to increase. The Uniform Plumbing Code requires that water pressures not exceed 80 psi at service connections, unless the service is provided with a pressure-reducing device. Another pressure criterion, related to fire flows, commonly requires a minimum of 20 psi at the hydrant used for fire fighting. Oregon Health Department also requires that service connection pressures never drop below 20 psi.

5.2.4 Distribution System

Distribution mains are typically sized for fire flow and 20-year population demand, or fire flow and saturation development demand. The mains should be at least six inches in diameter to provide minimum fire flow capacity. All pipelines should be large enough to sustain a minimum line pressure of approximately 30 psi at maximum flow rates. The State of Oregon requires a water distribution system be designed and installed to maintain a pressure of at least 20 psi at all service connections at all times. The distribution system must be sized to handle the peak hourly flows and to provide fire flows while maintaining minimum pressures.

In addition to the above design criteria, the following guidelines are recommended for the design of water distribution systems:

- Six-inch (6") diameter lines - minimum sized lateral water main for gridiron (looped) system and dead-end mains.

- Eight-inch (8") diameter lines - minimum size for permanently dead-ended mains supplying fire hydrants and for minor trunk mains.

- Ten-inch diameter (10”) and larger - as required for trunk (feeder) mains based on hydraulic analysis.

Distribution system lateral mains should be looped whenever possible. A lateral main is defined as a main not exceeding eight inches in diameter, which is installed to provide water service and fire protection for a local area including the immediately adjacent property. The normal size of lateral mains for single-family residential areas is 6 inches in diameter. However, eight-inch lateral mains may be required to meet both the domestic and fire protection needs of an area.

The installation of permanent dead-end mains and dependence of relatively large areas on a single main should be avoided. For the placement of a fire hydrant on a permanently dead-ended main, the minimum size of such laterals should be 8 inches in diameter. Six-inch diameter mains may be used for a stub-out not exceeding 500 feet in length supplying a single fire hydrant not on a public street and for internal fire protection. On new construction, the minimum size lateral main for supplying fire hydrants within public ways should be 6 inches provided that 6-inch mains are looped.

5.3 Basis for Cost Estimates

The cost estimates presented in this Plan will typically include four components: construction cost, engineering cost, contingency, and legal and administrative costs. Each of the cost components is discussed in this section. The estimates presented herein are preliminary and are based on the level and detail of planning presented in this Plan. Construction costs are based on competitive bidding as public works projects. As projects proceed and as site-specific information becomes available, the estimates may require updating. System improvements that are recommended are summarized in Section 7 along with associated costs. Detailed cost estimates and alternatives are presented in Section 6.

5.3.1 Construction Costs

The estimated construction costs in this Plan are based on actual construction bidding results from similar work, published cost guides, and other construction cost experience. Reference was made to system maps of the existing facilities to determine construction quantities, elevations of the reservoirs and major components, and locations of distribution lines. Where required, estimates will be based on preliminary layouts of the proposed improvements.

Future changes in the cost of labor, equipment, and materials may justify comparable changes in the cost estimates presented herein. For this reason, common engineering practices usually tie the cost estimates to a particular index that varies in proportion to long-term changes in the national economy. The Engineering News Record (ENR) construction cost index is most commonly used. This index is based on the value of 100 for the year 1913. Average yearly values for the past 18 years are summarized in Table 5-1.

Table 5-1 - ENR Index 1990 to 2008

YEAR	INDEX	% CHANGE/YR
1990	4732	---
1991	4835	2.54%
1992	4985	2.18%
1993	5210	3.10%
1994	5408	4.51%
1995	5471	3.80%
1996	5620	1.16%
1997	5826	2.72%
1998	5920	3.67%
1999	6059	1.61%
2000	6221	2.35%
2001	6343	2.67%
2002	6538	1.96%
2003	6694	3.07%
2004	7115	2.39%
2005	7446	6.29%
2006	7751	4.65%
2007	7967	4.10%
2008(May)	8141	2.78%
	Average Annual Change =	**3.09%**

Cost estimates prepared in this plan shall be based on May 2008 index. Future costs should be compared to a baseline ENR Index value of 8141.

If specific ENR index figures are not available, the historical ENR growth pattern has been around 3.1% per year.

5.3.2 Contingencies

A contingency factor equal to approximately twenty percent (20%) of the estimated project cost has been added. In recognition that the cost estimates presented are based on conceptual planning, allowances must be made for variations in final quantities, bidding market conditions, adverse construction conditions, unanticipated specialized investigation and studies, and other difficulties which cannot be foreseen at this time but may tend to increase final costs.

5.3.3 Engineering

The cost of engineering services for major projects typically include special investigations, a predesign report, surveying, foundation exploration, preparation of contract drawings and specifications, bidding services, construction management, inspection, construction staking, start-up services, and the preparation of operation and maintenance manuals. Depending on the size and type of project, engineering costs may range from 15 to 25% of the contract cost when all of the above services are provided. The lower percentage applies to large projects without complicated mechanical systems. The higher percentage applies to small, complicated projects. Engineering costs for design and construction presented in this Plan should average 20% of the estimated construction costs.

5.3.4 Legal and Administrative

An allowance of five percent (5%) of construction cost has been added for legal and administrative services. This allowance is intended to include internal project planning and budgeting, grant administration, liaison, interest on interim loan financing, legal services, review fees, legal advertising, and other related expenses associated with the project that the City could incur.

5.3.5 Land Acquisition

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

Section 6

Improvement Alternatives

6.1 Introduction

This section evaluates the water system improvement needs for the Kilchis Regional Water District over the upcoming 20-year planning period. Improvement needs are based on existing system deficiencies or anticipated deficiencies due to future growth as discussed in previous section of this Plan. Additionally, some infrastructure components will continue to age and degrade over time potentially requiring additional improvements to remain functional and reliable.

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

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

- Water Supply & Water Intake
- Regional Transmission System
- Water Storage
- District Management
- Distribution Systems

The following subsections will address each of these areas independently.

6.2 Water Supply & Water Intake

The Kilchis Regional Water District utilizes two wells located at Dill Bar on the Kilchis River as its sole water supply source. At the well head, the raw water is injected with soda ash for pH control and chlorine for disinfection. The treated water is then pumped into the transmission system for distribution to the system's reservoirs as well as to each of the individual service districts.

6.2.1 Water Supply

The wells at Dill Bar have extremely good yields and produce high quality raw water. The water right for these wells, which is owned by the City of Bay City, allows withdrawals up to 8,977 gpm from this source. Well logs for the existing wells show a combined yield of 2,200 gpm with drawdowns of 3.0 and 3.5 feet after 24 hours.

As discussed in Section 5 of this Plan, water sources should have a minimum capacity to supply maximum daily demands (MDD) with 18 hours of operations. Table 6-1 shows the comparison between current and future system demands and the Kilchis source capacity.

Table 6-1 – Comparison of System Demands & Water Source Capacity

System MDD[1]		Well Yields[2]	Water Right[3]
Current	Future		
1,280 gpm	1,690 gpm	2,200 gpm	8,977 gpm

[1] Based on 18 hours of operation
[2] Based on well log information
[3] Water Right Permit S4385

As the table above shows, the source capacity, both in terms of existing well yield and water rights, far exceeds the needs of the system through the 20-year planning period. It should be noted that the well yields shown in Table 6-1 are based on well logs and not the existing capacity of the existing wells. The existing capacity of these well is significantly less the theoretical well yields due to limitation of the well pumps. Further discussion on the well pump capacity is provided in a following subsection.

The water right on the Kilchis River has not been certified by the Oregon Water Resource Department (OWRD). The previous deadline to obtain certification expired on October 1, 1995. To ensure that this valuable water right is not revoked or reduced, a permit extension must be obtained by submitting an application to the OWRD. New water laws allow for permit extensions exceeding 40 years, however, as a condition of an extension a *Water Management & Conservation Plan* (WMCP) would need to be submitted to and approved by the OWRD.

Water Management & Conservation Plan (WMCP)

A WMCP is a plan developed by a water supplier (e.g. Kilchis Regional Water District) that describes the water system and it needs; identifies its sources of water; and explains how the water supplier will manage and conserve those supplies to meet present and future needs. As such, a WMCP is a long term water management and conservation tool. The requirement for completing such a plan is tied to the revised rules surrounding water permit extensions as described under OAR 690-315. These rules call for all suppliers serving over 1,000 people to complete a WMCP in association with water permit extensions.

The requirements of WMCPs are detailed in OAR 690-086. The plan must address four basic elements:

1. **Description of the municipal water supplier (OAR 690-086-0140).** This sets the stage for the rest of the elements by providing current information about the water supplier and the water supplier's supply. Required components of this section include: a description of water sources, service area, water use characteristics, and interconnections with other water systems; present and anticipated service population; analysis of the adequacy and reliability of the water supply, water system demands and leakage; summary of water rights; and system maps.

2. **Water conservation element (OAR 690-086-0150).** This element includes a description of past, current, and future water conservation measures performed or to be performed by the water supplier. Future conservation measures must include benchmarks in five year increments extending out for the life of the WMCP. Division 86 lists specific conservation

measures for the water supplier to implement and also requires some water suppliers to address additional measures.

3. **Water curtailment element (OAR 690-086-0160).** This section will help water suppliers react quickly to meet a community's needs in the event of a water supply emergency, such as supply shortage due to drought, contamination, or infrastructure failure. This element requires a water supplier to prepare a curtailment plan with stages of alert that trigger increasingly restrictive water use requirements. A water supplier must also review its ability to maintain delivery of water during a long-term drought.

4. **Water supply element (OAR 690-086-170).** This element should describe and support future supply needs of the supplier. These needs must be based upon population projections and anticipate development as found in comprehensive land use plans, or other similar planning documents. Water supply needs must be estimated for 10- and 20-year periods.

Much of the information required in a WMCP (e.g. service area, population and projects, system description) is also covered by this *Water Master Plan Update*. However, the WMCP has more stringent requirements regarding water demand and water use characteristics. The Regional District, as well as the individual service districts would need to maintain more accurate records in regards to water consumption within the service area.

The cost for developing a WMCP range considerable depending on the scope and needs of the community. Estimated cost to develop a WMCP meeting the requirement of OAR 690-086 for the Kilchis Region Water District is $20,000 to $30,000.

6.2.2 Water Intake

As previously noted, intake pumps must be capable of meeting the MDD with 18 hours or less of operation. The two existing well pumps have a combined capacity of approximately 900 gpm. With 18 hours of operations, these pumps can produce approximately 0.97 mgd. Based on calculations in Section 3.6, the current MDD for the system is 1.38 mgd, which is nearly 42% greater than the capacity of the existing intake. Future growth in the system will compound this deficiency. The projected 20-year MDD is estimated at 1.82 mgd, or nearly twice the capacity of the existing well pumps.

A summary of current and projected pumping needs is present in the following table.

Table 6-2 – Comparison of System Demands & Well Pump Capacity

	Current Conditions	Future Conditions
System MDD (gpm)[1]	1,280	1,690
Existing Combined Pump Capacity (gpm)	900	900
Pump Deficiency (gpm)	**380**	**790**

[1] Based on 18 hours of operation

As Table 6-2 indicates, the existing pumping capacity of the well intakes is not sufficient to meet current or future demands of the system. It has been estimated that the existing capacity needs to be increased by nearly 88% within the 20-year planning period.

It is important that the Regional Water District's wells can supply sufficient water to the system during peak demands without tapping into its storage reservoirs. Doing so would put the District at a

serious risk of not having a sufficient supply of stored water during an emergency. Adequately sized pumps also help the system meet minimum fire flow requirements.

Two alternatives have been investigated to increase the capacity of the existing water intake:

1. Replace existing well pumps with larger-capacity pumps
2. Develop a new (third) well

Alternative 1 - Replace Existing Well Pumps

One option for increasing the available source capacity is to replace the existing 500 gpm pumps. In order to provide the projected maximum daily demand (MDD), the new pumps would need to be rated at a minimum of 900 gpm. This would provide the district with its peak daily demand with only 18 hours of operation. Well logs indicated that both of the existing wells are capable of producing this increased flow. As part of this upgrade, new controls and electrical improvements would also be required.

The estimated cost for this project is $226,500. Detailed cost estimate for replacing the existing pumps at the well head is provided in Table 6-3.

Table 6-3 – Well Pump Replacements Cost Estimate

Item No.	Description	Units	Quantity	Unit Cost	Total Cost
1	Mobilization, Bonding & Insurance	LS	1	$ 16,000	$ 16,000
2	900 gpm well pumps	EA	2	$ 30,000	$ 60,000
3	Electrical & Controls	LS	1	$ 75,000	$ 75,000
				Construction Total	$ 151,000
				Contingency (20%)	$ 30,200
				Subtotal	$ 181,200
				Engineering (20%)	$ 36,240
				Administrative & Legal Costs (5%)	$ 9,060
				Total Project Cost	**$ 226,500**

The advantage of this alternative is that it is a relatively cost effective way to increase the District's available water supply. However, this option will not provide system redundancy. Both of the pumps will be required to operate in order to meet current or projected MDD. If a problem occurs with one of the pumps and it is taken off-line, then the District will be forced to rely on its storage reserves to meet peak demands. If this situation was prolonged over the course of several days or more, the system could begin to run out of available water for its customers.

Alternative 2 - Develop New Well

A second alternative to increase available water is to drill a new well. As noted in Table 6-1, the total water right associated with the wells at Dill Bar along the Kilchis River is 8,977 gpm. Therefore, the District could easily expand its existing well system under this water right (S 4385). Furthermore, based on well log information from the existing wells, it is very likely that a new well would have a capacity of at least 1,000 gpm, although well tests would need to verify this rate. This new well would increase the Regional District's well pumping capcity to approximately 1,900 gpm, resulting in a daily production of approximately 2 million gallons with 18 hours of pump operation.

In addition to drilling a new well, this alternative includes constructing a new pump building and installing new controls, electrical, and piping. A detailed cost estimate for this alternative is provided in Table 6-4. The estimated cost for this alternative is $387,750.

Table 6-4 – New Well Cost Estimate

Item No.	Description	Units	Quantity	Unit Cost	Total Cost
1	Mobilization, Bonding & Insurance	LS	1	$ 28,000	$ 28,000
2	New well	LS	1	$ 100,000	$ 100,000
3	Building	LS	1	$ 25,000	$ 25,000
4	1000 gpm	EA	1	$ 32,000	$ 32,000
5	Electrical & Controls	LS	1	$ 50,000	$ 50,000
6	Piping	LS	1	$ 20,000	$ 20,000
7	Meter	LS	1	$ 3,500	$ 3,500
		Construction Total			$ 258,500
		Contingency (20%)			$ 51,700
		Subtotal			$ 310,200
		Engineering (20%)			$ 62,040
		Administrative & Legal Costs (5%)			$ 15,510
		Total Project Cost			**$ 387,750**

There are several advantages to this alternative. Since the District has not certified the water right associated with the Kilchis well, this alternative would provide the OWRD evidence that the District is pursuing full development of this right. This evidence may be needed to obtain permit extensions and ensure that the amount of water granted under the original is not reduced in the future. This alternative also provides the District with some system redundancy. The major disadvantage of this option is the high capital cost, however, this could be partially offset by the larger SDC revenues the project would generate.

Recommendations

Of the two options analyzed for increasing the District's available source, developing an additional well is the preferred alternative. Although this is the more expensive alternative, it has the following advantages:

- Provides evidence that the District is moving forward to make full beneficial use of water right
- Provides some system redundancy
- Provides excess capacity for future growth, making much of the project SDC eligible
- Existing two wells still have available unused capacity, making future expansion more cost effective

6.3 Transmission System

The transmission system for the Kilchis Regional Water District was described in Section 4.3 of this Plan. The system is generally composed of 18-in, 10-in, and 8-in piping that conveys water from the well heads on the Kilchis River to the system's two storage reservoirs and six purchasing districts.

Analysis of the condition of the transmission system is based on observation made by staff and by the hydraulic model discussed in Section 4.6.

The hydraulic performance of the District's transmission system was analyzed in Section 4.6. This analysis showed that the existing system is not sufficient to deliver the required fire flows to the majority of the purchasing districts. This is largely a result of the lack of looping within the system.

A number of improvement alternatives have been developed for the District's transmission system. These alternatives are based on identified system deficiencies including system hydraulics, fire protection, and reliability. Detailed information on these improvement alternatives is provided below.

6.3.1 System Interties

Providing interconnections with other water systems would be beneficial for the Kilchis Regional Water District. The major benefit of these system interties is providing the District with additional water supply during emergency events.

Depending on the agreement of the system interties, it may also help the hydraulic performance in the transmission system during a fire event. Due to the location of the purchasing districts, it is not feasible to loop the majority of the system as is often recommended. An intertie with another water system would provide a hydraulic equivalent to system looping.

Two system interties have been considered in this *Water Master Plan Update*: Tillamook emergency intertie and high/low level system intertie.

Tillamook Emergency Intertie

An emergency intertie with the City of Tillamook has been discussed for some time. This project aims to create a water system intertie between the Kilchis Regional Water System and the City of Tillamook for emergency use in the event of a water system failure in either district. In 2008, approximately 540 feet of water line was installed along Highway 101, just south of Latimer Road, as part of this project. The remaining aspects of this project to be constructed include boring approximately 800' of 8-inch piping under the Wilson River, necessary valves, meters and controls and construction of building to house controls.

In addition to providing an emergency source of water during system failure, an intertie with the City of Tillamook could also assist the district in meeting required fire flows. In essence this intertie would provide the system with additional looping and thereby improve the systems hydraulics. Based on WaterCAD modeling, by installing an 8-inch intertie with the City of Tillamook required fire flows would be provided to all purchasing districts.

The total cost for this project has been estimated at approximately $400,000. As part of this project, an agreement between the two entities will need to be worked out regarding how much water may be shared and under what conditions.

High- & Low-Level System Intertie

An additional intertie is also possible between the high- and low-level systems in Bay City. This would allow the low-level system, which includes the entire Kilchis Regional transmission system, to access the additional 600,000 gallons of storage in the high-level system and provide the Regional District with more operating flexibility.

The new intertie would consist of a installing a pressure reducing valve (PRV) to allow water to flow back into the general transmission system from Bay City's high-level system. This transfer may be set up to be automatic or manual. However, when the PRV is activated, the Doughty Street pump station should automatically shut off to prevent recirculation of the water.

The estimated cost of installing a PRV station to interconnect the high- and low-level system is approximately $45,000 depending on the location of the station and size of the PRV, which would be determined during the design process. As will be discussed later in this Plan, this interconnection between the high- and low- level systems could be installed in conjunction with a new reservoir project (see Section 6.4).

6.3.2 Kilchis River Crossings

There are two bridges in the existing transmission system: the Kilchis Bridge and the Alderbrook Bridge. Currently the District's transmission lines are attached to these bridges. The Kilchis Bridge, which crosses the Kilchis River approximately 8,000 feet west of the sources wells, conveys a portion of the 18-inch ductile iron main transmission line. This line feeds the entire Regional District. The Alderbrook Bridge crosses the Kilchis River near the intersection of Highway 101 and Alderbrook Road. This bridge carries the 10-inch transmission line that feeds the districts of Juno Hill, Latimer Road, and Northwood, as well as the TCCA and Juno Hill Reservoir.

Having the transmission lines attached to bridges could pose a serious risk in an event of an earthquake or tsunami. If either of these bridges is seriously damaged the District's transmission lines would also be damaged or destroyed. As a result the entire Regional District (in the case of the Kilchis Bridge) or a large portion of the District (in the case of Alderbrook Bridge) would be without water until the bridge and transmission line are repaired or replaced. This could take several months or longer depending on the severity of the damage.

It is recommended that the District relocate these sections of pipeline by boring them under the Kilchis River. The District has already requested funds from the Federal Emergency Management Agency (FEMA) for this work. Costs estimates for these projects are provided in Table 6-5.

Table 6-5 – Kilchis River Crossing Cost Estimates

Improvement Project	Cost Estimate[1]
Kilchis Bridge River Crossing	$ 300,000
Juno Hill Reservoir Line Replacement	$ 116,000
Total	$ 416,000

A geotechnical investigation will be included in the design process to verify the types of soils in the area.

6.3.3 Master Meters

As noted in Section 4.3, master meters for each purchasing districts were originally installed 1988. Since this time, there have been numerous problems with the metering systems. Several of these meters have been recently out of commission for prolonged periods of time.

The Kilchis Regional District is in the process of replacing all master meters that are currently not operating. This process should be completed by the end of 2009. However, due to the age of many of the existing master meters and the District's historical problems maintaining meters, the District should develop and implement a *Water Meter Calibration, Repair, and Replacement Program.*

Water Meter Calibration, Repair, & Replacement Program

Accounting for all water should be the number one priority for a utility. Inaccurate readings result in inaccurate information about water usage, which impacts system audits and leak detection efforts. In order to assure water is being accounted for accurately, meters need to be selected, installed, operated, and maintained using generally accepted industry standards. Meters should be regularly calibrated and tested in accordance with the manufacturer's recommendations or the guidelines recommended by the American Water Works Association (AWWA), Manual for *Water Meters-Selection, Installation, Testing, and Maintenance* (AWWA M6).

- **Meter Testing** – The Regional District should implement a program to test all master meters at regular intervals. The water supplier should also ascertain that meters are appropriately sized, as oversized meters tend to under-record actual water use. Inaccurate readings will give misleading information regarding water usage, make leak detection difficult, and result in lost revenue for the system.

  Meters should be able to accurately record the full range of expected flow rates. Ranges of meter accuracy should be in general conformance with the latest revisions of the AWWA and/or specific State Plumbing Code requirements. When an AWWA standard for a meter is not available, it should be demonstrated that the meter used is capable of measuring not less than 95% and not more than 105% of the water that passes through the meter. All meter tests should be documented and maintained by the water utility.

  The AWWA recommends that meters in service be tested, on average, as follows:
  - Meter sizes 5/8 in to 1 in. = Every 10 years
  - Meter sizes 1 in to 4 in = Every 5 years
  - Meter sizes 4 in and larger = Every year

- **Meter Replacement** - In addition to a meter-testing program, a water supplier should develop a meter replacement program to replace or repair defective meters. Water meters tend to deteriorate with age, resulting in inaccurate readings. The AWWA Manual M6 recommends a planned meter replacement program to be implemented over a given number of years, e.g., 10 percent of the meters each year over 10 years or 20 percent per year over five years, so that all replaced meters in the system will be the more-efficient, modern design. Customer meters may need to be replaced at least once every 15 years, if not sooner. Implementation of meter replacement programs will not only show a decrease in apparent loss, but an increase in revenue.

- **Meter Calibration** - Meters should be recalibrated on a regular basis to ensure accurate water accounting and billing. Calibration provides a utility with valuable information on the accuracy of the quantity of water being supplied, leading to appropriate decisions on maintenance or replacement frequency. Larger meters in the system and wholesale customer meters should be calibrated on a regular basis in accordance with manufacturer recommendations.

It is also highly recommended that each of the purchasing districts should also consider implementing a similar *Water Meter Calibration, Repair, and Replacement Program*.

6.3.4 Other Improvements

Line Replacements

Two pipeline sections in the main transmission system have been prone to repeated breaks. These sections include:

- 10-in pipeline on Alderbrook Road (between Kilchis River Road and Highway 101).
- 10-in pipeline from Ellen Ave to Juno Hill Reservoir.

The District could choose to replace the entire sections of these faulty transmission lines. This would include replacing approximately 3,800 feet of 10-inch line on Alderbrook Road and an estimated 1,000 feet of pipe to Juno Hill Reservoir. For the line to Juno Hill reservoir, it is recommended that HDPE pipe be installed. This will provide additional strength to the pipe and protect it from future damage due to the service road's decay.

The combined estimated cost for these replacements has been estimated at $471,000 as show in Table 6-6.

Table 6-6 - Line Replacement Cost Estimates

Improvement Project	Cost Estimate[1]
Alderbrook Road Line Replacement	$ 349,500
Juno Hill Reservoir Line Replacement	$ 121,500
Total	$ 471,000

[1] Costs include 20% contingency, 20% engineering, and 5% administration and legal.

The cost of total replacement is not likely feasible for the District to complete in the near future. Furthermore, because these improvements are needed to resolve existing maintenance issues and do not provided increased capacity for future growth, these projects are not SDC eligible. For this reason, the District may wish to continue to perform spot repairs on these pipeline sections until sufficient funds are available.

Fire Hydrants

There are few fire hydrants located within the Kilchis Regional Water District's transmission system. Fire hydrants are an important aspect of any water system, not only for increased fire protection, but also improves system operation. In particular, fire hydrants are needed to perform periodic system flushing. The purposes of system flushing include the following:

- Flushes sediments from mainline pipes (which enhances water quality)
- Verifies the proper operation of fire hydrants and valves
- Helps find weaknesses in the water system
- Checks for closed valves and weak flows in the water mains
- Verifies ample flow for fire fighting

Currently, there are very few fire hydrants located in along the regional transmission system. The majority of these hydrants are located within the boundary for the Latimer Road Water Association.

The Regional District should begin installing additional hydrants throughout the transmission system. It should be noted that fire hydrants should only be installed in areas where the transmission system can provide sufficient fire flows.

Standards from ISO and AWWA typically require hydrants spacing of 500 feet or less. However, in rural settings hydrant spacing is generally increased. For the purpose of this planning effort, it is recommended that the Regional District install a minimum of 10 new fire hydrants. This would result in hydrant spacing ranging from 1,500 to 5,000 feet. Final decision on the location of new fire hydrants should be based on recommendations from the local fire officials. The estimated cost for installing 10 new fire hydrants is approximately $45,000.

6.4 Storage

The Kilchis Regional Water System owns and operates two reservoirs for storage of its treated water. Description of these reservoirs and an analysis of storage needs and availability are provided in Section 4.4.

Based on the storage analysis performed in Section 4.4, the Kilchis Regional Water District is severely deficient in its storage capacity. The existing two reservoirs have a combined storage capacity of 700,000 gallons, however, as shown in Table 6-7, the District's current storage requirements exceed 2.4 million gallons. The projected 20-year storage requirement for the Regional District is more than 3 million gallons.

Table 6-7 – Kilchis Regional Water District Storage Analysis

	Existing	Projected
Storage Requirements	2,433,100	3,096,500
Existing Available Storage	700,000	700,000
Needed Storage	1,733,100	2,396,500

This lack of storage capacity represents the District's most significant deficiency in its water system. The severity of this situation is compounded by the fact that the District is also deficient in its pumping capacity at the well intake. The combined deficiencies of the District's available water source and storage puts the District at a serious risk of running out of water during prolonged water emergencies or system failures.

Reservoir Sizing & Siting

The Kilchis Regional Water District currently needs a minimum of 1.7 million gallons of additional storage to meet the District's present needs. By the end of the planning period, an additional 700,000 gallons of storage will be needed. This equates to approximately 2.4 million gallons of additional storage that will need to be constructed in the upcoming planning period.

The Regional District has several options for sizing new reservoirs. It is possible to construct a single reservoir to meet all the existing and projected storage needs. This option is likely to be the most cost efficient option, however, will have the largest upfront capital costs as well as posing a possible siting issue due to the large land requirements.

The District also has the option of constructing two or more smaller reservoirs to resolve existing and future storage deficiencies. Although the total cost of this multi-tank or decentralized approach is likely to be more than constructing a single tank, it has several advantages:

- New reservoirs can be constructed in phases, thereby reducing short-term upfront capital requirements
- Tanks can be spread out through the Regional District, improving system performance
- Smaller tanks reduce land requirements, although more storage sites will be required.
- Less likely that a component failure (such as line brake) will affect of all the District's storage facilities.

The following table has been developed to provide the District with estimated costs for variously sized reservoir tanks. These costs are for glass-fused tanks which are the most corrosion resistant, an important factor in marine environments.

Table 6-8 – Cost Estimate for Variously Sized Reservoir

Tank Size	Estimated Cost[1]	Cost per Gallon
2.5-million gallon	$ 1,999,000	$ 0.80
1.5-million gallon	$ 1,414,000	$ 0.94
1.0-million gallon	$ 1,071,000	$ 1.07
0.8-million gallon	$ 903,000	$ 1.13
0.7-million gallon	$ 828,000	$ 1.18
0.5-million gallon	$ 657,000	$ 1.31

[1] Cost estimate for complete installation of glass-fused steel bolted tanks. Costs include 20% contingency, 20% engineering, and 5% administration and legal. Costs do not include monies for land acquisition. Estimates do not include cost for transmission line and off site piping.

New storage reservoirs should be constructed in locations that are at the same elevation as the existing Juno Hill and Willowbrook reservoirs (212.5 feet). Currently two possible sites for a new water storage reservoir have been identified.

The District recently purchased a parcel of land on Pennsylvania Street that could be used to site a new reservoir for the general low-level system. A second possible site lies east of the TCCA, although land in this area has not yet been purchased.

Recommendation

It is recommended that the District construct two new reservoirs within the upcoming planning period to provide the additional storage capacity by constructing a 1.0- and 1.5-million gallon glass fused reservoir. This would provide the system will the needed storage throughout the upcoming planning period.

Because the TCCA uses the majority of the water within the system, it is recommended that the larger be constructed in this section of the system. Currently, the District does not own any land in this vicinity. However, the TCCA does own large tracts of land in the area which meets elevation requirements. The District should begin investigating possible sites to locate a new reservoir in this area.

The estimated cost for a new 1.5 million gallon reservoir constructed near TCCA is approximately $1,824,000. This cost includes approximately 4,000 feet of 10-inch transmission main to connect the new reservoir to the existing system. Since the location of the new reservoir is not currently know,

the cost for this item is likely to change, which could have a significant impact on the projects final cost. The following cost estimate also does not include the cost of land acquisition that may be necessary.

Table 6-9 – 1.5 Million Gallon Reservoir Cost Estimate (TCCA Site)

Item No.	Description	Units	Quantity	Unit Cost	Total Cost
1	Mobilization, Bonding & Insurance	LS	1	$ 130,000	$ 130,000
2	1.5-MG Reservoir (including foundation)	LS	1	$ 690,000	$ 690,000
3	10-in transmission piping	LF	4000	$ 59	$ 236,000
4	Misc. piping	LS	1	$ 75,000	$ 75,000
5	Site Work (grading, erosion control, fencing, etc.)	LS	1	$ 85,000	$ 85,000
				Construction Total	$ 1,216,000
				Contingency (20%)	$ 243,200
				Subtotal	$ 1,459,200
				Engineering (20%)	$ 291,840
				Administrative & Legal Costs (5%)	$ 72,960
				Total Project Cost	**$ 1,824,000**

It is recommended to construct a new 1.0-million gallon reservoir at the newly acquired site on Pennsylvania Street in Bay City. Approximately 1,400 feet of new 8-in transmission line would need to be installed to connect the new reservoir to the existing low-level distribution and transmission system.

During the installation of the new reservoir on Pennsylvania Street, an interconnection between the high- and low-level systems would be advisable to allow for the emergency transfer of water from the high system to the lower system (see Section 6.3.1). With this new reservoir so close to the 500,000-gallon high-level reservoir, the installation of such an interconnection would be a small cost to the overall construction of the new water tank. A benefit of placing the low- and high-level system at this location is that a failure in PRV system would simply result in an overflow of excess water from the lower tank rather than damage to the system or customer equipment.

Table 6-10 shows the detailed cost estimated for a new 1.0-million gallon glass fused reservoir located on at the Pennsylvania Street sites, which totals approximately $1,257,000.

Table 6-10 – 1.0 Million Gallon Reservoir Cost Estimate (Pennsylvania Street Site)

Item No.	Description	Units	Quantity	Unit Cost	Total Cost
1	Mobilization, Bonding & Insurance	LS	1	$ 90,000	$ 90,000
2	1-MG Reservoir (including foundation)	LS	1	$ 500,000	$ 500,000
3	8-in transmission piping	LF	1500	$ 52	$ 78,000
4	PRV connection to high-level System	LS	1	$ 30,000	$ 30,000
5	Misc. piping	LS	1	$ 65,000	$ 65,000
6	Site Work (grading, erosion control, fencing, etc.)	LS	1	$ 75,000	$ 75,000
				Construction Total	$ 838,000
				Contingency (20%)	$ 167,600
				Subtotal	$ 1,005,600
				Engineering (20%)	$ 201,120
				Administrative & Legal Costs (5%)	$ 50,280
				Total Project Cost	**$ 1,257,000**

The total cost for the two reservoirs equates to an estimated $3,081,000.

6.5 Regional District Management

The current management and operation of the Regional District and its relationship to the individual service districts it serves was discussed in Section 4.7 of this *Water Master Plan Update*. The current system is cumbersome and inefficient for both operators and water customers. Some of the disadvantages of the existing management system include the following:

- Does not encourage water conservation
- Inequality in customer water rates
- Lack of maintenance in some districts
- Lack of accurate water consumption accounting
- Water loss unequally distributed through Regional Water District
- Confusion over district boundaries and service limits
- No adopted SDC methodology for entire Regional District
- No authority for taxation

In order to resolve these issues, it is recommended that the Kilchis Regional Water District as well as all of the purchasing for a single water authority. This would greatly simplify overall operation and management of the system.

6.5.1 Formation of New Water Authority

The formation of most types of special districts is covered in Oregon Revised Statute (ORS) Chapter 198. Provisions specifically related to water authorities are set forth in ORS 450.650 to 450.700.

A special district may be formed from contiguous or noncontiguous territory located in one or more adjoining counties. Territory within another district performing the same services as the proposed district may not be included in a new district unless the territory is withdrawn, either by a simultaneous withdrawal proceeding or automatically by statute, from the former district. The boundaries of a new district may only include territory that can be reasonably served by the facilities or services of the proposed district.

Formation may take as long as 12 to 24 months, depending on the type of district and whether the district will need to assess property taxes.

The first step in forming a special district is usually to form a committee to analyze the need for the district and to discuss the steps that must be undertaken. Consideration should be given to the area that will be served, the assessed valuation of the area, the revenue that could be provided by a reasonable tax or user fee, long and short term debt structure, if any, and how to generate needed funds for a security bond and possibly an election.

In general there are three procedures that may be used to form a special district: (1) filing of a petition for formation; (2) consent of all property owners within the area of the proposed district; or (3) initiation and order of the county board. The initiation of water authority formation may also be initiated by resolution of the governing bodies of cities and water districts, when they consider it necessary for the public health, safety and welfare.

The following steps are general guidelines to the formation of most types of special districts:

- Establish a working committee.
  - Set up community meetings and contact local agencies.
  - Draft maps and research property values.
- Review estimated costs and boundaries at public meetings.
- Draw up petitions. Submit prospective petition to county clerk. Begin preparing Economic Feasibility Statement.
- Circulate petitions. Obtain resolutions from any affected cities.
- Submit petitions, Economic Feasibility Report, and security deposit 180 days prior to election to County Clerk and Surveyor for review.
- County schedules hearing date and bond posted.
- County holds initial hearing.
- County holds second hearing.
- County enacts formation resolution or schedules election date.
- Formation materials submitted to Department of Revenue.
- Submit formation order to Assessor's Office.
- Hold formation and Board Member election (formation elections including permanent tax rates may only be held in May or November of even numbered years). Note: If there is a formation election held, the permanent tax rate, if any, must be included in that election.

The Special District Association of Oregon (SDAO) has published a detailed summary of rule and requirements for formation, which can be found in the appendix. Additional information and assistance on formation can also be directly obtained from the SDAO at (503) 371-8667.

The primary cost associated with the formation of a single water authority include writing a legal description of the boundaries of the new water authority as well as the legal and administrative fees that would be incurred during the process. Table 6-11 shows the estimated cost that would be associated with forming a single water authority.

Table 6-11 – Estimated Cost for Single Water Authority Formation

Item	Estimated Cost
Legal Description/Map	$ 45,000
Legal & Administrative	$ 30,000
Total	$ 75,000

It is assumed that the City of Bay City would take over the operation, maintenance, and billing activities for the expanded water authority service boundary. This would place additional burden on the City's existing personnel and equipment resources. As a result, it is likely that at least one additional public works crew member would need to be hired and new truck be purchased.

Furthermore, integration of the entire water system may also require updates to the City's existing billing system and software.

6.6 Service Districts' Distribution Systems

Section 4.5 provided details descriptions of each of the individual purchasing districts' distribution system. This information was developed based on existing system maps and by information provided by each district. Based on the available information, a hydraulic analysis of each system was performed using WaterCAD. As a result of the distribution descriptions and hydraulic analysis, a number of deficiencies were identified within each of the service districts.

The condition and performance of the districts' existing distribution systems vary widely. However, common deficiencies are found in each of the distribution systems primarily related to undersized and dead-end lines. The presence of undersized and dead-end lines is a particular problem in the smaller purchasing districts. Replacing these lines will improve system efficiency, reduce areas of low working pressure, and provide fire flow requirements.

In addition, there is a lack of fire hydrants within many of the districts. This not only reduces the systems' ability to meet fire requirements, but also causes operational problems because lines cannot be flushed on a regular basis.

The following subsections provide a range of improvements alternatives for each of the service districts. As noted above, these improvements are based on the best available information on the existing system. If new information is obtained which contradicts items in this report, then the following alternatives should be updated accordingly.

WaterCAD software was used to assess the effects of the various recommended improvements proposed below. The goal of this analysis was to ensure that the proposed improvements would effectively resolve existing hydraulic deficiencies, including system pressures and available fire flows. The results of this analysis are provided in the appendices.

6.6.1 City of Bay City

Over the last 20 years, the City of Bay City has made great efforts to upgrade and improve its water distribution system. This has included replacing older steel waterlines, upgrading many undersized pipelines, closing pipe loops, and installing gate valves at intersections. However, there are still areas throughout Bay City that need improvements and the City should continue these efforts.

The City has adopted minimum standards for it distribution system including 8-inch diameter PVC pipes for all main lines, however 6-inch PVC may be used on dead-end streets that are less than 500 feet long and without fire hydrants. In general, it is recommended that the City not allow any new dead end lines to be constructed.

Figure 6-2 presents various line replacement and looping proposed improvement alternatives. Implementing these improvements should enhance the system's overall hydraulic performance and increase the available fire flows throughout the system.

Improvements to both the low- and high-level pressure areas in the Bay City distribution system have been made. Additional details on these alternatives are provided below.

Low-Level System

The hydraulic performance in Bay City's low-level distribution system was very poor in terms of its ability to meet fire flow requirements. Nearly all areas analyzed in the low-level system, including commercial and industrial areas, had available fire flows less than 500 gpm. This is primarily a result of a number of undersized and dead-end pipe sections.

In the area south of Tillamook Avenue, the poor hydraulic performance is related to a number of undersized and dead-end pipe sections. Replacing and/or extending these line sections would drastically improve the systems operating characteristic and provide adequate fire flows.

Recommended improvements to this section of the system include:

- Connect the two 6-inch pipeline sections on Short Street
- Abandon the 4-inch line on 14th Street and extend the 6-inch line south to Highway 101
- Extend the 6-inch on 15th Street north to Woods Street
- Replace the 2-inch line on Spruce Street with a 6-inch pipe
- Replace the 2-inch line on Warren Avenue and Salmon Street with a 6-inch pipe
- Replace the 2-inch line on Elliot Street (from Salmon to Clam Streets) with a 6-inch pipe
- Install new 6-inch pipeline on Hare and Clam Streets from Salmon Street to connect to the new pipeline on Elliot Street

There are much fewer under sized pipelines in the northern portion of the low-level system. Systems inadequacies in this area are largely a result of unlooped piping networks and the fact the entire area is fed by a single feed line.

To improve the hydraulics of this section of Bay City's distribution system, the following improvements are recommended:

- Install new 10-inch pipeline connection to 10-inch main feed line on Highway 101 at "D" Street.
- Extend 6-inch line on 6th Street south between "B" and "C" Streets and connect line to existing system at the intersection of 5th Street and "C" Street
- Replace 4-inch line on 3rd Street with new 6-inch pipeline and extend line to "A" Street
- Extend 6-inch line on 6th Street north to Main Street
- Install new 8-inch line on "A" Street from 6th Street to 9th Street
- Install new 8-inch line on Trade Street to loop existing pipelines on 7th and 9th Streets
- Replace 2-inch pipeline section on Pacific Street with new 6-inch pipe and connect to system at the intersection of Main Street and 6th Street

It should also be noted that installing a new low-level reservoir on Pennsylvania Street will also help improve Bay City's overall hydraulic performance.

High-Level System

Much of the high-level system is made up of dead-end lines. These yield poor fire flows and increase the potential for water outages that affect large areas due to broken pipes. There are also a few sections of undersized pipeline that should be replaced.

Recommended improvements to this section of the system include:

- Replace existing 2-inch line on 3rd Street with new 6-inch line and extend line to connect with existing system at the intersection of 7th and Williams Streets
- Replace existing 2-inch line on Hendricks Street with new 6-inch line and extend line west to 4th Street and east to 7th Street
- Install new 6-inch line on 9th Street between High and Williams Streets and connect to existing line on Williams Street
- Install new 6-inch line to loop the system from the intersection of 8th and "B" Streets to the intersection of 7th and "D" Streets
- Extend 8-inch line on "D" Street from 10th Street to 12th Street
- Install new 8-inch line on "E" Street between 7th and 8th Street and on 7th Street between "E" Street and Portland Avenue
- Extend existing 8-inch line on 10th Street to Portland Avenue
- Extend existing 6-lines on 11th and 12th Streets to Portland Avenue
- Extend existing 8-inch line on Seattle Avenue to 15th Street

Bay City's high-level distribution system also contain includes a pump station. This pump station is in excellent operating condition. However, the existing station is not sufficiently sized to meet current or projected maximum daily demands with18 hours of operation.

Table 6-12 – Doughty Street Pump Station Analysis

	Current Conditions	Projected Conditions
Existing Capacity	100 gpm	100 gpm
Pumping Requirement	138 gpm	172 gpm
Pump Deficiency	38 gpm	72 gpm

The existing Doughty Street booster station should be upgraded within the planning period to meet current and future demands. This will include replacing existing pumps and updating the station's electrical and control system.

Summary

The following table has been prepared to provide a brief summary of the recommended improvements and associated costs for the Bay City distribution system. These improvements include the Highway 101 crossing at "D" Street, increasing pump capacity at the Doughty Street booster station, and general piping improvements to the high- and low-level distribution system. Detailed cost estimates for these improvements are provided in the appendix.

Table 6-13 – Bay City Distribution System Improvements Summary

Item	Description	Estimated Cost
1	"D" Street Highway Crossing	$ 57,000
2	Doughty Street Booster Station (DBS) Improvements	$ 66,000
4	General Low-Level Distribution Piping Improvements	$ 610,500
5	General High-Level Distribution Piping Improvements	$ 582,000
TOTAL		**$ 1,315,500**

6.6.2 Cole Creek Water District

As discussed in Section 4.5.2, the Cole Creek Water District connects to the general transmission system at the intersection of Kilchis River Road and Curl Road. The system is fed by a 4-inch pipeline extending Curl Road.

During the hydraulic analysis, the existing distribution system for Cole Creek did not perform well. During periods when the level in the reservoirs were low, no available fire flow to the area and service pressures were also low (30-40 psi). The system performed slightly better when reservoirs are filled, however, available fire flows are still extremely low (±100 gpm) although system pressures did improve.

There are no loops within this system. Furthermore, there is significant friction loss within the main 4-inch mainline. This combination results in the system's poor hydraulic performance.

Additionally, this area has extremely high water usage (see Section 3). This may indicate that there is a significant amount of water loss occurring within the district's distribution system, which may be a result of deteriorating pipelines. However, without accurate accounting of residential water, this cannot be verified.

Recommended improvements for the Cole Creek Water District include replacing the existing 4-inch water line with a new 6-inch PVC line, as well as installing a fire hydrant within the system (Figure 6-3). The estimated cost for these improvements is approximately $300,000. A detailed cost estimate is provided in the appendix.

6.6.3 Juno Hill Water Company

A detailed description of the distribution system for the Juno Hill Water Company was provided in Section 4.5.3. This system is composed of variously sized dead-end waterlines. As a result of the existing configuration, the hydraulic analysis of this system showed that minimum system criteria are not met. In particular is the system's inability to meet fire flow requirements.

Key improvements to the Juno Hill distribution include:

- Replace existing 4-inch line on west side of Highway 101 with new 8-inch PVC line
- Replace existing 4-inch line on Suppress Road with new 8-inch PVC line
- Replace existing 1- and 1.5-inch lines on Boquist Road with new 6-inch PVC line
- Replace existing 2-inch line on Ellen Road with new 4-inch PVC line
- Install additional 4 fire hydrants

The Juno Hill district also operations a booster station located on Sunset Drive. The Juno Hill district did not provide sufficient information to perform a hydraulic analysis of this station. However, based on conversations with City of Bay City Superintendant, this station is in extremely poor condition and needs to be completely replaced. The station should also be relocated to a lower elevation, possibly closer to Highway 101 if suitable land is available. In addition, a new 4-inch line on Sunset Drive should be installed

Table 6-14 provides a summary of the recommended distribution improvements to the Juno Hill distribution system. These improvements are also presented in Figure 6-4. Detailed cost estimates are provided in the appendix.

Table 6-14 – Juno Hill Distribution System Improvements Summary

Item	Description	Estimated Cost
1	General Distribution Piping Improvements	$ 579,000
2	Booster Station Improvements	$ 132,000
3	New 4-in pipeline on Sunset Drive	$ 57,000
TOTAL		$ 768,000

6.6.4 Latimer Road Water Association

The distribution system for the Latimer Road Water Associated is described in Section 4.5.4. This system includes a large portion of the Regional District's 8-in transmission line with a number of off-shooting service laterals, primarily composed of 1- and 2-inch diameter pipelines. The Latimer Road distribution also includes a number of fire hydrants within its boundary.

In general, the Latimer Road Water Association's distribution system appears to be in good condition. Although there are a number of smaller service lines (< 4 inches) within the district, the majority of these lines only serve one or two customers. Small lines servicing more customers should be replaced with pipelines having a minimum diameter of 4 inches.

Recommended improvements for the Latimer Road Water Association are shown in Figure 6-6. The estimated cost for these improvements is approximately $50,000. A detailed cost estimate is provided in the appendix.

6.6.5 Northwood Water District

The Northwood Water District's distribution system lies on far southeast side of the Regional District. This system includes a pump station, 15,000-gallon reservoir, and piping network consisting of 6-, 4-, 2-, and 1.5-inch lines.

Improvements in this district should be aimed to replace undersized pipelines in order to provide the service area with required fire flow. In order to accomplish this, the following recommendations have been made:

- Replace existing 4-inch steel line Northwood Drive
- Extend existing 4-inch line on Northwood Drive to Northwood Way
- Install an additional fire hydrants

The district did not provide sufficient information on its pump station to perform a hydraulic analysis. However, no deficiencies have been reported with this station and therefore no recommendations for improvements have been included.

Recommended improvements are illustrated in Figure 6-6. The estimated cost for these improvements is approximately $60,000. A detailed cost estimate is provided in the appendix.

6.6.6 Summary

This section of the *Water Master Plan Update* has attempted to provide preliminary recommendations of needed distribution improvements for each of the individual service districts. These

recommendations have developed through hydraulic analysis performed in previous sections of this plan, which were based on system information provided by each of the purchasing districts.

The recommendations provided in this plan are only intended to provide a general idea of the condition of each system and necessarily an exhaustive list of needed improvements. As new information on system components is obtained, these recommendations should be updated accordingly.

The following table provides a brief financial summary of the recommended improvements for each of the individual service districts.

Table 6-15 –Cost Estimate Summary for Service Districts' Distribution Improvements

Service District	Cost Estimate
City of Bay City (Low-Level)	$ 667,500
City of Bay City (High-Level)	$ 648,000
Cole Creek Water District	$ 300,000
Juno Hill Water Company	$ 768,000
Latimer Road Water Association	$ 50,000
Northwood Water District	$ 60,000
TOTAL	$ 2,493,500

WATER MASTER PLAN UPDATE

SCALE: 1" = 400'

H B H Consulting Engineers

KILCHIS REGIONAL WATER DISTRICT
WATER SYSTEM MASTER PLAN

NORTHWOOD DISTRIBUTION SYSTEM
PROPOSED IMPROVEMENTS

DRAWN BY: CLB

DATE: MARCH 2009

FIG
6-6

NEW 1.0 MG RESERVOIR
AND 8-IN TRANSMISSION LINE

WILLLOWBROOK RESERVOIR

KILCHIS BRIDGE CROSSING
(18-INCH)

KILCHIS RIVER

NEW WELL

TILLAMOOK BAY

REPLACE FAILING 10-INCH
TRANSMISSION LINE

ALDERBROOK BRIDGE CROSSING
(10-IN)

JUNO HILL RESERVOIR

REPLACE FAILING 10-IN
TRANSMISSION LINE &
STABILIZE ROAD

NEW 1.5 MG RESERVOIR
AND 10-IN TRANSMISSION LINE
(LOCATION TO BE DETERMINED IN FUTURE)

INTERTIE W/
CITY OF TILLAMOOK)

N

GRAPHIC SCALE

1000 0 500 1000 2000 4000

(IN FEET)
1 inch = 2000ft.

WATER MASTER PLAN UPDATE

SCALE: 1" = 2000'

LEGEND

- EXISTING WATER LINE
- NEW 6-INCH
- NEW 8-INCH
- NEW 10-INCH
- NEW 18-INCH

H B H Consulting Engineers

KILCHIS REGIONAL WATER DISTRICT
WATER MASTER PLAN UPDATE

KILCHIS REGIONAL WATER SYSTEM
RECOMMENDED IMPROVEMENTS

DRAWN BY: CLL

DATE: SEPT 2009

FIG
6-1

FIG 6-2A

DRAWN BY: CLL

DATE: SEPT 2009

CITY OF BAY CITY DISTRICT SYSTEM
PROPOSED IMPROVEMENTS

KILCHIS REGIONAL WATER DISTRICT
WATER SYSTEM MASTER PLAN

H B H Consulting Engineers

WATER MASTER PLAN UPDATE

SCALE: 1" = 500'

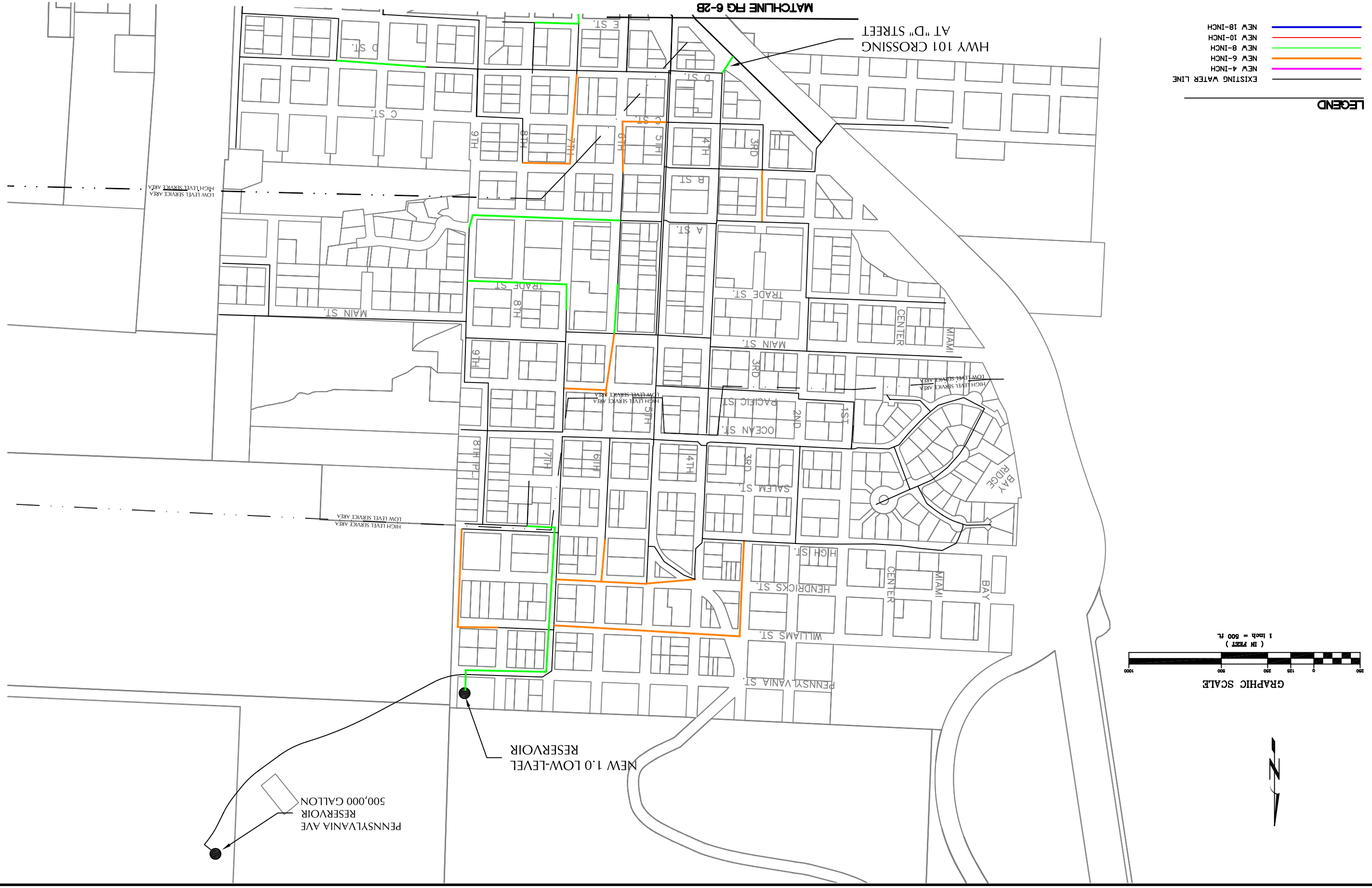

FIG 6-2B

DRAWN BY: CLL

DATE: SEPT 2009

CITY OF BAY CITY DISTRICT SYSTEM

PROPOSED IMPROVEMENTS

KILCHIS REGIONAL WATER DISTRICT

WATER SYSTEM MASTER PLAN

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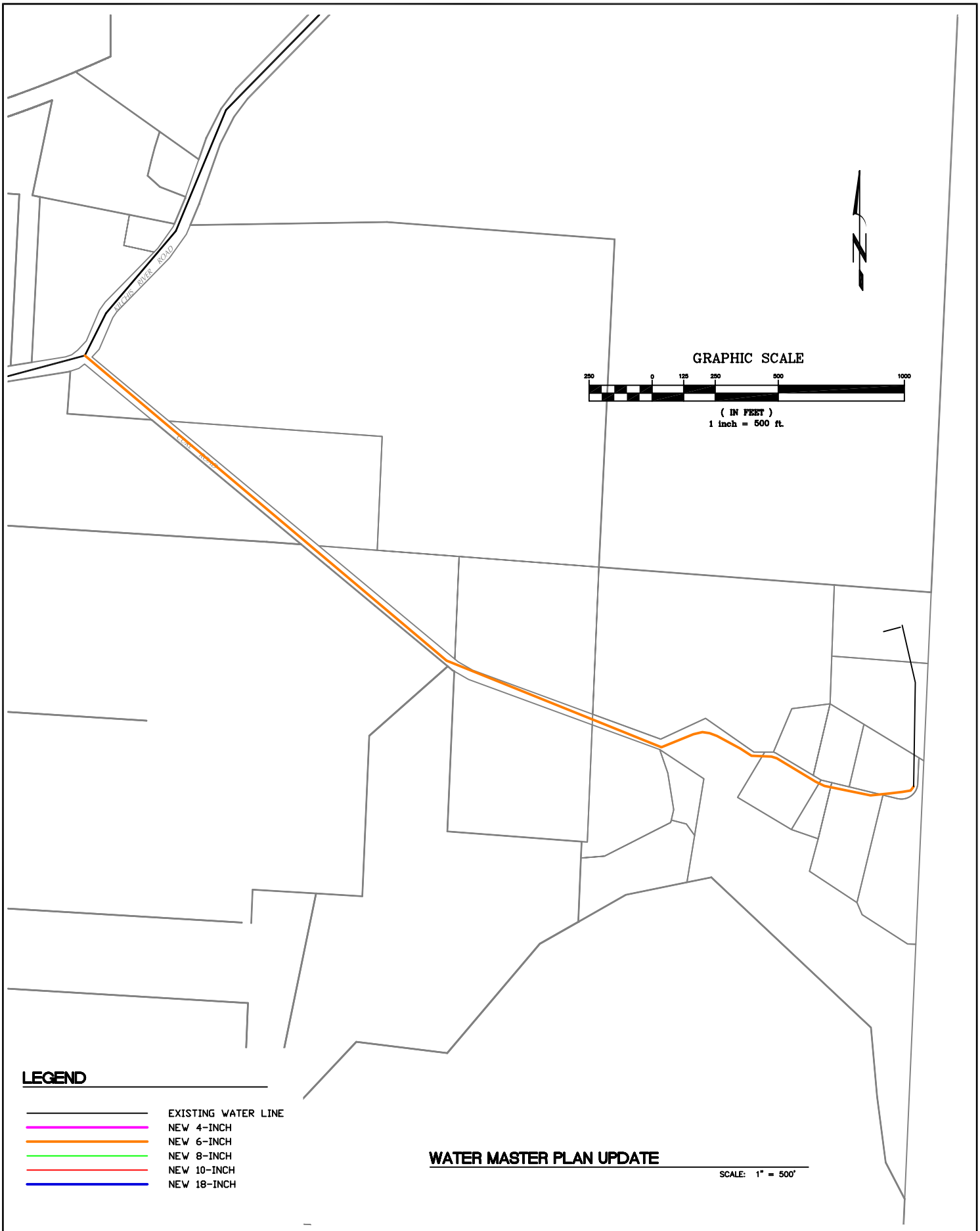
WATER MASTER PLAN UPDATE

SCALE: 1" = 500'



H B H Consulting Engineers	Kilchis Regional Water District *WATER MASTER PLAN UPDATE*	COLE CREEK WATER DISTRICT PROPOSED IMPROVEMENTS	FIG. 6-3

JUNO HILL RESERVOIR
500,000 GALLON

PORT OF TILLAMOOK RIGHT-OF-WAY

LAYMEN ROAD

HIGHWAY 101

FUTURE INTERTIE
W/ CITY OF TILLAMOOK

JUNO HILL
PUMP STATION

KILCHIS RIVER

SUPPRESS ROAD

BOQUIST ROAD

HIGHWAY 101

LEGEND

- EXISTING WATER LINE
- NEW 4-INCH
- NEW 6-INCH
- NEW 8-INCH
- NEW 10-INCH
- NEW 18-INCH

GRAPHIC SCALE

200 0 100 200 400 800

(IN FEET)
1 inch = 400 ft.

H B H
Consulting Engineers

KILCHIS REGIONAL WATER DISTRICT
WATER SYSTEM MASTER PLAN

JUNO HILL DISTRIBUTION SYSTEM
PROPOSED IMPROVEMENTS

DRAWN BY: CLB

DATE: MARCH 2009

FIG
6-4

WATER MASTER PLAN UPDATE

SCALE: 1" = 400'

H B H Consulting Engineers

KILCHIS REGIONAL WATER DISTRICT
WATER SYSTEM MASTER PLAN

LATIMER ROAD DISTRIBUTION SYSTEM
PROPOSED IMPROVEMENTS

DRAWN BY: CLB

DATE: MARCH 2009

FIG
6-5

Recommended Plan

Section 7

7.1 Introduction

This section is intended to summarize all the recommendations in this *Waster Master Plan Update* and provide clear and concise information on project selection, capacity needs, project prioritization, project costs, and financing strategies.

This section outlines the recommended plan for the water supply, storage, and transmission systems for the Kilchis Regional Water District, as well as preliminary recommendations for the individual districts' distribution systems. These recommendations were developed through the analyses and studies that were completed in previous sections of the Plan.

As the projects vary in their criticality, the projects have been divided into three separate and distinct priority groups. The priority groups are further described below:

> **Priority 1 Projects:** Priority 1 projects are the most critical and must be undertaken as soon as possible in order to satisfy the current operational and regulatory requirements. Priority 1 projects should be considered as the most immediate needs of the water system.
>
> **Priority 2 Projects:** Priority 2 projects are projects that should be undertaken within the first half of the planning period to restore aging facilities to new operating conditions and to increase system capacity. While they do not have to be undertaken immediately, they should be included in the capital improvement plans (CIP) and undertaken as funding is obtained.
>
> **Priority 3 Projects:** Priority 3 projects are projects that are primarily dependent on development and expansion of the distribution system to provide water service to new areas. Priority 3 projects are most likely to be driven by development and the need to expand the distribution system to service new properties and new subdivisions. Funding for Priority 3 projects are likely to be financed through a combination of system funds, developer contributions, and SDC funds (if available).

With these priorities in mind, the remainder of this section will further describe the recommended projects, their costs, and design criteria as well as financing strategies for the recommended projects.

7.2 Summary of Recommended Improvements

Improvements to the Kilchis Regional water system are needed to:

- Increase the pumping capacity of source intake
- Provide additional storage capacity
- Provide addition water supply during emergencies through interties with other water systems
- Provide more reliable river crossings
- Increase system efficiency by combining entire service area into single water district
- Replace the transmission mains that are prone to breakage

Each of the improvements is discussed in detail in Section 6, which also present associated cost estimates for each project.

7.2.1 Priority 1 Improvements

Highest priority improvements, indicated as Priority 1 improvements, include improvements to the well intake, providing additional finished water storage, increasing the reliability of the system during emergencies, and improving system management.

Priority 1 Improvements for these items are listed below:

Well Intake Improvements

- Develop new well rated at 1,000 gpm
- Apply for water right permit extension
- Develop Water Management & Conservation Plan (as a result of permit extension)

Finished Water Storage

- Construct new 1.0-million gallon storage reservoir on Pennsylvania Street
- Include intertie with high-level system

Emergency Intertie with the City of Tillamook

- Bore approximately 800' of 8-inch piping under the Wilson River

New Kilchis River Crossings

- Bore approximately 300' of 18-inch piping under the Kilchis River at the Kilchis Bridge crossing
- Bore approximately 200' of 10-inch piping under the Kilchis River at the Alderbrook Bridge crossing

Water System Management

- Merge individual water districts into singe water authority

Priority 1 projects should be completed within the next few of years or as soon as funding for these projects can be obtained

7.2.2 Priority 2 Improvements

Other projects that need to be completed within the 20-year planning period include:

Providing the remaining portion of the needed additional finished water storage

- Construct a 1.5-million gallon storage reservoir
- Additional property or an easement will be required east of TCCA for the reservoir.

Transmission System

- Replace approximately 3,800 feet of 10-in pipeline Alderbrook Loop Road (between Kilchis River Road and Highway 101).
- Replace approximately 1,000 feet of 10-in pipeline to Juno Hill
- Install 10 new fire hydrants

The Priority 2 project improvements can be undertaken in the future as additional funding becomes available.

7.2.3 Priority 3 Improvements

No Priority 3 projects have been developed for the Kilchis Regional Water System.

7.2.4 Improvements to Individual Districts' Distribution System

Section 6.6 of this *Water Master Plan Update* provides a number of preliminary recommendations for improvements to the distribution system of the individual service districts. These recommendations have are further described and prioritized below.

The primary goal of developing the following improvement projects is to give each district an initial idea of the condition of their respective system. These projects should not be viewed as an exhaustive list and may require significant updating as more information on existing systems and community's needs are established.

Many of these improvements are necessary to improve hydraulic efficiency of the system and provide fire flow requirements. For this reason, these improvements do not necessarily need to be implemented immediately, rather they can be constructed in multiple stages as funding sources allows.

City of Bay City

Priority 1 Projects:
- "D" Street Highway Crossing
- Doughty Street Booster Station (DBS) Improvements

Priority 2 Projects:
- General Low-Level Distribution Piping Improvements (see Section 6.6.1 for details)
- General High-Level Distribution Piping Improvements(see Section 6.6.1 for details)

Priority 3 Projects:
- No Priority 3 improvement projects have been d developed

Cole Creek Water District

Priority 1 Projects:
- No Priority 1 improvement projects have been d developed

Priority 2 Projects:
- Replace existing 4-in feed line with new line having a minimum diameter of 6 inches
- Install new fire hydrant

Priority 3 Projects:
- No Priority 3 improvement projects have been d developed

Juno Hill Water Company

Priority 1 Projects:

- Replace and relocated booster pump station
- Install new 6-inch PVC line on Ellen Road

Priority 2 Projects:

- Replace existing line on east side of Highway 101 with new 8-inch PVC line
- Install new fire hydrants

Priority 3 Projects:

- Replace existing 4-inch line on Suppress Road with new 8-inch PVC line
- Replace existing 1- and 1.5-inch lines on Boquist Road with new 6-inch PVC line

Latimer Road Water Association

Priority 1 Projects:

- No Priority 1 improvement projects have been d developed

Priority 2 Projects:

- Replace existing line on east N. Hillcrest Rd with new 4-inch PVC line

Priority 3 Projects:

- No Priority 3 improvement projects have been d developed

Northwood Water District

Priority 1 Projects:

- No Priority 1 improvement projects have been d developed

Priority 2 Projects:

- Replace existing 4-inch steel line Northwood Drive
- Extend existing 4-inch line on Northwood Drive to Northwood Way
- Install an additional fire hydrants

Priority 3 Projects:

- No Priority 3 improvement projects have been d developed

7.3 Recommended Improvements Cost Summary

7.3.1 Kilchis Regional Water District

Project priority groups have been developed in this section. As mentioned previously, the projects vary in their criticality with some requiring to be undertaken as soon as possible, while other can be planned for and undertaken later in the planning period.

A summary of the recommended projects costs is provided in the Table 7-1 for all project priority categories. No Priority 3 Improvement projects have been developed for the Kilchis Regional Water System. Detail cost estimates for each improvement is provided in Section 6 of this Plan.

Table 7-1 - Recommended Projects Costs Summary

Improvement Description	Total Project Costs
Priority 1 Projects	**$ 2,562,000**
New Well	$ 384,000
Water Right Extension & Water Management and Conservation Plan	$ 30,000
1.0-MG Water Storage Reservoir	$ 1,257,000
Emergency Intertie with City of Tillamook	$ 400,000
Kilchis Bridge Crossing	$ 300,000
Alderbrook Bridge Crossing	$ 116,000
Single Water Authority	$ 75,000
Priority 2 Projects	**$ 2,340,000**
1.5-MG Water Storage Reservoir	$ 1,824,000
Alderbrook Line Replacement	$ 349,500
Juno Hill Reservoir Transmission Line Replacement	$ 121,500
Fire Hydrants	$ 45,000
Priority 3 Projects	**NA**
No Priority 3 projects have been identified	NA
Overall Plan Costs	**$ 4,902,000**

The above costs are for recommended improvements to the general Regional District's source, transmission, and storage system. Costs for preliminary recommended improvements for each of the individual service districts are provided in the following section.

7.3.2 Individual Service Districts' Distribution System

The following table summarizes the estimated cost for the various distribution system improvement projects for each of the individual service districts as described in Section 7.2.4.

Table 7-2 - Recommended Projects Costs Summary for Distribution Improvements

Service District	Priority 1 Project Costs	Priority 2 Project Costs	Priority 3 Project Costs	Total Project Costs
City of Bay City	$ 123,000	$ 1,192,500	N/A	$ 1,315,500
Cole Creek Water District	N/A	$ 300,000	N/A	$ 300,000
Juno Hill Water Company	N/A	$ 50,000	N/A	$ 50,000
Latimer Road Water Association	$ 189,000	$ 220,500	$ 358,500	$ 768,000
Northwood Water District	N/A	$ 60,000	N/A	$ 60,000
TOTAL	**$ 312,000**	**$ 1,823,000**	**$ 358,500**	**$ 2,493,500**

Regarding the distribution system improvements, it is recommended that each district set aside money in the water budget to start replacing the older water mains that are in poor condition. This would

allow the cost of the needed distribution system improvements to be spread out over time. Service districts should set a goal to replace a set footage of pipe each year. In addition, when there is a water main break that requires a whole section of pipe to be replaced and when leaking pipes are found that require whole sections of pipe to be replaced, the pipe should be replaced with adequately sized pipe.

7.4 Financing Strategy

The Kilchis Regional Water District must upgrade and improve its water system in order to provide reliable water treatment and distribution to the general service area for the upcoming planning period and beyond.

This *Water System Master Plan Update* outlines a plan for all necessary improvements, which represent a significant investment for the Regional District. Therefore, a strategy and plan for financing the recommended improvements must be developed.

While the financing package that the Regional District will ultimately utilize depends on the results of coordination with the various funding agencies, this section will summarize the general direction the Regional District should proceed with and provide some insight into the potential impacts to rate payers.

As outlined earlier in this section, improvements projects recommend for the Regional Water System total approximately $4.9 million dollars. An additional $2.5 million have been identified for improvements to each of the service district's distribution systems.

The Regional District should proceed with the following steps as it moves forward with the financing strategy for the water system improvement projects:

1. As soon as this *Water System Master Plan Update* is approved, the Regional District should contact OECDD to schedule a one-stop meeting. At this one-stop meeting, all of the potential agencies who may be able to provide funding will send representatives to discuss the funding needs and develop a funding package for the improvement projects. The agencies will make recommendations and will discuss what each agency can offer. The result will be a funding package made up of grants and loans from a number of agencies to fund the projects.

2. Following the one-stop meeting, the Regional District should immediately process the necessary paperwork to apply for the funding included in the funding package recommended at the one-stop meeting. This will require numerous applications and other administrative efforts to apply for funding. The Regional District should apply to any and all programs or agencies that have the potential to provide grant money to reduce the impact to rate payers.

3. Due to the magnitude of the required improvements, the Regional District will not likely receive grants sufficient to cover all of the costs of the project. In fact, the Regional District will most likely be required to take out loans for a significant portion of the project costs. Since the Regional District will have to pay back loan monies, a rate increase will be required to generate the revenue to pay back the loans. The Regional District should immediately set up a timeline and plan for rate increase. The plan should include efforts to educate the public and provide for public meetings and other opportunities for the public to learn about the upcoming improvement projects, the project need, and the project costs.

4. Once the Regional District receives notification that they have secured the necessary funding to complete the work, they can begin the pre-design and design activities in preparation for bidding and construction of the improvements.

7.4.1 Impact to Rate Payers

As mentioned above, the funding package for the recommended projects will likely include a loan component that may necessitate a rate increase for the average rate payer. While the final funding package will not be known until after the one-stop meeting and not confirmed until notice that the necessary funding is secured, it is important to give some insight on the potential impact to rate payers.

Existing Water Rate Fees

As noted in Section 4.7.2, each of the individual servicing districts is charged a monthly rate by the Kilchis Regional Water District that is based on the percent of total water usage of each service area. In addition, monthly rates charged to each district include a capital repayment for previous improvement projects. Table 7-3 lists the current monthly rates charged to each of the purchasing districts.

Table 7-3 – 2009/2008 Monthly Payment by Service District

Service District	Water Usage Percentage	Annual Operating Payment	Annual Capital Payment	Monthly Payment
Bay City	36.5%	$ 77,072	N/A	$ 6,423
Cole Creek	0.7%	$ 1,42	$ 825	$ 187
Juno Hill	5.0%	$ 10,296	$ 1,751	$ 1,004
Latimer Rd	5.8%	$ 11,256	$ 2,851	$ 1,176
Northwood	1.4%	$ 2,769	$ 1,624	$ 366
TCCA	50.6%	$ 111,466	$ 13,890	$ 10,446
Total	100.0%	$ 214,281	$ 20,941	$ 19,602

The individual districts are responsible for establishing customer rates within their respective boundaries. As a result, customer water rates vary throughout the Regional District's service area. Table 7-4 provides a summary of the "average" monthly water bill for each of the purchasing districts. This average is based on the 7,500-gallon monthly water consumption used by funding agencies. As this table shows, the Northwood Water District has the lowest monthly water rate, while customers serviced by Bay City, but lie outside the City's UGB have the highest monthly rate.

Table 7-4 – Comparison of "Average" Monthly Water Bill

Water District	Average Monthly Water Bill[1]
Bay City (within City)	$ 28.30
Bay City (outside City)	$ 38.43
Cole Creek	$ 18.72
Juno Hill	$ 31.25
Latimer Road	$ 24.25
Northwood	$ 20.00

[1] Based on an average water usage of 7,500 gal/month or 15,000 gal/bi-monthly
[2] Average water rate based on ¾" service connection

Rate Impacts

The following table shows the financial impact of the various improvement projects, assuming 100% of the projects' costs are funded by loans based on an assumed loan at 3.5% for a term of 20 years.

The theoretical situation presented in Table 7-5 indicates that financing all of Priority 1 projects would require a monthly payback of $16,699. This cost would increase to $31,220 per month if a loan was received for all the improvement projects recommended for the Kilchis Regional Water District.

Table 7-5 – Estimated Monthly Payback for Project Financing

Improvement Project		Total Project Costs	Total Monthly Costs
Priority 1 Projects	New Well	$ 384,000	$ 2,383
	Water Right Extension & WMCP	$ 30,000	$ 186
	1.0-MG Water Storage Reservoir	$ 1,257,000	$ 7,800
	Emergency Intertie with City of Tillamook	$ 400,000	$ 2,482
	Kilchis Bridge Crossing	$ 300,000	$ 1,862
	Alderbrook Bridge Crossing	$ 116,000	$ 720
	Single Water Authority	$ 75,000	$ 465
	Total	*$ 2,562,000*	*$ 15,899*
Priority 2 Projects	1.5-MG Water Storage Reservoir	$ 1,824,000	$ 11,319
	Alderbrook Line Replacement	$ 349,500	$ 2,169
	Juno Hill Reservoir Transmission Line Replacement	$ 121,500	$ 754
	Fire Hydrants	$ 45,000	$ 279
	Total	*$ 2,340,000*	*$ 14,521*
Total Improvements		**$ 4,902,000**	**$ 30,420**

Assumes 3.5% Interest Rate, 20-yr Term

Due to the significant financial cost of pursuing all of the recommended improvements, it is recommended that the Regional District initially move forward with just the Priority 1 projects. Assuming that no grant monies are obtained for these projects (worst case scenario), the Regional District would require a loan of approximately $2.56 million. It is assumed that the financial impact of this loan would be distributed proportionally among each of the purchasing districts.

Table 7-6 presents the potential impact to current monthly payments required by each of the individual service districts. As this table shows, current monthly payment rates are expected to increase approximately 61% to 90% in order to repay loans for the Priority 1 project improvements.

Table 7-6 – Potential Impact to Service Districts' Monthly Payment

District	Water Usage Percentage	Existing Monthly Payment	Monthly Increase	New Monthly Payment	Percent Increase
Bay City	36.50%	$ 6,423	$ 5,803	$ 12,226	90%
Cole Creek	0.70%	$ 187	$ 111	$ 299	59%
Juno Hill	5.00%	$ 1,004	$ 795	$ 1,799	79%
Latimer Rd	5.80%	$ 1,176	$ 922	$ 2,098	78%
Northwood	1.40%	$ 366	$ 23	$ 589	61%
TCCA	50.60%	$ 10,446	$ 8,045	$ 18,491	77%

Assumes 3.5% Interest Rate, 20-yr Term

It should be reiterated the above figures are based on the worst-case scenario that all projects are funded by loans. It is very probably that grants will be available for some projects, particularly those related to improving system reliability during emergencies.

As a result of increased monthly payments to the Kilchis Regional District, the purchasing district may be required to raise the rates that they charge their own customers. The following table shows the potential impact that the increased monthly payment may have on the customers within each of the purchasing districts. Under the theoretical financial situation presented here, the average district increase would be approximately 53%.

Table 7-7 – Potential Impact on Service Districts' Water Rate

District	Existing EDUs	Monthly Increase per EDU	Existing Water Rate	New Water Rate
Bay City (within City)	928.1	$ 5.88	$28.30	$ 34.18
Bay City (outside City)	59.0	$ 5.88	$38.43	$ 44.31
Cole Creek	10.0	$ 11.13	$18.72	$ 29.85
Juno Hill	67.2	$ 11.83	$31.25	$ 43.08
Latimer Rd	98.6	$ 9.35	$24.25	$ 33.60
Northwood	21.0	$ 10.60	$20.00	$ 30.60

It should be noted that the potential rate impact to the individual service districts **does not** account for additional monies needed to fund the recommended improvements to their respective distribution systems.

As previously noted, one of the recommended Priority 1 projects is to merge the Kilchis Regional Water District and all of the individual purchasing districts under a single water authority. Once this occurs, a new rate structure will need to be adopted for the entire service area.

Table 7-8 shows a potential rate structure based on the existing estimate of 2,179.3 EDUs. The new rate would need to be sufficient to cover the total cost to operate the existing regional system as well as each of the individual service districts. In addition, the rate should also cover costs associated with existing and new capital repayments.

Table 7-8 – Estimated Monthly Rate per EDU for New Water Authority

Annual Operating Costs	$ 600,000
Annual Capital Payment (existing)	$ 20,941
Annual Capital Payment (new)	$ 190,784
Total Annual Cost	$ 811,725
Total EDUs	2179.3
Monthly Cost per EDU	**$ 31.04**

It should be noted that the above rate structure is for preliminary planning purposes. Once a new water authority is established, a detailed rate structure analysis will need to be preformed.

As mentioned before, the final impact to rate payers will not be known until the final funding package is confirmed and all variables are set.

7.4.2 System Development Charges

Systems Development Charges (SDCs) are charges assessed against new development in an attempt to recover some of the costs incurred by local government in providing the capital facilities required to serve increased growth in the system. Currently, the Kilchis Regional Water District does not impose any district-wide SDC fees. Of the individual service districts, only the City of Bay City has adopted SDCs for new customers connecting within its boundary.

In the present configuration of the Regional District's management scheme, implementing SDCs for the entire district is not feasible. However, should all of the existing service districts be merged into a single water authority, a SDC methodology should be develop to set SDC rates for the entire District.

An adopted SDC methodology is the basis of a SDC rate structure and must comply with the framework set forth in ORS 223.297 through 223.314. Much of the information required as part of an SDC methodology has been developed as part of this *Water Master Plan Update*.

Financing Options

Section 8

Most communities are unable to finance major infrastructure improvements without some form of governmental funding assistance, such as low interest loans or grants. In this section discusses a number of major Federal/State funding programs as well as local funding mechanisms that are appropriate for the recommended improvements. Projects are usually funding by a combination of grant, loan and local funds.

8.1 State and Federal Programs

A brief description of the major Federal and State funding programs that are typically utilized to assist qualifying communities in the financing of infrastructure improvement programs is given below. Each of the government assistance programs has its own particular prerequisites and requirements. These assistance programs promote such goals as aiding economic development, benefiting areas of low to moderate-income families, and providing for specific community improvement projects. With each program having its specific requirements, not all communities or projects may qualify for each of these programs.

Oregon Community Development Block Grant (OCDBG) Program

The Oregon Economic and Community Development Department (OECDD) administers the State's annual federal allocation of CDBG funds. Funds for the program come from the U.S. Department of Housing and Urban Development. OCDBG funds under the Public Works category are targeted to water and wastewater systems.

OCDBG grants are available for each of three phases necessary to complete water and/or wastewater system improvements; preliminary engineering and planning, final engineering, and construction. Public works project grants are limited to $1,000,000 except for preliminary/engineering planning grants are capped at $150,000.

Eligible projects must meet the national objective of benefiting low and moderate-income persons. This typically means that at least 51% of residents must have low or moderate incomes based on the 2000 Census data or local survey. In addition, the average residential water/sewer service rate (fee) should be approximately equal to 1.75% of the community median household income (MHI), taking into account any increases necessary for the intended project. This average water/sewer rate may include monthly use fees, and other local fees used specifically to finance the system, including any special levy's on taxable property within the system's service area being used to pay for the system.

Projects eligible for funding must be to solve problems faced by current residents, not projects intended to provide capacity for population and economic growth. CDBG funds may be used in projects that are needed to benefit current residents but which will be built with capacity for future development. In these cases, the CDBG participation is limited to that portion of the project cost that is necessary to serve the current population.

For additional information on the OCDBG programs, call 1-800-233-3306 or visit the OECDD website at http://www.econ.state.or.us/cdbg.htm.

Water/Wastewater Financing Program

The 1993 Legislature created the Water/Wastewater Financing Program for communities that must meet Federal and State mandates to provide safe drinking water and adequate treatment and disposal of wastewater. The legislation was intended to assist local governments in meeting the Safe Drinking Water Act and the Clean Water Act. The fund is capitalized with lottery funds appropriated each biennium and with the sale of state revenue bonds. The Oregon Economic and Community Development Department (OECDD) administers the program.

The grant/loan amounts are determined by a financial analysis based on demonstrated need and the applicant's ability or inability to afford additional loans (dept capacity, repayment sources and other factors). The programs guidelines, project administration, loan terms, and interest rates are similar to the Special Public Works Fund program. The maximum loan term is 25 years, however, loans are generally made for 20-year terms. Loans are generally repaid with utility revenues, general funds, or voter approved bond issues. Borrowers that are "credit worthy" may be funded through sale of state revenue bonds.

Interested applicants should contact OECDD prior to submitting an application. Applications are accepted year-round. For additional information on this and other OECDD programs, call 1-800-233-3306 or visit the OECDD website at http://www.econ.state.or.us/wtrww.htm.

Oregon Special Public Works Fund

The Special Public Works Fund (SPWF) program provides financing to municipalities (cities, districts, tribal councils, etc.) to construct, improve, and repair infrastructure in order to support local economic development and create new jobs locally, especially family wage jobs. All projects must principally benefit industrial or eligible commercial users.

The SPWF is primarily a loan program. Grant funds are available based upon economic need of the municipality. The maximum loan term is 25 years, though loans are generally made for 20-year terms. The grant/loan amounts are determined by a financial analysis based on a demonstrated need and the applicant's ability or inability to afford additional loans (debt capacity, repayment sources and other factors). Borrowers that are "credit worthy" may be funded through the sale of state revenue bonds. Loans are generally repaid with utility revenues, local improvement districts (LID's), general funds, or voter approved bond issues.

The maximum SPWF loan per project is $15 million, if funded from SPWF revenue bond proceeds. Projects financed directly from the SPWF may receive up to $1 million. The maximum SPWF grant is $500,000 for a construction project and cannot exceed 85% of the total project cost. Grants are made only when loans are not feasible.

For additional information on the OCDBG and other OECDD programs, call 1-800-233-3306 or visit the OECDD website at http://www.econ.state.or.us/spwf.htm.

Safe Drinking Water Revolving Loan Fund

The purpose of this loan fund is to provide funding to drinking water systems to comply with the Safe Drinking Water Act (SDWA), i.e., to protect the public health. It is intended to assist community and nonprofit, non-community water systems plan, design and construct drinking water facilities needed to correct non-compliance issues and to further the public health protection goals of the SDWA. Funds may be used for the following types of activities:

- All drinking water facilities necessary for source of supply, filtration, treatment, storage, transmission and metering.
- The acquisition of real property necessary for the project
- Preliminary and final engineering, surveying, legal review and other support activities necessary for the construction of the project
- Construction contingencies in approved change orders.
- Cost necessary for recipients to contract environmental review services
- A reasonable amount of community growth may be accommodated in the project. Growth may not be the primary purpose for constructing the facilities; public health improvement must be the main goal.

The Oregon Health Division and the Oregon Economic and Community Development Department (OECDD) rate proposed projects. The applicant must submit a "Letter of Interest" which is used to rank projects in a Project Priority List. Special consideration is given to projects at small water systems that serve 10,000 or fewer people, consolidating or merging with another system as a solution to a compliance problem, and which have an innovative solution to the stated problem. Additional consideration will be given to disadvantaged communities.

OECDD will structure a financing package that may include a Safe Drinking Water direct loan as well as loans and grants from other department programs. The loan interest rate is 80% of the "State and Local Bonds Rate" for the last week of the preceding quarter. For loans to Disadvantaged Communities, which also demonstrate financial need, the interest rate is 1%. Maximum loan terms are 20 years, except that loans to disadvantaged communities may be as long as 30 years. The loan limit per project is $4 million.

Interested parties should contact the OECDD for details. For additional information on the DWSRF programs, call 1-800-233-3306 or visit the OECDD website at http://www.econ.state.or.us/safe_wtr.htm.

Drinking Water Protection Loan Fund

For communities and municipalities needing improvements to protect source water, loan funds are available through OHD under the new Drinking Water Protection Loan Fund. There is less competition for funds under this program since only improvements related to source protection are eligible.

Water and Waste Disposal Loans and Grants (RUS)

The Rural Utilities Service (RUS) is one of three entities that comprise the USDA's Rural Development mission area. Administered by the USDA Rural Development office, the RUS supports various programs that provide financial and technical assistance for development and operation of safe and affordable water supply systems and sewer and other forms of waste disposal facilities.

RDA has the authority to make loans to public bodies and non-profit corporations to construct or improve essential community facilities. Grants are also available to applicants who meet the median household income (MHI) requirements. Eligible applicants must have a population less than 10,000. Priority is given to public entities in areas smaller than 5,500 people to restore a deteriorating water supply, or to improve, enlarge, or modify a water facility and/or inadequate waste facility. Preference is given to requests that involve the merging of small facilities and those serving low-income communities.

The maximum term on all loans is 40 years. However, no repayment period will exceed any statutory limitation on the organization's borrowing authority or the useful life of the improvement facility to be financed. Interest rates are set quarterly and are based on current market yields for municipal obligations. Current interest rates may be obtained from any Rural Development office.

Total grant funding cannot exceed the following percentage of eligible project development costs:

- 75% when the community meets poverty line interest rate criteria
- 45% when the community meets intermediate interest rate criteria

Maximum grant amounts based on MHI are provided in the following table.

Table 8-1 – Maximum Rural Development Grant Funds (based on MHI)

Median Household Income (MHI)	*Maximum Grant*	*Interest Rate*[1]
<$32,984	75%	2.625 %
$32,984 - $41,230	45%	3.500%
>$41,230	0%	4.375%

[1] Interest rates as of August 2009

There are other restrictions and requirements associated with these loans and grants. If a district becomes eligible for grant assistance, the grant will apply only to eligible project costs. Additionally, grant funds are only available after the district has incurred long-term debt resulting in an annual debt service obligation equal to 0.5% of the MHI. In addition, an annual funding allocation limits the Rural Development funds. To receive a Rural Development loan, the district must secure bonding authority, usually in the form of general obligation bonds or revenue bonds.

Applications for financial assistance are made at area offices of the RDA. For additional information on RDA loans and grant programs call 1-541-673-0136 or visit the RUS website at http://www.usda.gov/rus/water.

Emergency Community Water Assistance Grants (ECWAC)

Available through the USDA Rural Utilities Service (RUS) as part of the Water and Waste Disposal programs, ECWAC is available to communities when disaster strikes. Congress may appropriate funds for the program after a flood, earthquake, or other disaster if Federal assistance is warranted.

In order to receive assistance through an ECWAC grant, applicant must demonstrate that a significant decline in quantity or quality of water occurred within two years of the date the application was filed with RUS. Projects that are eligible for assistance include the following:

- Extend, repair or perform significant maintenance on existing water systems.
- Construct new water lines, wells, or other sources of water, reservoirs, and treatment plants.
- Replace equipment and pay costs associated with connection or tap fees.
- Pay related expenses such as legal and engineering fees and environmental impact analyses, or acquire rights associated with developing sources of treating, storing, or distributing water.
- Achieve compliance with the requirements of the Federal Water Pollution Control Act (33 U.S.C et seq.) or with the Safe Drinking Water Act when noncompliance is directly related to a recent decline in potable water quality.

The maximum grant available through ECWAC is $500,000. Grants for repairs, partial replacement, or significant maintenance on an established system cannot exceed $15,000. Otherwise, grants may be made for 100% of eligible project costs.

Applications are filed with any USDA Rural Development office. For additional information on RDA loans and grant programs call 1-541-673-0136 or visit the RUS website at http://www.usda.gov/rus/water/.

Rural Community Assistance Corporation (RCAC) Financial Services

The mission of RCAC's Financial Services is to manage resources, develop programs and participate in collaborative efforts, enabling RCAC to provide suitable and innovative solutions to the financial needs of rural communities and disadvantaged populations. In 1996, RCAC was designated a Community Development Financial Institution by the US Treasury to help address the capital needs of rural communities and has since added other loan programs. These programs include community facilities (housing, educational centers, public buildings, etc.) as well as lending for water and wastewater improvements.

Long-term loans are made in communities with a population of 20,000 or fewer. The Community Facility Loan Guarantee Program from USDA Rural Development enables RCAC to make low-interest loans with amortization periods of up to 25 years. The primary goal of Financial Services is to serve low- and very-low income rural residents. The primary borrowers are nonprofit organizations and municipalities.

The loan fund has received support from The California Endowment, Ford Foundation, USDA RD, Bank of America and many other agencies. This support enables Financial Services to leverage both public and private funds. Historically, each loan fund dollar has leveraged $11 additional for a project. Additional information can be found at http://www.rcac.org.

Economic Development Administration (EDA) Public Works Grant Program

The EDA Public Works Grant Program, administered by the U.S. Department of Commerce, is aimed at projects which directly create permanent jobs or remove impediments to job creation in the project area. Thus, to be eligible for this grant, a community must be able to demonstrate the potential to create jobs from the project. Potential job creation is assessed with a survey of businesses to demonstrate the prospective number of jobs that might be created if the proposed project was completed.

Proposed projects must be located within an EDA-designated Economic Development District. Priority consideration is given to projects that improve opportunities for the establishment or expansion of industry and that create or retain private sector jobs in both the near-term and long-term. Communities, which can demonstrate that their existing system is at capacity (i.e. moratorium on new connections), have a greater chance of being awarded this type of grant. EDA grants are usually in the range of the 50 to 80% of the project cost; therefore some type of local funding is also required. Grants typically do not exceed 1 million dollars.

Technical Assistance and Training Grants (TAT)

Available through the USDA Rural Utilities Service (RUS) as part of the Water and Waste Disposal programs, TAT grants are intended to provide technical assistance and training to associations on a wide range of issues relating to the delivery of water and waste disposal services.

Rural communities with populations of less than 10,000 persons are eligible along with private, nonprofit organizations that have been granted tax-exempt status by the IRS.

Grants may be made for up to 100% of the eligible project costs. Applications are filed with any USDA Rural Development office. For additional information on RDA loans and grant programs call 1-541-673-0136 or visit the RUS website at http://www.usda.gov/rus/water.

Department of Environmental Quality, State Revolving Fund (CWSRF)

The Clean Water State Revolving Fund (CW SRF) Program is administered by the Department of Environmental Quality (DEQ) and was developed to replace the EPA Construction Grants Program. The SRF is a loan program that provides low interest rate loans, instead of grants, for the planning, design, and construction of water pollution control facilities.

Interest rates on all design and/or construction loans are two-thirds of the current municipal bond rate during the quarter that the loan agreement is signed. In addition, an initiation fee and a servicing fee are also assessed to cover program administration by DEQ. The interest rates change quarterly based on the national average municipal bond rate. Loans can be in the form of general obligation bonds or other rated debt obligations, revenue secured loan, or a discretionary loan.

The Intended Use Plan is one part of Oregon's annual SRF capitalization grant application. This plan includes lists of eligible projects ranked in priority order. When projects have been allocated funds, they are placed on the Funded List. Project that are not funded remain on the Planning List to receive funds if any of the funded list projects do not complete the loan process. Projects identified on the funded list from prior years, which have not been initiated, are placed on a Supplemental List.

For additional information on this and other DEQ programs, call 1-800-452-4011 or visit the DEQ website at http://waterquality.deq.state.or.us.

State Water Resources Department: Water Development Loan Fund

The Water Development Loan Fund (WDLF) may grant loans to individuals, cities, local governments, and other public and private entities. The goal of the fund is to provide low-cost, long-term, fixed-rate financing incentives that promote projects that achieve the state's long-term water management goals.

Funds to finance a water development project are obtained through the issuance and sale of self-liquidating bonds. The bonds are repaid by participants in the program and at no cost to the state or the Oregon taxpayer. The amount and type of loan security required depends on the borrower and the type of project. A first lien on real estate is required security for all loans. Other security may also be required.

Interested parties should contact the Water Resources Department for details. For additional information on the WDLF programs, call 1-800-624-3199 or visit the WRD website at http://www.wrd.state.or.us.

8.2 Local Funding Sources

The amount and type of local funding obligations for infrastructure improvements will depend, in part, on the amount of grant funding anticipated and the requirements of potential loan funding. Local revenue sources for capital expenditures include ad valorem taxes, various types of bonds, service charges, connection fees, and system development charges. The following sections identify those local funding sources and financing mechanisms that are most common and appropriate for the improvements identified in this study.

Currently, the Kilchis Regional Water District does not have taxing authority within the individual service districts. Of the purchasing districts, only Bay City has taxing authority within its boundary. However, should the entire service area be consolidated into a single water authority, extended taxing authority can be enacted. For this reason, information on funding options via various taxations is included within this section.

General Obligation Bonds

A general obligation (G.O.) bond is backed by the full faith and credit of the issuer. For payment of the principal and interest on the bond, the issuer may levy ad valorem general property taxes. Such taxes are not needed if revenue from assessments, user charges or some other source are sufficient to cover debt service.

Oregon Revised Statutes limit the maximum term to 40 years for cities. Except in the event that Rural Development Administration will purchase the bonds, the realistic term for which general obligation bonds should be issued is 15 to 20 years. Under the present economic climate, the lower interest rates will be associated with the shorter terms.

Financing of water system improvements by general obligation bonds is usually accomplished by the following procedure:

- Determination of the capital costs required for the improvement.
- An election authorizing the sale of general obligation bonds.
- Following voter approval, the bonds are offered for sale.
- The revenue from the bond sale is used to pay the capital costs associated with the projects.

From a fund raising viewpoint, general obligation bonds are preferable to revenue bonds in matters of simplicity and cost of issuance. Since the bonds are secured by the power to tax, these bonds usually command a lower interest rate than other types of bonds. General obligation bonds lend themselves readily to competitive public sale at a reasonable interest rate because of their high degree of security, their tax-exempt status, and their general acceptance.

These bonds can be revenue-supported wherein a portion of the user fee is pledged toward payment of the debt service. Using this method, the need to collect additional property taxes to retire the obligated bonds is eliminated. Such revenue-supported general obligation bonds have most of the advantages of revenue bonds, but also maintain the lower interest rate and ready marketability of general obligation bonds. Because the users of the water system pay their share of the debt load based on their water usage rates, the share of that debt is distributed in a fare and equitable manner.

Advantages of general obligation bonds over other types of bonds include:

- The laws authorizing general obligation bonds are less restrictive than those governing other types of bonds.
- By the levying of taxes, the debt is repaid by all property benefited and not just the system users.
- Taxes paid in the retirement of these bonds are IRS deductible.
- General obligation bonds offer flexibility to retire the bonds by tax levy and/or user charge revenue.

The disadvantage of general obligation bond debt is that it is often added to the debt ratios of the underlying municipality, thereby restricting the flexibility of the municipality to issue debt for other purposes. Furthermore, general obligation bonds are normally associated with the financing of facilities that benefit an entire community and must be approved by a majority vote and often necessitate extensive public information programs. A majority vote often requires waiting for a general election in order to obtain an adequate voter turnout. Waiting for a general election may take years, and too often a project needs to be undertaken in a much shorter amount of time.

Revenue Bonds

The general shift away from ad valorem property taxes and toward a greater reliance on user fees makes revenue bonds a frequently used option of long term debt. These bonds are an acceptable alternative and offer some advantages to general obligation bonds. Revenue bonds are payable solely

from charges made for the services provided. These bonds cannot be paid from tax levies or special assessments; their only security is the borrower's promise to operate the system in a way that will provide sufficient net revenue to meet the debt service and other obligations of the bond issue.

Many communities prefer revenue bonding, as opposed to general obligation bonding because it insures that no tax will be levied. In addition, debt obligation will be limited to system users since repayment is derived from user fees. Another advantage of revenue bonds is that they do not count against a municipality's direct debt, but instead are considered "overlapping debt." This feature can be a crucial advantage for a municipality near its debt limit or for the rating agencies, which consider very closely the amount of direct debt when assigning credit ratings. Revenue bonds also may be used in financing projects extending beyond normal municipal boundaries. These bonds may be supported by a pledge of revenues received in any legitimate and ongoing area of operation, within or outside the geographical boundaries of the issuer.

Successful issuance of revenue bonds depends on the bond market evaluation of the revenue pledged. Revenue bonds are most commonly retired with revenue from user fees. Recent legislation has eliminated the requirement that the revenues pledged to bond payment have a direct relationship to the services financed by revenue bonds. Revenue bonds may be paid with all or any portion of revenues derived by a public body or any other legally available monies. In addition, if additional security to finance revenue bonds was needed, a public body may mortgage grant security and interests in facilities, projects, utilities or systems owned or operated by a public body.

Normally, there are no legal limitations on the amount of revenue bonds to be issued, but excessive issue amounts are generally unattractive to bond buyers because they represent high investment risks. In rating revenue bonds, buyers consider the economic justification for the project, reputation of the borrower, methods and effectiveness for billing and collecting, rate structures, provision for rate increases as needed to meet debt service requirements, track record in obtaining rate increases historically, adequacy of reserve funds provided in the bond documents, supporting covenants to protect projected revenues, and the degree to which forecasts of net revenues are considered sound and economical.

Municipalities may elect to issue revenue bonds for revenue producing facilities without a vote of the electorate (ORS 288.805-288.945). In this case, certain notice and posting requirements must be met and a 60-day waiting period is mandatory. A petition signed by 5% of the municipality's registered voters may cause the issue to be referred to an election.

Improvement Bonds

Improvement (Bancroft) bonds can be issued under an Oregon law called the Bancroft Act. These bonds are an intermediate form of financing that is less than full-fledged general obligation or revenue bonds, but is quite useful especially for smaller issuers or for limited purposes.

An improvement bond is payable only from the receipts of special benefit assessments, not from general tax revenues. Such bonds are issued only where certain properties are recipients of special benefits not accruing to other properties. For a specific improvement, all property within the improvement area is assessed on an equal basis, regardless of whether it is developed or undeveloped. The assessment is designed to apportion the cost of improvements, approximately in proportion to the afforded direct or indirect benefits, among the benefited property owners. This assessment becomes a direct lien against the property, and owners have the option of either paying the assessment in cash or applying for improvement bonds. If the improvement bond option is taken, a district sells Bancroft improvement bonds to finance the construction, and the assessment is paid over 20 years in 40 semi-

annual installments with interest. Cities and special districts are limited to improvement bonds not exceeding 3% of true cash value.

With improvement bond financing, an improvement district is formed, the boundaries are established, and the benefited properties and property owners are determined. The engineer usually determines an approximate assessment, either on a square foot or a front-foot basis. Property owners are then given an opportunity to object to the project assessments. The assessments against the properties are usually not levied until the actual cost of the project is determined. Since this determination is normally not possible until the project is completed, funds are not available from assessments for the purpose of making monthly payments to the contractor. Therefore, some method of interim financing must be arranged, or a preassessment program, based on the estimated total costs, must be adopted. Commonly, warrants are issued to cover debts, with the warrants to be paid when the project is complete.

The primary disadvantage to this source of revenue is that the property to be assessed must have a true cash value at least equal to 50% of the total assessments to be levied. As a result, a substantial cash payment is usually required by owners of undeveloped property. In addition, the development of an assessment district is very cumbersome and expensive when facilities for an entire community are contemplated. In comparison, general obligation bonds can be issued in lieu of improvement bonds, and are usually more favorable.

Capital Construction (sinking) Fund

Sinking funds are often established by budgeting for a particular construction purpose. Budgeted amounts from each annual budget are carried in a sinking fund until sufficient revenues are available for the needed project. Such funds can also be developed with revenue derived from system development charges or serial levies.

A water district may wish to develop sinking funds for each sector of the public services. The fund can be used to rehabilitate or maintain existing infrastructure, construct new infrastructure elements, or to obtain grant and loan funding for larger projects.

The disadvantage of a sinking fund is that it is usually too small to undertake any significant projects. Also, setting aside money generated from user fees without a designated and specified need is not generally accepted in a municipal budgeting process.

Connection Fees

Most municipalities charge connection fees to cover the cost of connecting new development to water and wastewater systems. Based on recent legislation, connection fees can no longer be programmed to cover a portion of capital improvement costs.

System Development Charges

A system development charge (SDC) is essentially a fee collected as each piece of property is developed, and which is used to finance the necessary capital improvements and municipal services required by the development. Such a fee can only be used to recover the capital costs of infrastructure. Operating, maintenance, and replacement costs cannot be financed through system development charges.

The Oregon Systems Development Charges Act was passed by the 1989 Legislature (HB 3224) and governs the requirements for systems development charges effective July 1, 1991. Two types of charges are permitted under this act: 1) improvement fees, and 2) reimbursement fees. SDC's charged before construction are considered improvement fees and are used to finance capital improvements to be constructed. After construction, SDC's are considered reimbursement fees and are collected to recapture the costs associated with capital improvements already constructed or under construction. A reimbursement fee represents a charge for utilizing excess capacity in an existing facility paid for by others. The revenue generated by this fee is typically used to pay back existing loans for improvements.

Under the Oregon Systems Development Charges Act, methodologies for deriving improvement and reimbursement fees must be documented and available for review by the public. A capital improvement plan must also be prepared which lists the capital improvements that may be funded with improvement fee revenues and the estimated cost and timing of each improvement. However, revenue from the collection of SDC's can only be used to finance specific items listed in a capital improvement plan. The projects and costs developed in this Water System Master Plan may be used for this purpose. In addition, SDC's cannot be assessed on portions of the project paid for with grant funding.

Local Improvement District (LID)

A local improvement district (LID) or multiple LIDs can be formed by a district to be responsible for securing and repaying the debt. A LID incorporates property owners within a defined boundary who agree to fund all or a portion of an improvement project. LID projects are best suited for improvements that benefit a limited number of users rather than the entire system.

A district may be required to assist in the LID process through facilitation and administration of the project. Agreements should be prepared detailing who will pay for engineering and planning costs, administration costs, interim financing, and other costs related to a public works project.

The LID formation process requires public hearings, at which, a remonstrance (no vote) of two thirds of the influenced area can halt the process. A successful LID area would result in liens against the LID properties at the end of the project or a full payment from all or some of the property owners.

Disadvantages to a LID include the requirement of a significant amount of time and interest from a district if they choose to administer the LID. It is not uncommon to have some or many within the LID boundary that are opposed to the project. Those in opposition to the project must either rally enough support to derail the project or work for some other compromise. The political and administrative fall out is often borne by the district.

Ad Valorem Taxes

Ad valorem property taxes are often used as revenue source for utility improvements. Property taxes may be levied on real estate, personal property or both. Historically, ad valorem taxes were the traditional means of obtaining revenue to support all local governmental functions.

A marked advantage of these taxes is the simplicity of the system; it requires no monitoring program for developing charges, additional accounting and billing work is minimal, and default on payments is rare. In addition, ad valorem taxation provides a means of financing that reaches all property owners

that benefit from a water system, whether a property is developed or not. The construction costs for the project are shared proportionally among all property owners based on the assessed value of each property.

Ad valorem taxation, however, is less likely to result in individual users paying their proportionate share of the costs as compared to their benefits. In addition, the ability of communities to levy property taxes has been limited with the passage of Ballot Measure 5 and other subsequent legislation. While the impacts of the various legislative efforts are still unclear, capital improvement projects are exempt from property tax limitations if new public hearing requirements are met and an election is held.

User Fees

User fees can be used to retire general obligation bonds, and are commonly the sole source of revenue to retire revenue bonds and to finance operation and maintenance. User fees represent monthly charges of all residences, businesses, and other users that are connected to the applicable system. These fees are established by resolution and can be modified, as needed, to account for increased or decreased operating and maintenance costs.

User fees should be based on a metered volume of water consumption. Through metered charges, an equitable and fair system of recovering water system costs is used. Flat fees and unmetered connections should be avoided. Large water users should pay a larger portion of the water system costs. Through higher rates and metered billing, this can be accomplished.

Assessments

Under special circumstances, the beneficiary of a public works improvement may be assessed for the cost of a project. For example, a district may provide some improvements or services that directly benefit a particular development. The district may choose to assess the industrial or commercial developer to provide up-front capital to pay for the administered improvements.

APPENDIX A

OAR 333-061-0060

OAR CHAPTER 333
DIVISION 061
PUBLIC WATER SYSTEMS

333-061-0060 Plan Submission and Review Requirements

(1) Plan Submission:

(a) Construction and installation plans shall be submitted to and approved by the Department before construction begins on new systems or major additions or modifications, as determined by the Department, are made to existing systems. Plans shall be drawn to scale;

(b) Preliminary plans, pilot studies, master plans and construction plans shall be prepared by a Professional Engineer registered in Oregon, and submitted to the Department unless exempted by the Department (See OAR 333-061-0060(4));

(c) Plans shall set forth the following:

(A) Sufficient detail, including specifications, to completely and clearly illustrate what is to be constructed and how those facilities will meet the construction standards set forth in these regulations. Elevation or section views shall be provided where required for clarity;

(B) Supporting information attesting to the quality of the proposed source of water;

(C) Vicinity map of the proposed project relative to the existing system or established landmarks of the area;

(D) Name of the owner of the water system facilities during construction and the name of the owner and operator of the facilities after completion of the project;

(E) Procedures for cleaning and disinfecting those facilities which will be in contact with the potable water.

(d) Prior to drilling a well, a site plan shall be submitted which shows the site location, topography, drainage, surface water sources, specifications for well drilling, location of the well relative to sanitary hazards, dimensions of the area reserved to be kept free of potential sources of contamination, evidence of ownership or control of the reserve area and the anticipated depth of the aquifer from which the water is to be derived. The Department will review well reports from the area and in consultation with the local watermaster and the well constructor as appropriate will recommend the depth of placement of the casing seal. After the well is drilled, the following documents shall be submitted to the Department for review and approval: Well driller's report, report of the pump test which indicates that the well has been pumped for a sufficient length of time to establish the reliable yield of the well on a sustained basis, including data on the static water level, the pumping rate(s), the changes in drawdown over the duration of the test, the rate of recovery after the pump was turned off, reports on physical, chemical and microbiological quality of the well water,

performance data on the well pump, a plan of the structure for protecting above-ground controls and appurtenances, and a plan showing how the well will be connected to the water system. (See OAR 333-061-0050(2).)

(e) Any community water system or non-transient noncommunity water system that treats surface water or groundwater under the influence of surface water that desires to make a significant change to the disinfection treatment process and is required to develop a disinfection profile according to OAR 333-061-0030 (2)(b)(B) through (D) must consult with and provide any additional information requested by the Department prior to making such a change. The water system must develop a disinfection profile for *Giardia lamblia* (and, if necessary, viruses), calculate a disinfection benchmark, describe the proposed change in the disinfection process, and analyze the effect(s) of the proposed change on current levels of disinfection according to the USEPA Disinfection Profiling and Benchmarking Guidance Manual and/or the USEPA LT1-ESWTR Disinfection Profiling and Benchmarking Technical Guidance Manual and submit the information to the Department for review and approval. Significant changes to the disinfection treatment process include:

(A) Changes to the point of application:
(B) Changes to the disinfectants used in the treatment process;
(C) Changes to the disinfection process;
(D) Any other modification identified by the Department.

(f) A water system subject to paragraph (1)(e) of this rule must calculate a disinfection benchmark using the following procedure:

(A) From data collected to develop the disinfection profile, determine the average *Giardia lamblia* inactivation for each calendar month by dividing the sum of all *Giardia lamblia* inactivations for that month by the number of values calculated for that month.
(B) Determine the lowest monthly average value out of the twelve values. This value becomes the disinfection benchmark.

(g) A water system that uses either chloramines, chlorine dioxide or ozone for primary disinfection must also calculate the disinfection benchmark for viruses using a method approved by the Department in addition to the disinfection profile for *Giardia lamblia*. This viral benchmark must be calculated in the same manner as is used for the *Giardia lamblia* disinfection benchmark described in subsection (1)(f) of this rule.

(2) Plan review

(a) Upon receipt of plans, the Department shall review the plans and either approve them or advise that correction or clarification is required. When the correction or clarification is received, and the item(s) in question are resolved, the Department shall then approve the plans;

(b) Upon completion of a project, a professional engineer registered in Oregon shall submit to the Department a statement certifying that the project has been constructed in compliance with the approved plans and specifications. When substantial deviations from the approved plans are made, as-built plans showing compliance with these rules shall be submitted to the Department;

(c) Plans shall not be required for emergency repair of existing facilities. In lieu of plans, written notice shall be submitted to the Department immediately after the emergency work is completed stating the nature of the emergency, the extent of the work and whether or not any threats to the water quality exists or existed during the emergency.

(3) Plan review fees: Plans submitted to the Department shall be accompanied by a fee as indicated in Table 31. Those plans not accompanied by a fee will not be reviewed.

Table 31

Nature of Plan	Community Water System	Non-Community Water System
Water source	$600	$150
Water Treatment	$600	$150
Water Treatment (full)	$600	$150
Disinfection only	$150	$45
Corrosion Control only	$150	$45
Distribution & Storage	$600	$150
Distribution only	$600	$150
Storage only	$600	$150
Combination two or more	$750	$150
Master Plan	$750	$150
Corrosion Control study	$750	$150
As-built plans & certification statement	No fee if original plans reviewed	

(4) Plan review exemptions:

(a) Water suppliers may be exempted from submitting plans of main extensions, providing they:

(A) Have provided the Department with a current master plan; and

(B) Certify that the work will be carried out in conformance with the construction standards of these rules; and

(C) Submit to the Department an annual summary of the projects completed; and

(D) Certify that they have staff qualified to effectively supervise the projects.

(b) Those water suppliers certifying that they have staff qualified to effectively plan, design and supervise their projects, may request the Department for further exemption from this rule. Such requests must be accompanied by a listing of staff proposed to accomplish the work and a current master plan. To maintain the exemption, the foregoing must be annually updated;

(c) At the discretion of the Department, Community, Transient and Non-Transient Non-Community and State Regulated water systems may be exempted from submitting engineered plans. They shall, however, submit adequate plans indicating that the project meets the minimum construction standards of these rules.

(5) Master plans

(a) Community water systems with 300 or more service connections shall maintain a current master plan. Master plans shall be prepared by a professional engineer registered in Oregon and submitted to the Department for review and approval.

(b) Each master plan shall evaluate the needs of the water system for at least a twenty year period and shall include but is not limited to the following elements:

(A) A summary of the overall plan that includes the water quality and service goals, identified present and future water system deficiencies, the engineer's recommended alternative for achieving the goals and correcting the deficiencies, and the recommended implementation schedule and financing program for constructing improvements.

(B) A description of the existing water system which includes the service area, source(s) of supply, status of water rights, current status of drinking water quality and compliance with regulatory standards, maps or schematics of the water system showing size and location of facilities, estimates of water use, and operation and maintenance requirements.

(C) A description of water quality and level of service goals for the water system, considering, as appropriate, existing and future regulatory requirements, nonregulatory water quality needs of water users, flow and pressure requirements, and capacity needs related to water use and fire flow needs.

(D) An estimate of the projected growth of the water system during the master plan period and the impacts on the service area boundaries, water supply source(s) and availability, and customer water use.

(E) An engineering evaluation of the ability of the existing water system facilities to meet the water quality and level of service goals, identification of any existing water system deficiencies, and deficiencies likely to develop within the master plan period. The evaluation shall include the water supply source, water treatment, storage, distribution facilities, and operation and maintenance requirements. The evaluation shall also include a description of the water rights with a determination of additional water availability, and the impacts of present and probable future drinking water quality regulations.

(F) Identification of alternative engineering solutions, environmental impacts, and associated capital and operation

and maintenance costs, to correct water system deficiencies and achieve system expansion to meet anticipated growth, including identification of available options for cooperative or coordinated water system improvements with other local water suppliers.

(G) A description of alternatives to finance water system improvements including local financing (such as user rates and system development charges) and financing assistance programs.

(H) A recommended water system improvement program including the recommended engineering alternative and associated costs, maps or schematics showing size and location of proposed facilities, the recommended financing alternative, and a recommended schedule for water system design and construction.

(I) If required as a condition of a water use permit issued by the Water Resources Department, the Master Plan shall address the requirements of OAR 690-086-0120(Water Management and Conservation Plans).

(c) The implementation of any portion of a water system master plan must be consistent with OAR 333-061 (Public Drinking Water Systems, DHS), OAR 660-011 (Public Facilities Planning, Department of Land Conservation and Development) and OAR 690-086(Water Management and Conservation Plans, Water Resources Department).

Statutory Authority: ORS 448.131
Stats. Implemented: ORS 431.110, ORS 431.150, ORS 448.131, ORS 448.150, ORS 448.273 & ORS 448.279

APPENDIX B

WATER RIGHTS & WELL LOGS

Application No. 51053 Permit No. 43858

RECEIVED
JAN 23 1979
WATER RESOURCES DEPT.
SALEM, OREGON

STATE OF OREGON WATER RESOURCES DEPARTMENT

Application for Permit to Appropriate Surface Waters

I, Bay City, Oregon
(Name of Applicant)

of City Hall, Bay City
(Mailing Address) (City)

State of Oregon, 97107 Phone No. 377-2288 do hereby
(Zip Code)

make application for a permit to appropriate the following described waters of the State of Oregon:

1. The source of the proposed appropriation is Kilchis River

, a tributary of Tillamook Bay

2. The point of diversion is to be located 819.65 ft. N (N. or S.) and 3895.03 ft. E (E. or W.)

from the SW Section corner of Sec. 32, TS 1N, R9S, WM. (present well)
(Public Land Survey Corner)

plus all that portion of the Southwest quarter of Section 33 and the
(If there is more than one point of diversion, each must be described)

Southeast quarter of Section 32, Township 1 North, Range 9 West of the Willamette Meridian, Tillamook County, Oregon, which lies South and East of the centerline of the Kilchis River and North of Old Whitney Co. Railroad Right of Way. being within the - ¼ of the - ¼ of

Sec. 32 & 33 Tp. 1 N (N. or S.) R. 9W (E. or W.), W.M., in the county of Tillamook

See Exhibit A & B

3. Location of area to be irrigated, or place of use if other than irrigation. See Exhibit C

Township	Range	Section	List ¼ ¼ of Section	List use and/or number of acres to be irrigated
1 North	9 West	31	All	All
1 North	9 West	32	South 1/2	All
1 North	9 West	33	S 1/2 & NE 1/4	All
1 North	9 West	34	W 1/2	All
1 South	9 West	6	All	All
1 South	9 West	5	N 1/2 & SW 1/4	All
1 South	9 West	4	N 1/2	All
1 South	9 West	7	All	All
1 South	9 West	8	W 1/2	All
1 South	9 West	15	W 1/2	All

Form 690-1-0-1-77

(SEE ATTACHED SHEET)

4. *The amount of water which the applicant intends to apply to beneficial use is* 20

cubic feet per second

(If water is to be used from more than one source, give quantity from each)

5. *The use to which the water is to be applied is* quasi municipal

6. *DESCRIPTION OF WORKS*

Include dimensions and type of construction of diversion dam and headgate, length and dimensions of supply ditch or pipeline, size and type of pump and motor, type of irrigation system to adequately describe the proposed distribution system.

The system as proposed now (decision to be made by February 1, 1979 on exact configuration) will include 2-3 wells within the Kilchis River property of Bay City (See Exhibit A), necessary controls; an 18 - inch transmission line to the Rosedale School and two 10-inch lines off the 18-inch line to the City of Bay City and to the Tillamook Creamery; two major reservoirs and one high service reservoirs, and miscellaneous distribution system. An Economic Development Administration Grant of $582,000 has been tentatively earmarked for this upcoming construction season with the remaining cost of a total construction of $2.2 million to be made up by local share and hopefully a 1979-80 Farmers Home Administration Grant. The City of Tillamook will decide by February 1, 1979, on whether they will participate in the regional water system, which may change the size of line from Rosedale School to the Creamery. As previously indicated one well (Exhibit A) has already been drilled for use.

If for domestic use state number of families to be supplied 2500 (1978) 4000 (2000 estimated)

7. *Construction work will begin on or before* August, 1979 (one well already completed)

8. *Construction work will be completed on or before* December 1980

9. *The water will be completely applied to the proposed use on or before* December 1980

Application No. 51053 *Permit No.* 42858

"EXHIBIT C" Application No. 51053
Permit No. 43858

Township	Range	Section	List ¼ ¼ of Section	List use and/or number of acres to be irrigated
1 South	9 West	16	All	All
1 South	9 West	17	All	All
1 South	9 West	18	All	All
1 South	9 West	19	All	All
1 South	9 West	20	All	All
1 South	9 West	21	All	All
1 South	9 West	22	S 1/2 and NW 1/4	All
1 South	9 West	23	S 1/2	All
1 South	9 West	26	All	All
1 South	9 West	27	All	All
1 South	9 West	28	All	All
1 South	9 West	29	All	All
1 South	9 West	30	E 1/2	All
1 South	9 West	31	NE 1/4	All
1 South	9 West	32	N 1/2	All
1 South	9 West	33	N 1/2	All
1 South	9 West	34	N 1/2	All
1 South	9 West	35	N 1/2	All
1 North	10 West	6	E 1/2	All
1 North	10 West	5	All	All
1 North	10 West	7	E 1/2	All
1 North	10 West	8	All	All
1 North	10 West	13	SW 1/4	All
1 North	10 West	14	S 1/2	All
1 North	10 West	15	S 1/2	All

(CONTINUED)

"EXHIBIT C"
(continued)

Application No. 51053
Permit No. 43858

Township	Range	Section	List ¼ ¼ of Section	List use and/or number of Acres to be irrigated
1 North	10 West	16	S 1/2	All
1 North	10 West	17	All	All
1 North	10 West	18	E 1/2	All
1 North	10 West	20	All	All
1 North	10 West	21	All	All
1 North	10 West	22	All	All
1 North	10 West	23	W 1/2	All
1 North	10 West	26	W 1/2	All
1 North	10 West	27	All	All
1 North	10 West	34	All	All
1 North	10 West	35	All	All
1 North	10 West	36	All	All
1 South	10 West	1	All	All
1 South	10 West	2	All	All
1 South	10 West	3	E 1/2	All
1 South	10 West	11	All	All
1 South	10 West	12	All	All
1 South	10 West	13	All	All
1 South	10 West	14	All	All
1 South	10 West	15	SE 1/4	All
1 South	10 West	18	All	All
1 South	10 West	22	All	All
1 South	10 West	23	All	All
1 South	10 West	24	All	All
2 North	10 West	29	All	All
2 North	10 West	30	All	All

(CONTINUED)

"EXHIBIT C"
(CONTINUED)

Application No. 51053
Permit No. 43858

Township	Range	Section	List ¼ ¼ of Section	List use and/or number of Acres to be irrigated
2 North	10 West	31	All	All
2 North	10 West	32	All	All

Remarks: Bay City, Kilchis River Water District, Juno Water Company, Northwood Water District, Latimer Road Water Association, Tillamook Creamery, Wilson River Water District (Garibaldi, Barview, Twin Rocks, Rockaway - future possibilities). Fairview Water District and the City of Tillamook all need or will need additional source of supply and/or upgrading by treatment. Public agencies have stressed the elimination of small systems and to solve water needs on an area wide basis some of these systems have been contacted and have actively worked towards obtaining water from this source of supply.

M S Buckingham City Engineer
Signature of Applicant

Authorized Agent of City

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

In order to retain its priority, this application must be returned to the Water Resources Director with corrections on or before ....., *19*.....

WITNESS my hand this ..... *day of* ....., *19*.....

Water Resources Director

By .....

This instrument was first received in the office of the Water Resources Director at Salem, Oregon, on the 10th *day of* August, *19* 73, *at* 10:35 *o'clock* A. *M.*

Application No. 51053 *Permit No.* 43858

Application No. 51053 Permit No. 43858

Permit to Appropriate the Public Waters of the State of Oregon

This is to certify that I have examined the foregoing application and do hereby grant the same SUBJECT TO EXISTING RIGHTS INCLUDING THE EXISTING FLOW POLICIES ESTABLISHED BY THE WATER POLICY REVIEW BOARD 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 20.0 *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* Kilchis River.

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*

BC Ext. 10-1-00

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 August 10, 1973

Actual construction work shall begin on or before March 2, 1980 *and shall thereafter be prosecuted with reasonable diligence and be completed on or before October 1, 19* 80

Extended to Oct. 1985 Extended to October 1, 1990, 10-1-95

*Complete application of the water to the proposed use shall be made on or before October 1, 19*81

Extended to Oct. 19 Extended to October 1, 1990, 10-1-95

WITNESS my hand this 2nd *day of* March, *19*79

James E. Sexton

Water Resources Director

BEFORE THE WATER RESOURCES DIRECTOR OF OREGON

IN THE MATTER OF APPLICATION FOR)
EXTENSION OF TIME IN WHICH TO)
COMPLETE CONSTRUCTION WORK AND) ORDER
MAKE COMPLETE APPLICATION OF)
WATER UNDER CERTAIN PERMITS)

The above entitled matter now coming on for the consideration of the Water Resources Director, and it appearing that:

The holders of the following water right permits issued by the Water Resources Director have submitted applications for extensions of time limits within which to complete the construction work and make complete application of water to beneficial use under their respective water right permits;

The Water Resources Director is authorized under the provisions of ORS 537.230 to grant extensions of time for good cause shown, within which to complete work or perfect a right under a water right permit;

The statements in the applications for extensions filed regarding completion of the projects indicate that each has shown such reasonable diligence as entitles him to an extension of time; and

No protest or objections to the granting of an extension under any of the following permits have been filed by any subsequent permit holders;

NOW, THEREFORE, it hereby is ORDERED that extensions of time are granted as follows:

Name	Permit Number	To Complete Work	To Apply Water
City of Silverton	3226	October 1, 1990	October 1, 1990
City of Warrenton	5070	October 1, 1990	October 1, 1990
City of Medford	6703	October 1, 1990	October 1, 1990
City of Medford	6884	October 1, 1990	October 1, 1990
City of Hood River	8387	October 1, 1990	October 1, 1990
The City of Cascade Locks Mr. Richard B. McCulley	18134	October 1, 1990	October 1, 1990
City of Lincoln City	18293	October 1, 1990	October 1, 1990
The City of Sweet Home	20525	October 1, 1990	October 1, 1990
City of Medford	23210	October 1, 1990	October 1, 1990
The City of Rogue River	26594	October 1, 1990	October 1, 1990
International Paper Co. Gardiner Paper Mill	26724	October 1, 1990	October 1, 1990
City of Eugene, by and through the Eugene Water and Electric Board	27441	October 1, 1990	October 1, 1990
Crown Zellerback Corp.	30138	October 1, 1990	October 1, 1990

Tillamook Water Commission	30192	October 1, 1990	October 1, 1990
Big Creek Ditch Co.	30974	October 1, 1989	October 1, 1989
Big Creek Ditch Co.	30975	October 1, 1989	October 1, 1989
Alsea Co. Service Dist.	31214	October 1, 1990	October 1, 1990
Umpqua Basin Water Association, Inc.	31555	October 1, 1990	October 1, 1990
Clackamas Water District	33586	October 1, 1990	October 1, 1990
Winston-Dillard Water Dist.	34106	October 1, 1990	October 1, 1990
Clackamas Water District	34426	October 1, 1990	October 1, 1990
City of Drain	35252	October 1, 1990	October 1, 1990
Oak Lodge Water District	35297	October 1, 1990	October 1, 1990
Boeing Agri Industrial Co.	35425	October 1, 1990	October 1, 1990
Boeing Agri Industrial Co.	35426	October 1, 1990	October 1, 1990
Archie McVay Frank Akin	35534	October 1, 1988	October 1, 1988
City of Corvallis	35551	October 1, 1990	October 1, 1990
Bureau of Reclamation	35792	October 1, 1990	October 1, 1990
City of Adair Village	35819	October 1, 1990	October 1, 1990
City of Cave Junction	36172	October 1, 1990	October 1, 1990
Umpqua Basin Water Association, Inc.	36186	October 1, 1990	October 1, 1990
Pacific City Water District	36881	October 1, 1990	October 1, 1990
C and B Livestock Co.	37108	October 1, 1982	October 1, 1982
Boeing Agri Industrial Co.	37346	October 1, 1990	October 1, 1990
City of Lincoln City	37605	October 1, 1990	October 1, 1990
Welches Water Company	37730	October 1, 1986	October 1, 1986
Portland General Electric Co.	39188	October 1, 1990	October 1, 1990
Richard E. Sasek	39252	October 1, 1985	October 1, 1985
Benson J. Benjamin Family Trust	39252		October 1, 1986
City of Boardman	40336	October 1, 1990	October 1, 1990
Boeing Agri Industrial Co.	40920	October 1, 1990	October 1, 1990
Fat Elk Drainage District	41158	October 1, 1990	October 1, 1990
Beoing Agri Industrial Co.	41314	October 1, 1990	October 1, 1990
Boeing Agri Industrial Co.	41644	October 1, 1990	October 1, 1990
Boeing Agri Industrial Co.	41645	October 1, 1990	October 1, 1990
Star Mountain Ranch	42689	October 1, 1985	October 1, 1985
Miller, William E.	42781	October 1, 1988	October 1, 1988
Parkdale Water Company	42929	October 1, 1987	October 1, 1987
Santiam Water Control Dist.	43080	October 1, 1986	October 1, 1986
City of Canyonville	43119	October 1, 1990	October 1, 1990
City of Myrtle Creek	43121	October 1, 1990	October 1, 1990
City of Gladstone	43170	October 1, 1990	October 1, 1990
Boeing Agri Industrial Co.	43325	October 1, 1990	October 1, 1990
East Fork Irrigation Dist.	43395	October 1, 1988	October 1, 1988
City of Ontario	43401	October 1, 1990	October 1, 1990
Cape Meares Water Co-op System	43812	October 1, 1990	October 1, 1990
Harbor Rural Water District	43837	October 1, 1990	October 1, 1990
City of Bay City	43858	October 1, 1990	October 1, 1990

Umpqua Basin Water Association, Inc.	43898	October 1, 1990	October 1, 1990
City of Roseburg	44018	October 1, 1990	October 1, 1990
Lynn Geelan	44410	October 1, 1985	October 1, 1985
Robert and Shirley Mai	44719	October 1, 1985	October 1, 1985
Wally Nusbaum and Gregory S. Jeffrey	44732	October 1, 1985	October 1, 1986
Becraft, Everett J. and Dorothy L.	44753	October 1, 1986	October 1, 1986
Dan E. Maynard	44902	October 1, 1986	October 1, 1986
Edward W. Earnest	44923	October 1, 1985	October 1, 1985
Stanley R. Hokenson	45695	October 1, 1986	October 1, 1986
J.R. Harris	45814		October 1, 1985
City of Grants Pass	45827	October 1, 1989	October 1, 1989
Department of Fish and Wildlife	45828	October 1, 1985	October 1, 1985
David Elliott Cunningham	45843	October 1, 1986	October 1, 1986
Delia H. Spuhler	45903	October 1, 1986	October 1, 1986
Greg and Paula Jackson	45966	October 1, 1986	October 1, 1986
Mark D. Hurst	46233	October 1, 1985	October 1, 1985
Florence M. Sexton	46249	October 1, 1986	October 1, 1986
Michael J. Goe	46314		October 1, 1987
Lake Shore Development Co.	46332	October 1, 1985	October 1, 1985
Homer Mitchell	46392	October 1, 1985	
Paul G. Wares	46449	October 1, 1986	October 1, 1987
Anthony E. and Patricia J. Sowers	46479	October 1, 1988	October 1, 1988
Carroll, Michael Patrick	46481	October 1, 1986	October 1, 1986
Norton L. Smith	46627	October 1, 1986	October 1, 1986
Holmes, David H.	46644	October 1, 1986	October 1, 1986
Forrest E. Drake	46663	October 1, 1987	October 1, 1987
East Fork Irrigation Distict	46707	October 1, 1988	October 1, 1988
Jack Rhoden	46760	October 1, 1986	October 1, 1986
Harvey W. Buche	46783	October 1, 1987	October 1, 1987
Rice, William L.	46815		October 1, 1986
City of Lincoln City	46867	October 1, 1990	October 1, 1990
Lakeshore Water and Development Coop	46961	October 1, 1989	October 1, 1989
Hammond Ranches Inc.	46978	October 1, 1987	October 1, 1987
Kevin and Kayle Smith	47021	October 1, 1986	
Robert and Carolyn Powell	47040	October 1, 1986	October 1, 1986
Raymond Manning O'Connor	47077	October 1, 1987	October 1, 1987
Glenn A. Walters	47083		October 1, 1986
Bette M. Tucker	47088		October 1, 1986
City of Boardman	47091		October 1, 1987
Koos, John R. and Sons	47116		October 1, 1986
Otto V. Epping	47229	October 1, 1986	October 1, 1986
Jeanette W. and Hughes David M. Cooley	47249	October 1, 1986	October 1, 1986
Anthony E. and Patricia J. Sowers	47267	October 1, 1988	October 1, 1988

Devils Lake Golf Club, Inc.	47281	October 1, 1986	October 1, 1986
Horace Arthur Daum	47436	October 1, 1987	October 1, 1988
John Harry Jacobson	47448	October 1, 1987	October 1, 1987
Walter McEwen	47505	October 1, 1987	October 1, 1988
Suma Shaazmunda	47516	October 1, 1986	
Stanciu, Wallace and Lorin	47517	October 1, 1986	
Roger A. Fox	47524	October 1, 1987	October 1, 1987
Derby, Wallace N.	47543	October 1, 1986	
William B. Kenny	47550	October 1, 1988	October 1, 1988
Cleland, Glenn	47584	October 1, 1986	
Mildred L. Frick	47637	October 1, 1987	October 1, 1987
UNC Cornucopia Mining Co.	47653	October 1, 1987	October 1, 1988
John F. Hamel	47657	October 1, 1986	
Darwin and Jeanne Secord	47661	October 1, 1986	
Spike Ranch Inc.	47673	October 1, 1986	
Iseli Nursery Inc.	47675	October 1, 1986	
Robert F. Olson	47716	October 1, 1987	October 1, 1987
City of Brownsville	47733	October 1, 1990	October 1, 1990
Clinton Dennis Brown	47923	October 1, 1986	
Robert C. Sheehy	47884	October 1, 1987	October 1, 1988
Greg Ballard	47890	October 1, 1986	October 1, 1987
Paulsen, Edna M.	47958	October 1, 1987	October 1, 1987
Gladys O. Philpott	48032	October 1, 1987	October 1, 1987
Gerald D. Hebard	48055	October 1, 1986	
Pearcy, Martha Jane	48098	October 1, 1986	
Ralph H. Jacobs	48143	October 1, 1986	October 1, 1987
Norman G. Kurz	48149	October 1, 1986	
Robert and Vera Martin	48150	October 1, 1986	
Karel and Herta Vitu	48199	October 1, 1986	
Langley, Ivan B.	48229	October 1, 1986	
Langley, Ivan B.	48230	October 1, 1986	
Vince LaRocco	48256	October 1, 1986	
Lawrence G. Knox	48259	October 1, 1986	
Oregon State Parks and Recreation	48309	October 1, 1986	
Douglas County Water Resources Survey	48635	October 1, 1987	October 1, 1988
City of Drain	R-5652	October 1, 1990	
John A. Pettus	R-6091	October 1, 1983	
Boeing Agri Industrial Co.	R-6605	October 1, 1990	
Miller, William E.	R-6892	October 1, 1988	
Robert and Shirley Mai	R-8001	October 1, 1985	
Paul G. Wares	R-8361	October 1, 1986	
Harvey W. Buche	R-8443	October 1, 1987	
John Harry Jaobson	R-8667	October 1, 1987	
Greg Ballard	R-8897	October 1, 1986	
Jerry A. and Linda K. Miller	R-8899	October 1, 1987	
Virgel L. Clark	R-9389	October 1, 1986	
Douglas County Water Resources Survey	R-9964	October 1, 1987	

City of Salem	G-734	October 1, 1989	October 1, 1989
Coos Bay - North Bend Water Board	G-1389	October 1, 1990	October 1, 1990
Willamette Water Co.	G-2643	October 1, 1989	October 1, 1989
Roats Water Systems Inc.	G-3128	October 1, 1986	October 1, 1986
Rivergrove Water District	G-3182	October 1, 1990	October 1, 1990
Shenandoah Home Owners	G-3388	October 1, 1987	October 1, 1987
West Interlachen Water Co-op	G-3862	October 1, 1988	October 1, 1988
Luckiamute Domestic Water Cooperative	G-4480	October 1, 1990	October 1, 1990
Metolius Meadows Property Owner Association	G-5218	October 1, 1989	October 1, 1989
Rivergrove Water District	G-6023	October 1, 1990	October 1, 1990
City of Jordan Valley	G-6030	October 1, 1988	October 1, 1988
Luckiamute Domestic Water Water Cooperative	G-6093	October 1, 1990	October 1, 1990
City of Troutdale	G-6881	October 1, 1989	October 1, 1989
City of Spray	G-7606	October 1, 1990	October 1, 1990
Rainbow Rock Service Association	G-7658	October 1, 1989	October 1, 1989
City of Cottage Grove	G-7724	October 1, 1990	October 1, 1990
City of Echo	G-8546	October 1, 1990	October 1, 1990
Theodore R. Tiahrt Double Tree Ranches	G-8551	October 1, 1987	October 1, 1987
Charles Wavra	G-8948		October 1, 1985
Strubhar, Timothy J.	G-9123	October 1, 1986	October 1, 1986
Ronald D. and Suzanne E. Johnson	G-9168	October 1, 1985	October 1, 1985
Donald and Alice Bowden	G-9170	October 1, 1986	October 1, 1986
William W. and Laurena Z.	G-9202	October 1, 1986	October 1, 1986
Birch Circle Farms, Inc.	G-9229	October 1, 1986	October 1, 1986
David and Galyn Roth	G-9261	October 1, 1985	October 1, 1986
Birch Circle Farms, Inc.	G-9275	October 1, 1986	October 1, 1986
William E. Rodgers	G-9399	October 1, 1985	October 1, 1985
Willie A. and Linda S. Olson	G-9421	October 1, 1986	October 1, 1986
Richard B. Anderson	G-9567	October 1, 1985	October 1, 1985
Walter Hulden and Darrell Hanan	G-9579	October 1, 1987	October 1, 1987
Carol Ann Binkley	G-9582		October 1, 1985
Nolan O. Higley	G-9593	October 1, 1985	October 1, 1985
Robert Jennings Sanders	G-9644	October 1, 1986	October 1, 1986
Hazelwood Water District	G-9772	October 1, 1989	October 1, 1989
Emily Lewis	G-9782	October 1, 1985	October 1, 1986
Hillview Dairy Inc.	G-9811	October 1, 1985	October 1, 1985
City of Lincoln City	G-9827	October 1, 1990	October 1, 1990
City of Troutdale	G-9866	October 1, 1989	October 1, 1989
City of Troutdale	G-9867	October 1, 1989	October 1, 1989
Christopherson, K. Neal and Pam	G-9903		October 1, 1986
Bailey, Richard J.	G-9906	October 1, 1986	October 1, 1986

City of Wilsonville	G-9957	October 1, 1990	October 1, 1990
Benson, Mary C.	G-9964		October 1, 1986
Stockhoff, Robert L.	G-9974	October 1, 1987	October 1, 1987
Avion Water Co., Inc.	G-9975	October 1, 1989	October 1, 1989
John Kevin O'Leary	G-10061	October 1, 1985	
Cecil James	G-10079	October 1, 1986	October 1, 1986
Lorenzen Ranches, Inc.	G-10087	October 1, 1986	October 1, 1986
The Idaho First National Bank	G-10096		October 1, 1986
The Idaho First National Bank	G-10101		October 1, 1986
City of Portland Bureau of Water Works	G-10124	October 1, 1991	October 1, 1991
David Cheney	G-10135	October 1, 1986	
Floweree Farms, Inc.	G-10160	October 1, 1986	
Floweree Farms, Inc.	G-10161	October 1, 1986	
Floweree Farms, Inc.	G-10163	October 1, 1986	
Floweree Farms, Inc.	G-10164	October 1, 1986	
Anthony A. Urbanski	G-10189	October 1, 1987	October 1, 1987
Comyford, J.P.	G-10190	October 1, 1987	October 1, 1987
Ralph J. Doty	G-10192	October 1, 1987	October 1, 1987
Richard T. and Osie N. Van Santen	G-10197	October 1, 1986	
Arthur W. Pullen	G-10233	October 1, 1988	October 1, 1988
Ashdown Woods Water Company	G-10270	October 1, 1988	October 1, 1988
Murphy, Donald W. and Doris R.	G-10274	October 1, 1986	
Frederick G. Graser	G-10276	October 1, 1986	
Golden Rule Farms, Inc.	G-10277	October 1, 1986	
Stockhoff, Robert L.	G-10326	October 1, 1987	October 1, 1987
Buwalda, Robert L.	G-10334	October 1, 1986	
Kenneth Hudson	G-10338	October 1, 1986	October 1, 1987
The Port of Portland	G-10343	October 1, 1987	October 1, 1987
Pierce, Rex	G-10368	October 1, 1986	
Odgen Martin Systems of Marion Inc.	G-10393	October 1, 1986	
PomeRoy G. Sorum	G-10402	October 1, 1986	
Barlow Ranches	G-10411	October 1, 1987	October 1, 1987
Caudill, Charles R.	G-10417	October 1, 1986	
Barlow Ranches	G-10420	October 1, 1987	
City of Portland Bureau of Water Works	G-10455	October 1, 1991	October 1, 1991

Dated at Salem, Oregon, this 21 day of March, 1986.

William H. Young

WILLIAM H. YOUNG
Director

3515D

Reservoir—150—3-51

STATE OF OREGON

COUNTY OF TILLAMOOK

CERTIFICATE OF WATER RIGHT

This Is to Certify, *That* CITY OF BAY CITY

of Bay City *, State of* Oregon *; has made proof*

to the satisfaction of the STATE ENGINEER of Oregon, of a right to store the waters of

Patterson Creek, a tributary of Tillamook Bay to be appropriated under Application No. 26691, Permit No. 20895.

for the purposes of

municipal use

under Reservoir Permit No. R-1287 *of the State Engineer, and that said right to store said waters has been perfected in accordance with the laws of Oregon; that the priority of the right hereby confirmed dates from* December 6, 1951 .

that the amount of water entitled to be stored each year under such right, for the purposes aforesaid, shall not exceed 3.3 *acre-feet.*

The reservoir is located in Section 35 (SE¼ NW¼) *, Tp.* 1 N *, R.* 10 W. *, W.M.*

WITNESS the signature of the State Engineer, affixed this 21st *day of* September *,* 1956 .

LEWIS A. STANLEY
State Engineer.

Recorded in State Record of Water Right Certificates, Volume 15 *, page* 21584 .

STATE OF OREGON

COUNTY OF TILLAMOOK

CERTIFICATE OF WATER RIGHT

This Is to Certify, That CITY OF BAY CITY,

of Bay City, 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 Patterson Creek and Reservoir to be constructed under App. No. R-26690, Per. No. R-1287 a tributary of Tillamook Bay for the purpose of municipal under Permit No. 20895 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 December 6, 1951;

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 1.00 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 SE¼ NW¼, Section 35, Township 1 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:

SE¼ NW¼
SW¼ NW¼
NW¼ SW¼
Section 35
NE¼ SW¼
Section 34
Township 1 North, Range 10 West, W.M.

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 21st day of September, 1956.

LEWIS A. STANLEY
State Engineer

Recorded in State Record of Water Right Certificates, Volume 15, page 21585

NOTICE TO WATER WELL CONTRACTOR
The original and first copy of this report are to be filed with the WATER RESOURCES DEPARTMENT, SALEM, OREGON 97310 within 30 days from the date of well completion.

RECEIVED
SEP 08 1980
WATER RESOURCES DEPT
SALEM, OREGON

WATER WELL REPORT
STATE OF OREGON
(Please type or print)
(Do not write above this line)

TILL 535

State Well No. 15/9w-33cc

State Permit No.

(1) OWNER:
Name City of Bay City
Address Bay City, Oregon

(2) TYPE OF WORK (check):
New Well ☒ Deepening ☐ Reconditioning ☐ Abandon ☐
If abandonment, describe material and procedure in Item 12.

(3) TYPE OF WELL:
Rotary ☐ Driven ☐
(: ☒ Jetted ☐
Du… ☐ Bored ☐

(4) PROPOSED USE (check):
Domestic ☐ Industrial ☐ Municipal ☒
Irrigation ☐ Test Well ☐ Other ☐

) CASING INSTALLED:
Threaded ☐ Welded ☒
12 " Diam. from plus 2 ft. to 21 ft. Gage .250
" Diam. from ft. to ft. Gage
" Diam. from ft. to ft. Gage

) PERFORATIONS:
Perforated? ☐ Yes ☒ No
Type of perforator used
Size of perforations in. by in.
perforations from ft. to ft.
perforations from ft. to ft.
perforations from ft. to ft.

(7) SCREENS:
Well screen installed? ☒ Yes ☐ No
Manufacturer's Name Johnson
Type stainless Model No.
Diam. 10"PS Slot size 100 Set from 20 ft. to 40 ft.
Diam. Slot size Set from ft. to ft.

(8) WELL TESTS:
Drawdown is amount water level is lowered below static level
…s a pump test made? ☒ Yes ☐ No If yes, by whom? driller
Yield: 1000 gal./min. with 3.5 ft. drawdown after 24 hrs.
" " " "
" " " "
…ller test gal./min. with ft. drawdown after hrs.
Artesian flow g.p.m.
…mperature of water Depth artesian flow encountered ft.

(9) CONSTRUCTION:
Well seal—Material used cement
Well sealed from land surface to 20 ft.
Diameter of well bore to bottom of seal 16 in.
Diameter of well bore below seal 10 in.
Number of sacks of cement used in well seal 6 sack mix sacks
How was cement grout placed? by tremie pipe

Was a drive shoe used? ☐ Yes ☒ No Plugs Size: location ft.
Did any strata contain unusable water? ☐ Yes ☒ No
Type of water? depth of strata
Method of sealing strata off
Was well gravel packed? ☐ Yes ☒ No Size of gravel:
Gravel placed from ft. to ft.

(10) LOCATION OF WELL:
County Tillamook Driller's well number
SW ¼ SW ¼ Section 33 T. 1S R. 9 W.M.
Bearing and distance from section or subdivision corner

(11) WATER LEVEL: Completed well.
Depth at which water was first found 15 ft.
Static level 15 ft. below land surface. Date 5/12/80
Artesian pressure lbs. per square inch. Date

(12) WELL LOG:
Diameter of well below casing 10
Depth drilled 50 ft. Depth of completed well 50 ft.

Formation: Describe color, texture, grain size and structure of materials; and show thickness and nature of each stratum and aquifer penetrated, with at least one entry for each change of formation. Report each change in position of Static Water Level and indicate principal water-bearing strata.

MATERIAL	From	To	SWL
clay sand brown	0	7	0
clay gravel cobbles gray	7	18	15
sand gravel water gray	18	29	15
clay gravel cobbles brown	29	36	15
sand gravel water brown	36	41	15
clay brown	41	43	15
clay gravel brown	43	50	15

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AUG 05 1980
WATER RESOURCES DEPT
SALEM, OREGON

Work started 4/28/80 19 Completed 5/9/80 19
Date well drilling machine moved off of well 5/12/80 19

Drilling Machine Operator's Certification:
This well was constructed under my direct supervision. Materials used and information reported above are true to my best knowledge and belief.
[Signed] Arnold A. Petro Date 5/12/, 19 80
(Drilling Machine Operator)
Drilling Machine Operator's License No. 574

Water Well Contractor's Certification:
This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.
Name Zent Drilling, Inc. (Person, firm or corporation) (Type or print)
Address 7310 St. Johns Vancouver, Wa. 98665
[Signed] Martin Zent (Water Well Contractor)
Contractor's License No. 228 Date 5/13/80, 19

(USE ADDITIONAL SHEETS IF NECESSARY)

SP*45656-119

RECEIVED
AUG 19 1996
WATER RESOURCES DEPT.
SALEM, OREGON

Till 50075

WELL I.D.# LO1711

STATE OF OREGON
WATER SUPPLY WELL REPORT
(as required by ORS 537.765)

(START CARD) # 89981

Instructions for completing this report are on the last page of this form

(1) OWNER: Well Number 378
Name Kilchis Water District
Address 8155 Kilchis Rive Rd.
City Tillamook State OR. Zip 97141

(2) TYPE OF WORK
[X] New Well [ ] Deepening [ ] Alteration (repair/recondition) [ ] Abandonment

(3) DRILL METHOD:
[ ] Rotary Air [ ] Rotary Mud [X] Cable [ ] Auger
[ ] Other

(4) PROPOSED USE:
[ ] Domestic [X] Community [ ] Industrial [ ] Irrigation
[ ] Thermal [ ] Injection [ ] Livestock [ ] Other

(5) BORE HOLE CONSTRUCTION:
Special Construction approval [ ] Yes [X] No Depth of Completed Well 75 ft.
Explosives used [ ] Yes [X] No Type Amount

HOLE Diameter	From	To	SEAL Material	From	To	Sacks or pounds
12	0	38	bentonite	0	38	38
8	38	75				

How was seal placed: Method [ ] A [ ] B [ ] C [ ] D [ ] E
[ ] Other
Backfill placed from ft. to ft. Material
Gravel placed from ft. to ft. Size of gravel

(6) CASING/LINER:

	Diameter	From	To	Gauge	Steel	Plastic	Welded	Threaded
Casing:	8	+2	75	1/4	[X]	[ ]	[X]	[ ]
					[ ]	[ ]	[ ]	[ ]
					[ ]	[ ]	[ ]	[ ]
					[ ]	[ ]	[ ]	[ ]
Liner:					[ ]	[ ]	[ ]	[ ]
					[ ]	[ ]	[ ]	[ ]

Final location of shoe(s) 75

(7) PERFORATIONS/SCREENS:
[X] Perforations Method mills knif
[ ] Screens Type Material

From	To	Slot size	Number	Diameter	Tele/pipe size	Casing	Liner
45	65	1/4/2	140	8		[X]	[ ]
						[ ]	[ ]
						[ ]	[ ]
						[ ]	[ ]
						[ ]	[ ]

(8) WELL TESTS: Minimum testing time is 1 hour

[X] Pump [X] Bailer [ ] Air [ ] Flowing Artesian

Yield gal/min	Drawdown	Drill stem at	Time
			1 hr.
320	1'		2 hr.

Temperature of water 54 Depth Artesian Flow Found
Was a water analysis done? [ ] Yes By whom
Did any strata contain water not suitable for intended use? [ ] Too little
[ ] Salty [ ] Muddy [ ] Odor [ ] Colored [ ] Other
Depth of strata:

(9) LOCATION OF WELL by legal description:
County Tillamook Latitude Longitude
Township 1 N or S Range 9 E or W. WM.
Section 6 NE 1/4 NE 1/4
Tax Lot 1801 Lot Block Subdivision
Street Address of Well (or nearest address) 7850 Kilchis River RD.

(10) STATIC WATER LEVEL:
16 ft. below land surface. Date 8/15/96
Artesian pressure lb. per square inch. Date

(11) WATER BEARING ZONES:
Depth at which water was first found 21

From	To	Estimated Flow Rate	SWL
21	30	35	18
45	65	320	16

(12) WELL LOG:
Ground Elevation

Material	From	To	SWL
top soil	0	1	
clay brown	1	21	
gravel/sand brown	21	30	18
clay/sand brown	30	45	
sand/gravel red brown	45	65	16
clay brown	65	67	
sand brown	67	69	
sand/gravel cemented gray	69	75	

Date started 8/8/96 Completed 8/15/96

(unbonded) Water Well Constructor Certification:
I certify that the work I performed on the construction, alteration, or abandonment of this well is in compliance with Oregon water supply well construction standards. Materials used and information reported above are true to the best of my knowledge and belief.
WWC Number
Signed Date

(bonded) Water Well Constructor Certification:
I accept responsibility for the construction, alteration, or abandonment work performed on this well during the construction dates reported above. All work performed during this time is in compliance with Oregon water supply well construction standards. This report is true to the best of my knowledge and belief.
AMERICAN WELL DRILLING
WWC Number 663
Signed Rocky C. Gale Date 8/16/96

ORIGINAL & FIRST COPY-WATER RESOURCES DEPARTMENT SECOND COPY-CONSTRUCTOR THIRD COPY-CUSTOMER

APPENDIX C

WaterCAD Analysis

Label	Elev. (ft)	EXISTING SYSTEM						SYSTEM IMPROVEMENTS		
		Existing Conditions			Future Conditions			Future Conditions		
		Pressure (psi)	Demand (gpm)	Available Fire Flow (gpm)	Pressure (psi)	Demand (gpm)	Available Fire Flow (gpm)	Pressure (psi)	Demand (gpm)	Available Fire Flow (gpm)
J-1	130	73.10	0.00	0.00	72.82	3.00	0.00	73.24	3.00	588.21
J-2	155	62.29	0.00	0.00	62.00	3.00	0.00	62.42	3.00	588.21
J-3	200	42.82	1.25	0.00	42.53	3.00	0.00	42.95	3.00	587.85
J-4	200	42.82	0.00	0.00	42.53	3.00	0.00	42.95	3.00	587.80
J-5	215	36.33	1.25	0.00	36.05	3.00	0.00	36.46	3.00	588.20
J-6	200	42.82	2.50	0.00	42.54	3.00	0.00	42.95	3.00	588.82
J-7	140	68.78	1.87	0.00	68.49	2.25	0.00	68.91	2.25	588.13
J-8	160	60.12	0.00	0.00	59.84	3.00	0.00	60.26	3.00	588.11
J-9	170	55.80	0.63	0.00	55.51	3.00	0.00	55.93	3.00	588.05
J-10	150	64.45	1.25	0.00	64.17	2.25	0.00	64.58	2.25	587.08
J-11	125	75.27	1.25	0.00	74.98	2.25	0.00	75.40	2.25	588.11
J-12	140	68.78	3.13	0.00	68.50	3.00	0.00	68.91	3.00	589.92
J-14	185	49.31	4.38	0.00	49.03	4.50	0.00	49.44	4.50	589.80
J-15	155	62.29	6.25	0.00	62.01	6.00	0.00	62.42	6.00	591.00
J-16	95	88.25	3.13	0.00	87.97	3.00	0.00	88.38	3.00	588.39
J-17	120	77.43	3.13	0.00	77.15	3.00	0.00	77.57	3.00	588.40
J-18	150	64.45	5.00	0.00	64.17	5.25	0.00	64.58	5.25	588.07
J-19	90	90.40	1.25	0.00	90.10	2.25	0.00	90.55	2.25	599.48
J-20	120	77.43	3.13	0.00	77.15	3.00	0.00	77.57	3.00	591.41
J-21	130	73.09	1.87	0.00	72.79	3.00	0.00	73.24	3.00	596.44
J-22	100	86.09	1.87	0.00	85.80	2.25	0.00	86.22	2.25	587.90
J-23	75	96.90	1.87	0.00	96.62	2.25	0.00	97.03	2.25	587.51
J-24	75	96.90	1.25	0.00	96.62	2.25	0.00	97.03	2.25	588.25
J-25	75	96.91	4.38	0.00	96.63	4.50	0.00	97.04	4.50	590.89
J-26	110	81.77	0.63	0.00	81.49	2.25	0.00	81.89	2.25	595.02
J-27	55	61.31	3.41	0.00	58.76	3.87	0.00	68.04	3.87	2034.60
J-28	65	56.99	3.41	0.00	54.43	3.87	0.00	63.73	3.87	2062.02
J-29	70	54.82	0.68	0.00	52.27	2.58	0.00	61.57	2.58	2062.24
J-30	90	46.17	0.68	0.00	43.62	2.58	0.00	52.99	2.58	2370.95
J-32	130	73.35	3.13	0.00	73.22	3.00	0.00	73.26	3.00	614.15
J-33	110	82.05	3.13	0.00	81.96	3.00	0.00	81.99	3.00	712.62
J-34	145	66.86	0.63	0.00	66.73	2.25	0.00	66.77	2.25	610.10
J-35	80	94.86	2.50	0.00	94.66	2.25	0.00	94.88	2.25	603.00
J-36	90	90.54	0.63	0.00	90.33	2.25	0.00	90.55	2.25	605.56
J-37	90	90.41	6.25	0.00	90.13	6.00	0.00	90.54	6.00	585.97
J-38	65	101.23	6.25	0.00	100.95	6.00	0.00	101.36	6.00	583.75
J-39	30	116.37	0.00	0.00	116.09	0.00	0.00	116.50	0.00	577.53
J-40	45	65.67	6.82	0.00	63.13	7.09	0.00	72.35	7.09	1944.06
J-41	70	54.85	6.82	0.00	52.32	7.09	0.00	61.53	7.09	971.32
J-42	50	63.48	5.45	0.00	60.92	5.16	0.00	70.20	5.16	1956.77
J-44	40	67.80	4.09	0.00	65.25	4.51	0.00	74.52	4.51	2012.39

Label	Elev. (ft)	EXISTING SYSTEM						SYSTEM IMPROVEMENTS		
		Existing Conditions			Future Conditions			Future Conditions		
		Pressure (psi)	Demand (gpm)	Available Fire Flow (gpm)	Pressure (psi)	Demand (gpm)	Available Fire Flow (gpm)	Pressure (psi)	Demand (gpm)	Available Fire Flow (gpm)
J-45	50	63.47	1.36	0.00	60.88	3.22	0.00	70.19	3.22	2000.67
J-46	25	74.35	3.41	0.00	71.82	3.87	0.00	81.00	3.87	2026.65
J-47	20	76.51	3.41	0.00	73.98	3.87	0.00	83.17	3.87	1995.50
J-48	30	72.18	2.73	0.00	69.65	3.22	0.00	78.84	3.22	1999.36
J-49	25	74.37	3.40	0.00	71.86	3.87	0.00	81.00	3.87	2049.32
J-50	30	72.15	4.09	0.00	69.61	4.51	0.00	78.84	4.51	2007.19
J-51	50	63.47	6.82	0.00	60.92	7.09	0.00	70.19	7.09	1859.86
J-52	50	63.47	2.73	0.00	60.92	3.22	0.00	70.19	3.22	1948.43
J-53	85	48.33	2.05	0.00	45.77	3.22	0.00	55.04	3.22	909.04
J-54	100	41.84	1.36	0.00	39.28	2.58	0.00	48.55	2.58	878.04
J-55	80	50.49	2.73	0.00	47.93	3.22	0.00	57.20	3.22	909.04
J-56	25	74.35	2.73	0.00	71.82	3.22	0.00	81.00	3.22	2054.48
J-57	25	74.35	1.36	0.00	71.82	2.58	0.00	81.00	2.58	2057.37
J-59	40	67.84	3.41	0.00	65.31	3.87	0.00	74.51	3.87	1686.43
J-60	75	52.70	3.41	0.00	50.16	3.87	0.00	59.36	3.87	1398.57
J-62	25	118.53	0.00	0.00	118.25	0.00	0.00	118.67	0.00	541.28
J-63	5	83.34	76.36	0.00	80.98	106.42	0.00	89.59	106.42	2299.94
J-64	10	81.23	0.00	0.00	78.90	0.64	0.00	87.51	0.64	2300.16
J-65	10	81.23	2.05	0.00	78.90	3.22	0.00	87.52	3.22	2300.14
J-67	15	78.77	2.05	0.00	76.29	3.22	0.00	85.33	3.22	2107.41
J-68	20	76.55	2.39	0.00	74.04	3.22	0.00	83.16	3.22	2069.86
J-70	20	76.61	2.05	0.00	74.12	3.22	0.00	83.16	3.22	2081.31
J-72	15	78.72	3.41	0.00	76.21	3.87	0.00	85.33	3.87	2063.11
J-73	30	72.22	5.45	0.00	69.71	5.80	0.00	78.84	5.80	2056.61
J-75	30	116.37	0.00	0.00	116.09	0.00	0.00	116.51	0.00	499.08
J-76	35	114.21	2.50	0.00	113.93	2.25	0.00	114.35	2.25	493.74
J-77	65	101.23	0.63	0.00	100.95	2.25	0.00	101.37	2.25	489.33
J-78	80	94.74	1.25	0.00	94.46	2.25	0.00	94.88	2.25	486.01
J-81	245	23.35	2.50	0.00	23.08	3.00	0.00	23.50	3.00	442.55
J-83	140	68.78	2.50	0.00	68.50	3.00	0.00	68.92	3.00	482.31
J-84	80	94.74	1.25	0.00	94.46	2.25	0.00	94.88	2.25	489.90
J-85	30	116.37	2.50	0.00	116.09	3.00	0.00	116.51	3.00	493.55
J-86	40	112.05	3.13	0.00	111.77	3.00	0.00	112.19	3.00	491.44
J-87	170	55.80	2.50	0.00	55.53	2.25	0.00	55.94	2.25	489.32
J-88	215	36.34	1.87	0.00	36.06	3.00	0.00	36.48	3.00	486.72
J-89	230	29.85	1.87	0.00	29.59	3.00	0.00	30.00	3.00	495.39
J-90	200	42.85	1.87	0.00	42.59	3.00	0.00	42.98	3.00	498.39
J-91	210	38.52	2.50	0.00	38.27	3.00	0.00	38.64	3.00	490.35
J-92	200	42.85	4.38	0.00	42.59	4.50	0.00	42.97	4.50	484.96
J-93	145	66.62	1.87	0.00	66.34	2.25	0.00	66.76	2.25	488.74
J-95	195	45.03	9.38	0.00	44.80	9.75	0.00	45.16	9.75	507.21

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		Existing Conditions			Future Conditions			Future Conditions		
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J-96	160	60.26	6.25	0.00	60.07	6.00	0.00	60.41	6.00	560.35
J-97	150	64.87	5.63	0.00	64.79	6.00	0.00	64.90	6.00	662.74
J-98	220	34.60	4.38	0.00	34.56	4.50	0.00	34.61	4.50	980.79
J-99	195	45.67	0.00	N/A	45.57	0.00	N/A	45.48	6.00	658.57
J-100	175	53.69	5.00	0.00	53.49	5.25	0.00	54.05	5.25	627.13
J-101	150	64.51	5.63	0.00	64.31	6.00	0.00	64.79	6.00	598.57
J-102	155	62.36	9.38	0.00	62.15	9.75	0.00	62.57	9.75	565.58
J-103	135	70.99	3.13	0.00	70.77	3.00	0.00	71.13	3.00	516.12
J-104	140	68.83	3.13	0.00	68.60	3.00	0.00	68.95	3.00	504.47
J-105	190	47.15	6.25	0.00	46.88	6.00	0.00	47.30	6.00	496.62
J-106	180	51.48	2.50	0.00	51.21	3.00	0.00	51.63	3.00	493.53
J-107	150	64.46	2.50	0.00	64.18	3.00	0.00	64.60	3.00	491.67
J-108	105	83.92	2.50	0.00	83.65	3.00	0.00	84.07	3.00	490.24
J-109	75	96.90	9.38	0.00	96.63	9.75	0.00	97.05	9.75	490.07
J-110	160	60.18	2.50	0.00	59.98	3.00	0.00	60.54	3.00	626.98
J-111	165	58.01	3.75	0.00	57.78	3.75	0.00	58.14	3.75	510.97
J-112	205	40.66	1.87	0.00	40.39	3.00	0.00	40.81	3.00	491.76
J-113	155	62.29	1.87	0.00	62.02	3.00	0.00	62.44	3.00	489.26
J-114	135	70.94	1.87	0.00	70.67	3.00	0.00	71.09	3.00	489.38
J-116	80	94.79	1.25	0.00	94.56	2.25	0.00	94.91	2.25	504.48
J-117	20	77.29	0.00	0.00	75.21	0.64	0.00	83.39	0.64	2024.55
J-118	20	77.30	0.00	0.00	75.24	0.64	0.00	83.41	0.64	2005.32
J-119	10	81.63	128.18	0.00	79.58	1.79	0.00	87.74	1.79	2001.22
J-120	10	81.77	0.00	0.00	79.66	2.58	0.00	87.80	2.58	1954.88
J-121	30	73.22	0.00	0.00	71.07	0.00	0.00	79.20	0.00	1937.48
J-122	80	94.76	3.13	0.00	94.49	3.00	0.00	94.87	3.00	593.22
J-123	85	48.33	2.73	0.00	45.78	3.22	0.00	55.15	3.22	1941.07
J-124	120	77.43	1.25	0.00	77.15	2.25	0.00	77.57	2.25	589.98
J-125	115	79.59	0.63	0.00	79.30	2.25	0.00	79.73	2.25	590.52
J-126	80	50.53	2.73	0.00	47.99	3.22	0.00	57.20	3.22	1159.55
J-128	30	72.13	6.82	0.00	69.58	7.09	0.00	78.85	7.09	1968.47
J-129	25	74.34	2.05	0.00	71.82	3.22	0.00	81.00	3.22	2021.77
J-130	25	74.38	2.05	0.00	71.86	3.22	0.00	81.00	3.22	2052.83
J-131	25	74.38	2.05	0.00	71.87	3.22	0.00	81.00	3.22	2051.47
J-132	85	48.37	2.05	0.00	45.83	3.22	0.00	55.04	3.22	1553.37
J-133	20	76.51	1.36	0.00	73.98	2.58	0.00	83.16	2.58	2004.26
J-134	15	78.74	1.36	0.00	76.25	2.58	0.00	85.33	2.58	2080.21
J-136	65	56.98	2.05	0.00	54.42	3.22	0.00	63.69	3.22	971.76
J-137	85	48.33	2.05	0.00	45.77	3.22	0.00	55.04	3.22	909.05
J-138	150	64.48	1.25	0.00	64.22	2.25	0.00	64.60	2.25	488.27
J-139	80	94.76	0.63	0.00	94.51	2.25	0.00	94.89	2.25	488.39

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J-140	145	66.62	2.50	0.00	66.34	3.00	0.00	66.76	3.00	478.28
J-141	215	36.33	0.63	0.00	36.05	2.25	0.00	36.47	2.25	481.77
J-142	60	103.39	1.25	0.00	103.11	2.25	0.00	103.53	2.25	485.19
J-143	160	60.18	1.25	0.00	59.94	2.25	0.00	60.30	2.25	507.71
J-144	180	51.48	3.13	0.00	51.21	3.00	0.00	51.64	3.00	501.05
J-145	35	69.97	3.41	0.00	67.42	3.87	0.00	76.68	3.87	1984.04
J-146	30	116.37	1.25	0.00	116.09	2.25	0.00	116.51	2.25	493.41
J-147	10	125.02	1.87	0.00	124.75	3.00	0.00	125.17	3.00	493.40
J-148	10	81.77	2.73	0.00	79.71	3.22	0.00	87.72	3.22	1891.58
J-149	35	70.95	6.82	0.00	68.89	7.09	0.00	76.90	7.09	1891.62
J-150	105	40.76	3.41	0.00	38.71	3.87	0.00	46.62	3.87	1801.31
J-151	80	51.87	6.82	0.00	49.87	7.09	0.00	57.44	7.09	1945.42
J-152	105	41.50	6.82	0.00	39.57	7.09	0.00	46.64	7.09	1927.24
J-153	80	52.46	8.86	0.00	50.55	9.67	0.00	57.47	9.67	1988.81
J-154	120	36.00	0.00	0.00	34.48	0.00	0.00	40.12	0.00	1960.30
J-155	95	48.95	0.00	0.00	48.18	3.22	0.00	50.99	3.22	2700.33
J-156	165	57.89	6.25	0.00	57.83	0.00	0.00	58.24	0.00	565.53
J-157	65	57.97	6.14	0.00	55.91	7.09	0.00	63.92	7.09	1416.59
J-158	30	72.98	4.77	0.00	70.91	5.16	0.00	79.06	5.16	2009.76
J-159	55	62.17	3.41	0.00	60.10	3.87	0.00	68.25	3.87	1983.32
J-160	80	51.87	6.82	0.00	49.86	7.09	0.00	57.44	7.09	1356.29
J-161	70	56.19	3.41	0.00	54.19	3.87	0.00	61.76	3.87	1289.28
J-162	90	47.54	6.82	0.00	45.54	7.09	0.00	53.11	7.09	941.92
J-163	140	68.78	2.50	0.00	68.51	3.00	0.00	68.93	3.00	491.45
J-164	30	73.09	3.41	0.00	71.00	3.87	0.00	79.11	3.87	1967.02
J-165	55	62.27	3.41	0.00	60.18	3.87	0.00	68.30	3.87	1960.66
J-166	35	70.92	2.73	0.00	68.83	3.22	0.00	76.96	3.22	1950.24
J-167	35	70.89	2.73	0.00	68.78	3.22	0.00	76.96	3.22	1946.89
J-168	35	70.97	2.05	0.00	68.90	3.22	0.00	76.92	3.22	1986.25
J-169	20	77.30	0.68	0.00	75.24	2.58	0.00	83.41	2.58	2005.23
J-170	20	77.30	2.05	0.00	75.24	3.22	0.00	83.41	3.22	2005.32
J-171	20	77.30	1.36	0.00	75.24	2.58	0.00	83.41	2.58	1315.80
J-172	30	73.09	2.73	0.00	71.00	3.22	0.00	79.13	3.22	1952.33
J-173	25	75.21	6.82	0.00	73.06	7.09	0.00	81.21	7.09	981.10
J-174	20	77.36	3.41	0.00	75.21	3.87	0.00	83.36	3.87	951.02
J-175	15	79.52	3.41	0.00	77.37	3.87	0.00	85.53	3.87	931.38
J-176	10	81.68	2.73	0.00	79.53	3.22	0.00	87.69	3.22	880.70
J-177	45	66.60	3.41	0.00	64.51	3.87	0.00	72.65	3.87	1931.74
J-178	60	60.11	1.36	0.00	58.02	2.58	0.00	66.17	2.58	1921.85
J-179	80	51.45	2.73	0.00	49.36	3.22	0.00	57.52	3.22	1774.46
J-180	20	77.36	4.09	0.00	75.21	4.51	0.00	83.36	4.51	953.87

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J-181	10	81.69	1.36	0.00	79.54	2.58	0.00	87.69	2.58	888.75
J-182	10	81.67	1.36	0.00	79.47	2.58	0.00	87.69	2.58	867.00
J-183	20	77.36	3.41	0.00	75.21	3.87	0.00	83.36	3.87	900.38
J-184	15	79.50	2.05	0.00	77.33	3.22	0.00	85.53	3.22	930.39
J-185	40	68.91	4.77	0.00	66.76	5.16	0.00	74.86	5.16	1922.21
J-186	70	55.93	4.77	0.00	53.77	5.16	0.00	61.85	5.16	1920.15
J-187	45	66.79	3.41	0.00	64.64	3.87	0.00	72.69	3.87	1894.37
J-188	60	60.38	6.82	0.00	58.24	7.09	0.00	66.20	7.09	1847.83
J-189	105	41.07	3.41	0.00	38.93	3.87	0.00	46.73	3.87	1641.92
J-190	0	86.50	6.82	0.00	84.36	7.09	0.00	92.14	7.09	1782.40
J-191	105	41.16	5.45	0.00	39.03	5.80	0.00	46.74	5.80	1640.47
J-192	80	51.98	5.45	0.00	49.85	5.80	0.00	57.56	5.80	1629.58
J-193	90	47.75	5.45	0.00	45.62	5.80	0.00	53.24	5.80	1640.25
J-194	90	47.84	5.45	0.00	45.72	5.80	0.00	53.24	5.80	1668.86
J-195	110	39.19	5.45	0.00	37.07	5.80	0.00	44.61	5.80	1726.89
J-196	115	36.93	5.45	0.00	34.81	5.80	0.00	42.43	5.80	1552.55
J-197	110	39.21	11.59	0.00	37.10	13.54	0.00	44.62	13.54	1815.25
J-198	25	75.57	0.00	0.00	73.32	0.00	0.00	81.64	0.00	1917.95
J-199	40	69.35	0.00	0.00	66.97	0.00	0.00	75.54	0.00	1896.22
J-200	40	69.41	0.00	0.00	67.14	0.00	0.00	75.27	0.00	1870.50
J-201	45	69.45	0.00	0.00	61.84	0.00	0.00	163.77	0.00	2309.38
J-202	30	76.01	0.00	0.00	68.26	0.00	0.00	172.91	0.00	3134.00
J-203	35	74.23	0.00	0.00	66.56	0.00	0.00	171.95	0.00	3204.88
J-204	60	65.78	0.00	N/A	58.60	0.00	N/A	168.45	0.00	N/A
J-206	25	69.35	0.00	0.00	56.43	0.00	0.00	157.73	0.00	4494.35
J-207	35	61.41	0.00	0.00	46.36	0.00	0.00	146.30	0.00	4460.17
J-208	40	56.41	6.52	0.00	39.70	9.77	0.00	138.55	9.77	4412.84
J-209	20	55.97	967.78	0.00	32.97	1304.40	0.00	146.90	1304.40	3871.85
J-210	20	55.90	0.00	0.00	32.86	0.00	0.00	148.61	0.00	3672.87
J-211	30	49.75	12.22	0.00	25.91	18.33	0.00	134.77	18.33	1047.80
J-212	40	45.27	4.89	0.00	21.40	6.11	0.00	129.03	6.11	954.97
J-213	40	45.15	3.67	0.00	21.28	4.89	0.00	127.57	4.89	943.21
J-214	40	45.03	12.38	N/A	21.17	15.13	N/A	125.49	15.13	N/A
J-215	40	44.93	0.00	N/A	21.09	0.00	N/A	121.77	0.00	N/A
J-216	40	126.16	0.00	N/A	125.99	0.00	N/A	131.51	0.00	N/A
J-217	135	84.98	4.56	0.00	84.84	4.56	0.00	86.44	4.56	1285.34
J-218	245	37.21	10.65	0.00	37.15	12.17	0.00	38.37	12.17	1258.20
J-219	145	80.41	3.04	0.00	80.31	3.04	0.00	81.78	3.04	1102.36
J-220	240	39.27	1.52	0.00	39.08	3.04	0.00	40.55	3.04	43.77
J-221	160	73.86	3.04	0.00	73.69	4.56	0.00	75.16	4.56	115.45
J-222	95	102.00	3.04	0.00	101.89	4.56	0.00	103.51	4.56	1160.66

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J-223	95	102.00	6.08	0.00	101.89	6.08	0.00	103.63	6.08	1221.45
J-224	35	73.59	2.39	0.00	65.91	2.40	0.00	171.88	2.40	1001.36
J-225	75	56.15	11.98	0.00	48.48	11.98	0.00	154.56	11.98	908.44
J-226	105	43.15	4.79	0.00	35.48	4.79	0.00	141.56	4.79	654.34
J-227	130	32.12	4.79	0.00	24.44	4.79	0.00	130.53	4.79	125.77
J-230	40	71.64	0.00	0.00	63.97	0.00	0.00	167.02	0.00	2057.65
J-231	110	38.03	0.00	0.00	27.42	0.00	0.00	130.47	0.00	42.78
J-232	160	16.08	3.44	0.00	5.03	5.50	0.00	108.08	5.50	32.96
J-237	30	49.77	27.01	0.00	25.93	36.67	0.00	134.89	36.67	1055.82
J-238	80	27.81	7.33	0.00	3.49	12.22	0.00	113.12	12.22	741.82
J-239	90	23.52	3.67	0.00	-0.34	3.67	0.00	107.28	3.67	123.37
J-240	30	49.93	30.56	0.00	26.15	42.78	0.00	135.88	42.78	1121.76
J-241	40	45.29	3.67	0.00	21.43	4.89	0.00	129.29	4.89	971.03
J-242	40	45.33	2.44	0.00	21.47	2.44	0.00	129.60	2.44	990.23
J-243	40	45.24	8.56	0.00	21.37	12.22	0.00	128.76	12.22	938.89
J-244	40	45.17	14.67	0.00	21.30	15.89	0.00	127.92	15.89	941.98
J-245	40	45.13	2.44	0.00	21.26	2.44	0.00	127.34	2.44	943.90
J-246	40	45.10	2.44	0.00	21.24	3.67	0.00	126.82	3.67	945.46
J-247	40	44.97	17.19	0.00	21.12	19.25	0.00	124.11	19.25	865.87
J-248	45	66.27	6.88	0.00	55.82	8.94	0.00	158.87	8.94	48.59
J-249	100	17.29	2.44	0.00	-6.58	2.44	0.00	101.27	2.44	18.31
J-250	30	50.86	26.89	0.00	27.49	36.67	0.00	140.87	36.67	1660.33
J-251	120	78.66	0.00	0.00	78.53	0.00	0.00	78.21	0.00	670.43
J-253	60	47.41	6.51	0.00	30.30	9.77	0.00	129.90	9.77	2019.61
J-254	50	51.01	4.89	0.00	33.26	6.51	0.00	134.22	6.51	2419.05
J-255	50	401.63	4.89	0.00	266.72	6.51	0.00	368.07	6.51	2025.78
J-256	100	379.83	4.89	0.00	244.67	8.14	0.00	346.44	8.14	1558.97
J-257	30	56.47	6.51	0.00	36.81	6.51	0.00	142.70	6.51	4267.12
J-258	35	54.08	4.39	0.00	34.17	6.51	0.00	140.54	6.51	1905.06
J-259	25	55.98	0.00	0.00	34.47	0.00	0.00	144.77	0.00	4053.55
J-260	25	55.89	13.03	0.00	34.32	14.66	0.00	144.76	14.66	4054.42
J-261	20	57.98	11.40	0.00	36.39	13.03	0.00	146.91	13.03	1580.02
J-262	25	55.09	19.54	0.00	32.63	24.25	0.00	144.58	24.25	1675.77
J-263	15	59.17	11.40	0.00	36.30	16.28	0.00	148.84	16.28	1315.46
J-264	15	51.99	4.89	0.00	1.82	11.40	0.00	148.83	11.40	1108.57
J-265	10	51.75	9.77	0.00	13.91	16.25	0.00	150.98	16.25	993.55
J-266	195	45.04	6.25	0.00	44.83	6.25	0.00	57.49	0.00	N/A
J-267	195	45.04	0.00	0.00	44.83	0.00	0.00	83.24	0.00	N/A

APPENDIX D

DETAILED COST ESTIMATES

KILCHIS REGIONAL WATER DISTRICT
SYSTEM IMPROVEMENTS

Tillamook Intertie

Item No.	Description	Units	Quantity	Unit Cost	Total Cost
1	Bonding, mobilization, insurance	LS	1	$ 20,000	$ 20,000
2	Traffic Control	LS	1	$ 3,500	$ 3,500
3	8" Gate Valves	EA	4	$ 1,000	$ 4,000
4	Fire Hydrant Assembly	EA	1	$ 3,000	$ 3,000
5	8" Meter Assembly	LS	1	$ 45,000	$ 45,000
6	Connect to Existing	EA	2	$ 2,000	$ 4,000
7	Testing and Disinfection	LS	1	$ 1,000	$ 1,000
8	Conventional Trench 8" SDR 11 HDPE	LF	830	$ 75	$ 62,250
9	Directional Bore 8" SDR 11 HDPE (Under Wilson River)	LF	850	$150	$ 127,500
		Construction Total			$ 270,250
		Contingency (20%)			$ 54,050
		Subtotal			$ 324,300
		Engineering (20%)			$ 64,860
		Administrative & Legal Costs (5%)			$ 16,215
		Total Project Cost			**$ 405,375**

Alderbrook Bridge Crossing (10" HDPE)

Item No.	Description	Units	Quantity	Unit Cost	Total Cost
1	Mobilization, Bonding & Insurance	LS	1	$ 7,000	$ 7,000
2	Traffic Control	1	EA	$ 4,500	$ 4,500
3	Abandon Existing System (remove pipe and hanger from bridge,	1	EA	$ 2,500	$ 2,500
4	Tie into Existing System	2	EA	$ 2,500	$ 5,000
5	Fittings (tees, bends, adaptors, and thrust blocks)	1	LS	$ 1,500	$ 1,500
6	10" Gate Valve	2	EA	$ 1,500	$ 3,000
7	Pressure Test and Bacteria Test	1	EA	$ 1,000	$ 1,000
8	Conventional Trench 10"SDR11 HDPE	50	LF	$ 58	$ 2,900
9	Directional Bore 10" SDR11 HDPE, 8.7" ID	200	LF	$ 250	$ 50,000
		Construction Total			$ 77,400
		Contingency (20%)			$ 15,480
		Subtotal			$ 92,880
		Engineering (20%)			$ 18,576
		Administrative & Legal Costs (5%)			$ 4,644
		Total Project Cost			**$ 116,100**

Kilchis Bridge Crossing (18" HDPE)

Item No.	Description	Units	Quantity	Unit Cost	Total Cost
1	Mobilization, Bonding & Insurance	LS	1	$ 18,000	$ 18,000
2	Traffic Control	LS	1	$ 7,500	$ 7,500
3	Abandon Existing System	LS	1	$ 4,000	$ 4,000
4	Tie into Existing System	EA	2	$ 3,000	$ 6,000
5	Fittings (tees, bends, adaptors, and thrust blocks)	LS	1	$ 5,000	$ 5,000
6	18" Butterfly Valve	EA	2	$ 2,500	$ 5,000
7	18" PVC C900 Pipe with Rock Backfill	LF	50	$ 60	$ 3,000
8	Pavement Replacement	Tons	20	$ 100	$ 2,000
9	Pressure Test and Bacteria Test	EA	1	$ 1,000	$ 1,000
10	Directional Bore 18" SDR, 11 HDPE, 14.6" ID	LF	300	$ 500	$ 150,000
		Construction Total			$ 201,500
		Contingency (20%)			$ 40,300
		Subtotal			$ 241,800
		Engineering (20%)			$ 48,360
		Administrative & Legal Costs (5%)			$ 12,090
		Total Project Cost			**$ 302,250**

Alderbrook Transmission Line Replacement

Item No.	Description	Units	Quantity	Unit Cost	Total Cost
1	Mobilization, Bonding & Insurance	LS	1	$ 20,000	$ 20,000
2	10-inch C900	LF	3800	$ 55	$ 209,000
3	10" Butterfly Valve	EA	2	$ 2,000	$ 4,000
		Construction Total			$ 233,000
		Contingency (20%)			$ 46,600
		Subtotal			$ 279,600
		Engineering (20%)			$ 55,920
		Administrative & Legal Costs (5%)			$ 13,980
		Total Project Cost			**$ 349,500**

Juno Hill Reservoir Transmission Line Replacement

Item No.	Description	Units	Quantity	Unit Cost	Total Cost
1	Mobilization, Bonding & Insurance	LS	1	$ 7,000	$ 7,000
2	10-inch HDPE	LF	1000	$ 70	$ 70,000
3	10" Butterfly Valve	EA	2	$ 2,000	$ 4,000
		Construction Total			$ 81,000
		Contingency (20%)			$ 16,200
		Subtotal			$ 97,200
		Engineering (20%)			$ 19,440
		Administrative & Legal Costs (5%)			$ 4,860
		Total Project Cost			**$ 121,500**

SERVICE DISTRICTS' DISTRIBUTION SYSTEM IMPROVEMETNS

Bay City - General High Level System Improvements

Item No.	Description	Units	Quantity	Unit Cost	Total Cost
1	Mobilization, Bonding & Insurance	LS	1	$ 35,000	$ 35,000
2	6in C900 PVC Pipe with Class "B" Backfill and Asphalt Surface	LF	4900	$ 45	$ 220,500
3	8in C900 PVC Pipe with Class "B" Backfill and Asphalt Surface	LF	1400	$ 50	$ 70,000
4	6in Gate Valve	EA	6	$ 750	$ 4,500
5	8in Gate Valve	EA	10	$ 1,000	$ 10,000
6	Connect to existing water system	EA	24	$ 2,000	$ 48,000
		Construction Total			$ 388,000
		Contingency (20%)			$ 77,600
		Subtotal			$ 465,600
		Engineering (20%)			$ 93,120
		Administrative & Legal Costs (5%)			$ 23,280
		Total Project Cost			**$ 582,000**

Bay City - General Low Level System Improvements

Item No.	Description	Units	Quantity	Unit Cost	Total Cost
1	Mobilization, Bonding & Insurance	LS	1	$ 37,000	$ 37,000
2	6in C900 PVC Pipe with Class "B" Backfill and Asphalt Surface	LF	5000	$ 45	$ 225,000
3	8in C900 PVC Pipe with Class "B" Backfill and Asphalt Surface	LF	1500	$ 50	$ 75,000
4	6in Gate Valve	EA	12	$ 750	$ 9,000
5	8in Gate Valve	EA	9	$ 1,000	$ 9,000
6	Connect to existing water system	EA	26	$ 2,000	$ 52,000
		Construction Total			$ 407,000
		Contingency (20%)			$ 81,400
		Subtotal			$ 488,400
		Engineering (20%)			$ 97,680
		Administrative & Legal Costs (5%)			$ 24,420
		Total Project Cost			**$ 610,500**

Bay City - "D" Street Connection

Item No.	Description	Units	Quantity	Unit Cost	Total Cost
1	Mobilization, Bonding & Insurance	LS	1	$ 4,000	$ 4,000
2	Directional Bore 10" (Under Highway 101)	LF	100	$ 250	$ 25,000
3	10in Gate Valve	EA	2	$ 1,500	$ 3,000
4	Connect to existing water system	EA	2	$ 3,000	$ 6,000
		Construction Total			$ 38,000
		Contingency (20%)			$ 7,600
		Subtotal			$ 45,600
		Engineering (20%)			$ 9,120
		Administrative & Legal Costs (5%)			$ 2,280
		Total Project Cost			**$ 57,000**

Bay City - Dough Creek Pump Station Improvements

Item No.	Description	Units	Quantity	Unit Cost	Total Cost
1	Mobilization, Bonding & Insurance	LS	1	$ 4,000	$ 4,000
2	175 gpm pumps	EA	2	$ 7,500	$ 15,000
3	Electrical and Controls Update	LS	1	$ 25,000	$ 25,000
		Construction Total			$ 44,000
		Contingency (20%)			$ 8,800
		Subtotal			$ 52,800
		Engineering (20%)			$ 10,560
		Administrative & Legal Costs (5%)			$ 2,640
		Total Project Cost			**$ 66,000**

Cole Creek - General Distribution Improvements

Item No.	Description	Units	Quantity	Unit Cost	Total Cost
1	Mobilization, Bonding & Insurance	LS	1	$ 18,000	$ 18,000
2	6in C900 PVC Pipe with Class "B" Backfill and Asphalt Surface	LF	3900	$ 45	$ 175,500
3	6in Gate Valve	EA	2	$ 750	$ 1,500
4	Fire Hydrant	EA	1	$ 3,500	$ 3,500
5	Connect to existing water system	EA	1	$ 2,000	$ 2,000
		Construction Total			$ 200,500
		Contingency (20%)			$ 40,100
		Subtotal			$ 240,600
		Engineering (20%)			$ 48,120
		Administrative & Legal Costs (5%)			$ 12,030
		Total Project Cost			**$ 300,750**

Juno Hill - Pump Station Improvements

Item No.	Description	Units	Quantity	Unit Cost	Total Cost
1	Mobilization, Bonding & Insurance	LS	1	$ 8,000	$ 8,000
2	Packaged booster station	LS	1	$ 50,000	$ 50,000
3	Electrical & controls	LS	1	$ 20,000	$ 20,000
4	Misc. piping	LS	1	$ 10,000	$ 10,000
		Construction Total			$ 88,000
		Contingency (20%)			$ 17,600
		Subtotal			$ 105,600
		Engineering (20%)			$ 21,120
		Administrative & Legal Costs (5%)			$ 5,280
		Total Project Cost			**$ 132,000**

Juno Hill - Ellen Road Distribution Line

Item No.	Description	Units	Quantity	Unit Cost	Total Cost
1	Mobilization, Bonding & Insurance	LS	1	$ 3,500	$ 3,500
2	4in C900 PVC Pipe with Class "B" Backfill and Asphalt Surface	LF	900	$ 35	$ 31,500
4	4in Gate Valve	EA	2	$ 500	$ 1,000
5	Connect to existing water system	EA	1	$ 2,000	$ 2,000
			Construction Total		$ 38,000
			Contingency (20%)		$ 7,600
			Subtotal		$ 45,600
			Engineering (20%)		$ 9,120
			Administrative & Legal Costs (5%)		$ 2,280
			Total Project Cost		**$ 57,000**

Juno Hill - General Distribution Improvements

Item No.	Description	Units	Quantity	Unit Cost	Total Cost
1	Mobilization, Bonding & Insurance	LS	1	$ 37,000	$ 37,000
2	4in C900 PVC Pipe with Class "B" Backfill and Asphalt Surface	LF	500	$ 35	$ 17,500
3	6in C900 PVC Pipe with Class "B" Backfill and Asphalt Surface	LF	2700	$ 45	$ 121,500
4	8in C900 PVC Pipe with Class "B" Backfill and Asphalt Surface	LF	3700	$ 50	$ 185,000
5	4in Gate Valve	EA	1	$ 500	$ 500
4	6in Gate Valve	EA	2	$ 750	$ 1,500
5	8in Gate Valve	EA	3	$ 1,000	$ 3,000
6	Fire Hydrant	EA	4	$ 3,500	$ 14,000
7	Connect to existing water system	EA	3	$ 2,000	$ 6,000
			Construction Total		$ 386,000
			Contingency (20%)		$ 77,200
			Subtotal		$ 463,200
			Engineering (20%)		$ 92,640
			Administrative & Legal Costs (5%)		$ 23,160
			Total Project Cost		**$ 579,000**

Latimer Road - General Distribution Improvements

Item No.	Description	Units	Quantity	Unit Cost	Total Cost
1	Mobilization, Bonding & Insurance	LS	1	$ 3,000	$ 3,000
2	4in C900 PVC Pipe with Class "B" Backfill and Asphalt Surface	LF	400	$ 35	$ 14,000
3	4in Gate Valve	EA	2	$ 500	$ 1,000
4	Connect to existing water system	EA	6	$ 2,500	$ 15,000
			Construction Total		$ 33,000
			Contingency (20%)		$ 6,600
			Subtotal		$ 39,600
			Engineering (20%)		$ 7,920
			Administrative & Legal Costs (5%)		$ 1,980
			Total Project Cost		**$ 49,500**

Northwood - General Distribution Improvements

Item No.	Description	Units	Quantity	Unit Cost	Total Cost
1	Mobilization, Bonding & Insurance	LS	1	$ 3,500	$ 3,500
2	4in C900 PVC Pipe with Class "B" Backfill and Asphalt Surface	LF	650	$ 40	$ 26,000
3	4in Gate Valve	EA	2	$ 600	$ 1,200
5	Fire Hydrant	EA	1	$ 3,500	$ 3,500
6	Connect to existing water system	EA	3	$ 2,000	$ 6,000
		Construction Total			$ 40,200
		Contingency (20%)			$ 8,040
		Subtotal			$ 48,240
		Engineering (20%)			$ 9,648
		Administrative & Legal Costs (5%)			$ 2,412
		Total Project Cost			**$ 60,300**

APPENDIX E

WATER AUTHORITY FORMATION

Formation, Alteration, and Dissolution of Special Districts

(Chapter 6)

Table of Contents

INTRODUCTION

The formation of most types of special districts is covered in Oregon Revised Statute (ORS) Chapter 198 - "Special Districts Generally." Some types of districts have additional requirements for formation that are found in that particular type of district's principal enabling statute. Please check the principal statutes for each type of special district being formed.

Applicable Oregon Revised Statutes

The formation of most types of special districts is covered in Oregon Revised Statute (ORS) Chapter 198 - "Special Districts Generally." Some types of special districts have additional requirements for formation that are found in that particular type of district's principal enabling statute. ORS Chapter 198 covers the formation of the following districts:

	Type of District	Enabling Oregon Statutes
1.	Cemetery Maintenance District	ORS Chapter 265
2.	Domestic Water Supply	ORS Chapter 264
3.	Geothermal Heating District	ORS Chapter 523
4.	Health District	ORS 440.305 to 440.410
5.	Heritage Districts	ORS 198.973 to 198.989
6.	Highway Lighting District	ORS Chapter 372
7.	Library District	ORS 357.216 to 357.286
8.	Metropolitan Service District	ORS Chapter 268
9.	Park and Recreation District	ORS Chapter 266
10.	Port District	ORS 777.005 to 777.725
11.	Road Assessment District	ORS 371.405 to 371.535
12.	Sanitary Authority, Water Supply Authority or Joint Water and Sanitary Authority	ORS 450.600 to 450.989
13.	Sanitary District	ORS 450.005 to 450.245
14.	Special Road District	ORS 371.305 to 371.360
15.	Transportation District	ORS 267.510 to 267.650
16.	Vector Control District	ORS 452.020 to 452.170
17.	Water Control District	ORS Chapter 553
18.	Water Improvement District	ORS Chapter 552
19.	Weather Modification District	ORS 558.200 to 558.540
20.	County Road District	ORS 371.055 to 371.110
21.	The Port of Portland	ORS Chapter 778.010
22.	Translator District	ORS 354.605 to 354.715

Special districts with formation requirements in addition to those specified in this chapter:

1.	Corporation for Irrigation, Drainage, Water Supply or Flood Control	554
2.	County Service District	451
3.	Drainage District	547
4.	Emergency Communications District	401.818 to 401.857
5.	Irrigation District	545
6.	Mass Transit District	267.010 to 267.390
7.	People's Utility District	261
8.	Rural Fire Protection District	478
9.	Soil and Water Conservation District	568.210 to 568.805

INITIAL STEPS

Special districts are the most rapidly growing form of government in the United States. One reason is the advantage districts enjoy over other forms of government: districts provide one service, and all funds collected are expended on this one type of service. This allows special districts to concentrate on a particular service, and avoid many of the controversies that surround general-purpose governments who must make funding decisions by weighing the needs of competing groups or interests.

The first step in forming a special district is usually to form a committee to analyze the need for the district and to discuss the steps that must be undertaken. Consideration should be given to the area that will be served, the assessed valuation of the area, the revenue that could be provided by a reasonable tax or user fee, long and short term debt structure, if any, and how to generate needed funds for a security bond and possibly an election.

Formation may take as long as 12 to 24 months, depending on the type of district and whether the district will need to assess property taxes. Districts that involve public facilities construction may require advanced preparation

(*i.e.*, sewer or water systems). In addition, there are important state and county deadlines, which must be met, and should be considered in the planning process.

The following steps are general guidelines to the formation of most types of special districts:

- Interested citizens with time, energy, and a willingness to raise or bear certain expenses should form an unofficial or "ad hoc" committee. This committee should be formed approximately 9 to 12 months prior to March 31st -- the date by which the county assessor and the Department of Revenue must be officially notified of the formation of a new district.

- Even at this early stage, the committee would be well advised to employ an attorney familiar with their particular type of special district and election laws. If possible, others who have gone through the process of formation should be contacted to gain additional information and assistance.

- The committee must determine who will initiate the formation and where the initiators will derive financial support. Costs will include obtaining a bond to accompany the formation petition, possible election fees, any attorney or consultant fees, printing fees, boundary commission filing fees, etc. Some of these costs are refundable if the district is formed. If the district is not formed, the members of the committee, or those that provided the funding, must bear the cost.

- The Committee should study the feasibility of forming a district by estimating the following:

  - The area to be served (rough boundaries should be established, specific boundaries will be required with the formal proposal).

  - The assessed valuation of the area to be served.

  - Sources of potential revenue, such as taxes, user fees, bonds, etc.

- The anticipated level of services to be provided.
- The cost to provide these services.

- Notices advising of any proposed public discussion regarding formation should be developed and distributed as widely as possible within the proposed district area. Available news media should be utilized and special effort given in making sure notices are brought to the attention of all voters and property owners. The notices should briefly describe the proposal; announce a date, time, and place for a public meeting to discuss the proposal; outline the proposed boundaries; and briefly discuss relevant issues.
- The committee should hold a meeting open to the public on the date, time, and place specified in the notice, in order to determine voter interest. At this meeting, the committee should:
  - Present information, data, and other research materials.
  - Present its recommendations.
  - Introduce any people available to serve as a resource, such as an attorney, consultant or representative from state organizations.
  - Present any other pertinent information or individuals regarding the need for the district and the services that it would provide.

After a limited time has been given to answering questions, those attending the meeting should be polled to determine if there is enough support to petition the county board on the matter. If it appears there is sufficient interest in the measure, the committee should begin the job of developing a formation plan.

FORMATION

A special district may be formed from contiguous or noncontiguous territory located in one or more adjoining counties. Exceptions to this may exist in individual principal acts that govern the formation and authorities of specific types of districts. A district may also include territory within a city if the city governing body consents to the formation. Territory within another district performing the same services as the proposed district may not be included in a new district unless the territory is withdrawn, either by a simultaneous withdrawal proceeding or automatically by statute, from the former district. The boundaries of a new district may only include territory that can be reasonably served by the facilities or services of the proposed district.

If two or more counties are affected by a formation proposal, the notices, proceedings, orders, and any other act required of a county board or county clerk must be given or taken to the person holding those offices in the principal county. The principal county is the county in which the greatest portion of the assessed valuation of all taxable property in the proposed district is located. Officers of any other affected county must cooperate with the officers of the principal county and must furnish such records and certificates as may be required. Once the principal county is determined, it will remain the county with jurisdiction over the special district for all purposes thereafter.

There are three procedures that may be used to form a special district:

- The filing of a petition for formation,

- The consent of all property owners within the area of the proposed district, or

- Initiation and order of the county board.

Following is an analysis of each of those procedures:

Initiation by Petition
Pursuant to ORS 198.800, formation of a special district may be initiated by a petition filed with the county board of the principal county. If the proposed district includes territory within a city, a certified copy of the resolution of the city's governing body approving the petition must be filed with the petition.

The petition must contain the following information:

- A statement that the petition is filed pursuant to ORS 198.705 to 198.955.

- A statement of the names of all affected districts and all affected counties.

- A designation of the principal act of each affected district.

- A statement of the nature of the proposal, whether formation of a district or change of organization and the kind of change proposed.

- A statement whether the territory subject to the petition is inhabited or uninhabited (uninhabited territory means territory within which there reside less than twelve (12) electors who were residents within the territory thirty (30) days prior to the date a proceeding is commenced to form the district).

- A statement that district board members are or are not to be elected and, if so, the number of members on the board.

- A proposed permanent tax rate sufficient to support the services and functions described in the economic feasibility statement and a declaration of the rate of taxation necessary to raise an amount of revenue equal to the proposed permanent tax rate. A permanent tax rate need not be included in the petition if no tax revenues are necessary to support the services and functions described in the economic feasibility statement. The permanent tax rate, if any, must be expressed as a total dollar amount and the tax rate must be expressed as a rate per thousand of assessed valuation. These rates must be calculated for the latest tax year for which information is available.

- A statement of the proposed terms and conditions, if any, to which a proposed formation is to be subject.

- A statement or indication opposite each signature on the petition whether the signers of the petition are landowners within the district or electors registered within the district, or both.

- A request that proceedings be taken for formation of the district.

The petition for formation must be signed by at least:

- 15% of the electors or 100 electors, whichever is more, registered in the territory to be included in the proposed district;

- 15 landowners or the owners of 10% of the acreage, whichever is greater, within

the territory to be included in the proposed district.

Before circulating the petition for formation of a district, the persons designated on the petition as the chief petitioners must complete an economic feasibility statement for the proposed district. That feasibility statement forms the basis for any proposed permanent tax rate. The feasibility statement must contain:

- A description of the services and functions to be performed or provided by the proposed district;

- An analysis of the relationships between those services and functions and other existing or needed government services; and

- A proposed first year line item operating budget and a projected third year line item operating budget for the new district that demonstrates its economic feasibility.

The economic feasibility statement must be attached to the petition when it is filed with the county and before it is circulated for signing.

Prior to circulation of any petition, the petitioners must file with the county clerk of the principal county a prospective petition. The prospective petition must include a description of the boundaries of the territory proposed to be included in the district.

The petition should provide space for each signer to sign his or her name, print his or her name and add the date of signing. The petition should also provide that if the person is signing the petition as an elector, the person shall add after the signature the person's place of residence, giving street and number or a designation sufficient to enable the place of residence to be readily ascertained. If the signer is signing the petition as a landowner, the number of acres of land owned by the signer and the name of the county whose assessment role is used for the purpose of determining the signer's right to vote must be stated in the body of the petition or indicated opposite the signature. If the signer is a legal representative of the owner of the property, the signature must be accompanied by a certified copy of the signer's authority to sign as a legal representative.

A signer may withdraw his or her name from the petition up until the time of filing with the county, but may not withdraw the name after such filing.

A petition must designate not more than three (3) persons as "chief petitioners," setting forth their names and mailing addresses.

A petition may consist of a single document or separate documents.

Petition Filing Requirements

A petition may not be accepted for filing by the county unless the signatures have been secured within six (6) months of the date on which the first signature on the petition was obtained. Nor may a petition be accepted for filing if it is not accompanied by the economic feasibility statement required under ORS 198.749.

If the petition for formation of a district includes a permanent tax rate for the proposed district, the petition must be filed not later than 180 days before the date of the next regular statewide primary or general election at which the petition for formation may be voted upon.

A petition for formation of a district may not be accepted for filing by the county unless the petition is accompanied by a bond, a cash deposit, or other security deposit.

- A bond must be in a form and in an amount approved by the county board not to exceed $100 for each precinct in the affected district and any territory to be included in the district, up to a maximum of $10,000. The bond must be conditioned that, if the attempted formation is not completed, the chief petitioners will pay the costs thereof.

- A cash deposit must be in an amount approved by the county board not to exceed $100 for each precinct in the affected district and any territory to be included in the district up to a maximum of $10,000. The cash deposit must be accompanied by a form prescribed by the Secretary of State. The form must include the names and addresses of all persons and organizations providing any part of the cash deposit and the amount provided by each, and a statement signed by the chief petitioners that if the costs of the attempted formation exceed the deposit, the chief petitioners will pay to the county the amount of the excess costs.

- A security deposit other than a bond or cash deposit shall be of a kind and in an amount approved by the county board not to exceed $100 for each precinct in the affected district and any territory to be included in the district up to a maximum of $10,000. The security deposits must be accompanied by a form prescribed by the Secretary of State. The form must include the names and addresses of all persons and organizations providing any part of the security deposit and the amount in mind provided by each, and a statement signed by the chief petitioners that if the costs of the attempted formation exceed the security deposited, the chief petitioners shall or will pay to the county the amount of the excess cost.

After circulation of the petition, the clerk of the principal county has ten (10) days from the date the petition is received to review the petition and determine whether it has been signed by the requisite number of qualified signers. If the clerk determines there are sufficient signatures, the clerk files the petition. If the clerk determines there are insufficient signatures, the clerk notifies the chief petitioners and may return the petition to the petitioners.

A petition may not be filed unless the certificate of the county clerk or the district secretary is attached thereto certifying that the county clerk or district secretary has compared the signatures of the signers with the appropriate records and that the county clerk or district secretary has ascertained the number of qualified signers appearing on the petition and that the petition is signed by the requisite number of qualified signers.

After a petition satisfying all the statutory requirements has been filed, the county board must set a date for hearing on the petition and will give notice of the hearing by posting and publication as specified in ORS 198.730 and 198.800(2). Chief petitioners are advised to keep in constant contact with the county clerk and the board of county commissioners to assure that the functions required of the county by the statutes are actually performed in a timely manner.

Formation by Consent of Property Owners

Pursuant to ORS 198.830, a special district may be created by consent of all property owners within the area of the proposed district. The owners of all real property within an area may petition the county board to form a district. The petition must contain all the information required by ORS 198.750 to 198.755, must state the names of the person who will serve as members of the first district board, and must contain the written acceptance of each person agreeing to serve as a board member. The petition must include an affidavit of one of the petitioners that the petitioner believes that the signers of the petition comprise all the owners, at the time of the verification, of all the land included within the proposed district.

The county board then holds a hearing on the petition. If the county board finds that all property owners within the proposed district have joined in the petition and that the area could be benefited by formation of the district, the board will adopt an order approving formation of the district. If the formation is approved, any election otherwise required by law is dispensed with. The board shall enter an order creating the district, and the persons nominated by the petition and accepting nomination, as members of the board shall constitute the first board of the district.

Initiation by County Board

Pursuant to ORS 198.835, a county board may initiate and pay the cost of the formation of a district to be located entirely within the county by adopting an order stating the county board's intention to initiate formation of the district, identifying the principal act, describing the name and boundaries of the proposed district, and setting a time, date, and place for a public hearing on the proposal. If any of the territory to be included within the proposed district is within the boundaries of a city, a certified copy of the city governing body's resolution approving the order must be attached to the order.

Notice of the hearing set by the board order must be posted in at least three public places and published by two insertions in a newspaper. In addition, the notice must state that the county board has entered an order declaring its intention to initiate formation. The hearing and election on the proposal, and the election of the initial board members, is to be conducted pursuant to ORS 198.800 to 198.825.

Hearing

Once proper petitions have been circulated and filed with the principal county and have been approved by endorsement by any agency required by the principal act, the county is required to set a hearing on the petition. The hearing must be held between 30 days and 50 days after the date the petition is filed. Notice of hearing must be posted in at least three places and published by two insertions in a newspaper. The notice must include:

- The purpose for which the district is to be formed.
- The name and boundaries of the proposed district.
- The time and place of the hearing on the petition.
- A statement that all interested persons may appear and be heard.

On or before the date set for any hearing on the petition, any person interested in the proposed formation of a district may appear

and present written statement for or against the granting of the petition. At the hearing on the petition for formation, the county board may receive oral or written testimony favoring or opposing the district formation. Any written statement objecting to the formation must clearly identify the error, omission, or defect, which is the basis for the objection. If the written objection is not timely filed, the objection is considered waived.

Upon conclusion of the hearing, the county board must evaluate the formation petition by applying the criteria in ORS 199.462. That statute requires consideration of local comprehensive planning for the area, economic, demographic, and sociological trends and projections pertinent to the proposal, past and prospective physical development of land that would directly or indirectly be affected by the proposed district, and the statewide goals.

The board may modify the boundaries of the proposed district to include or exclude territory considering the benefit the proposed district will have to territory in or out of the district. The board may not modify the boundaries to exclude land that could be benefited by the district formation and may not include land that will not be benefited. If the county board determines that land that has been improperly omitted from the proposed district and the owner has not appeared, the county board must continue the hearing and order notice to be given to the non-appearing owner in the manner required by ORS 198.805.

If the county board approves the formation of the petition, the board adopts an order identifying the name and boundaries of the proposed district and setting a time and place, between 20 and 50 days from the date of the order, for a final hearing on the petition. The order must also state that if no written requests for an election are filed, the board will adopt an order creating the district at the final hearing. Notice of the final hearing is given by publication.

Election

If the approved petition includes a permanent tax rate, an election on the question of formation of a special district is required. An election is also required if the county board receives requests for an election filed by at least 15% of the electors or 100 electors, whichever is less, on or before the date of the final hearing, even if the petition for formation includes no permanent tax rate.

If a sufficient number of requests for an election are filed with the county on or before the date of the final hearing, or if the petition for formation includes a permanent tax rate for the proposed district, the board provides by an order for the holding of an election to submit to the electors the question of forming the district.

The board must cause notice of the election to be published by two insertions in a newspaper. If requests for an election are filed by less than the required number of persons and no permanent tax rate is included in the petition, the county board shall dismiss the requests for an election and enter an order creating the district. Nevertheless, the county board must order an election for the purpose of electing the first members of the district board. The procedure for nominating and electing the first board is provided in ORS Chapter 255.

If no permanent tax rate is proposed, the only question before the electors is whether the proposed district should be formed. When the proposal for information includes a permanent tax rate for the proposed

district, the ballot title shall clearly indicate that a single question is being proposed which is:

- Whether the proposed district should be formed.

- Whether the permanent tax rate specified in the ballot title should be adopted as the initial permanent tax rate of that district.

When the proposal for formation includes a permanent tax rate limit for the proposed district, the district will be authorized to impose operating taxes not in excess of the permanent rate limit if the proposal is approved by a majority of the votes cast and at least 50 percent of registered electors eligible to vote in the election cast a ballot or the election is in a general election in an even-numbered year.

The county board has thirty (30) days after the date of the election to canvass the votes and adopt an order regarding the proposed formation. If a majority vote favors formation of the district, the board adopts an order creating the district. After the date of the formation order, the inhabitants of the territory within the new district become a municipal corporation with all the powers conferred by the principal act. The new district pays the costs of forming the district and the county clerk refunds any cash deposit or other form of security to the persons who post the security with the county.

If a majority votes against formation of the district, the county board will adopt an order dismissing the petition. The county clerk reimburses the county for the costs of the attempted formation from the security deposit posted by the chief petitioners and refunds any remaining portion of the security deposit to the chief petitioners. If the costs of the attempted formation exceed the amount of the deposit, the chief petitioners must pay the amount of the excess costs.

Challenges to District Formation

Pursuant to ORS 198.785, any citizen of the affected district or territory may initiate proceedings to challenge the county clerk's refusal to accept and file a petition for formation or the county board's refusal to call a special election on the question of formation within ten (10) days of such refusal. Such citizen may file in circuit court of the principal county for a writ of mandamus to compel the county clerk to accept and file the petition or to compel the county board to call an election. If the circuit court finds that the petition for formation is legally sufficient and the requisite number of signatures is attached, the circuit court will direct the county board to call the election. The courts are required to handle and decide such suits as quickly as possible and the circuit court's decision is appeasable.

In addition, proceedings to challenge the validity of a formation of a district may be brought by filing a writ of review pursuant to ORS 33.710 or ORS 34.010 to 34.100.

STEPS FOR DISTRICT FORMATION

- Establish a working committee.
    - Set up community meetings and contact local agencies.
    - Draft maps and research property values.
- Review estimated costs and boundaries at public meetings.

- Draw up petitions. Submit prospective petition to county clerk. Begin preparing Economic Feasibility Statement.

- Circulate petitions. Obtain resolutions from any affected cities.

- Submit petitions, Economic Feasibility Report, and security deposit 180 days prior to election to County Clerk and Surveyor for review.

- County schedules hearing date and bond posted.

- County holds initial hearing.

- County holds second hearing.

- County enacts formation resolution or schedules election date.

- Formation materials submitted to Department of Revenue.

- Submit formation order to Assessor's Office.

- Hold formation and Board Member election (formation elections including permanent tax rates may only be held in May or November of even numbered years).

Note: If there is a formation election held, the permanent tax rate, if any, must be included in that election.

MERGERS AND CONSOLIDATIONS

Pursuant to ORS 198.885 to 198.915, two or more districts providing like services may consolidate and form a new district or a district may merge its operations into a surviving district. Consolidation and merger are statutory methods for creating a special district by joining two or more existing districts into a single new or surviving district.

Districts which are merged into other districts are considered to be annexed by and absorbed into the surviving district. Districts which consolidate, however, become an entirely new district.

Mergers and consolidations are designed to promote efficiency in providing governmental service. In fact, Oregon law encourages and facilitates mergers and consolidations among water and sanitary service providers located within a single river basin or other region.

Initiation of Merger or Consolidation

Creation of a new district by merger or consolidation may be initiated in any one of four ways:

- By duplicate petitions filed by the electors of two or more districts with the boards of the districts to be merged or consolidated. ORS 198.895(1). The petition shall state the names of the affected districts and the name of the surviving or successor district and whether the merger or consolidation must be approved by each district.

- By duplicate petitions filed by the electors of two or more districts with the district boards and by the electors of a city with the city governing body, if the proposed consolidation includes joining a city to the surviving or successor district. A petition under this statute must contain all the matters required stated in the petition under Bullet 1 above except that the petition must also state the name of the city proposed to join the surviving or successor district and whether the merger or consolidation must be approved by each district or city

in order to be effective (ORS 198.895(3).

- By duplicate petitions filed by the electors of a single district with the district board and by the electors of a city with the city governing body, if the proposal is to join a city to the district. ORS 198.895(4). A petition under this statute must contain the name of the district, the name of the city, and must state that the proposal must be approved by the district and the city in order to be effective.

- By resolution adopted by the boards of two or more districts. If the merger or consolidation proposes to join a city to the successor district, the city governing body must also adopt a resolution approving the consolidation. ORS 198.895(5). A resolution adopted or approved under this statute must contain all the matters required to be stated in a petition to merge or to consolidate.

A proposal to merge or consolidate districts may provide that a city be joined to the surviving or successor district for the purpose of receiving service from the district.

If a proposal to merge or consolidate districts includes a proposal to join a city to the surviving or successor district, the proposal may be initiated as provided in ORS 198.895.

The procedures and requirements for preparing, circulating, and filing a petition in a district or city proposed to be included in a proposed consolidation are described in ORS 198.705 to 198.955. A petition for merger or consolidation must be signed by not less than 15% of the electors or 100 electors, whichever is less, registered in each district proposed to merge or consolidate; or by 15 owners of land in each district or by the owners of 10% of the acreage located in each district, whichever is the greater number of signers. ORS 198.755(4).

A petition for consolidation or merger may include a plan for the distribution of debt, which is to be voted upon as a part of the proposal. The plan may provide for any distribution of indebtedness and may require that merging or consolidating districts, and any city to be joined to the surviving or successor district, remain solely liable for all or any portion of the indebtedness outstanding at the time of the consolidation or merger. ORS 198.900(1).

When the governing body of each affected district or city has received a petition containing the required number of signatures, or has adopted or approved a resolution, the governing body of the affected entity having the largest population according to the most recent federal decennial census must call a joint assembly of the governing bodies of the affected entities. The governing body calling the joint assembly must give notice of the time and place of the assembly by certified mail.

At the joint assembly, a majority of the members of each governing body will constitute a quorum for the transaction of business. The assembly, by a majority of all members present, must adopt an order calling an election in each affected entity. That order must include all matters required in ORS 198.745. The order adopted by the assembly may include a plan for zoning or sub-districting the surviving or successor district for the purpose of nominating or electing members of its board if the principal Act for the district provides for election or representation by zone or sub-

district. If required by the principal Act, the plan must also include a map of the proposed zone or sub-district boundaries.

It should be noted that zones or sub-districts must be based on equal distribution of population. Also, if the merger or consolidation is initiated by petition, and the petition includes a debt distribution plan, the order adopted by the assembly must include that plan. ORS 198.903.

Election

As indicated above, there is held a joint assembly of the affected governing bodies. By a majority vote of all of the members present, the joint assembly adopts an order calling for an election in each affected entity. The electors of each district and city involved in the merger or consolidation must approve the merger or consolidation, and the majority of votes in any one of the districts or city against consolidation or merger defeats the proposal. However, where there are more than two districts, or districts and cities, involved and the proposal specifically provides that it will be effective in all districts or cities where it has been approved and does not require the approval of all areas to be effective, the election will be effective in those approving districts or cities, and the areas where the proposal is not approved would not be part of the merged or consolidated district.

If the proposal for merger or consolidation is approved by a majority of the votes cast in each affected entity required for approval of the proposal, the governing body of the affected entity with the largest population must call and give notice of a joint meeting of the governing bodies of the affected entities. The meeting must be held at a time and place designated by the governing body calling the meeting not later than ten (10) days after the canvass of the vote in the entity last canvassed. At the meeting, a majority of the members of the governing body of each affected entity constitutes a quorum for the transaction of business. The purpose of the joint meeting is to elect members of the board of the successor district and to declare the formation of the consolidated district.

The newly elected board meets immediately and adopts a resolution declaring the districts consolidated and each affected city joined to the district, as the case may be. The number of board members elected is as provided in the principal Act of the surviving or successor district, and the terms of office of such members are provided in ORS 198.910(3).

From the date of adoption of the resolution, the merger or consolidation is complete and the city territory, if any, together with any territory thereafter annexed to the city, is included in the boundaries of the surviving or successor district and shall be subject to all the liabilities of the district in the same manner and to the same extent as other territory included in the district.

In a merger or consolidation, board members of the new or surviving district are apportioned as required by ORS 198.912. If two or more of the affected districts each have 20 percent or more of the electors or owners of land within the successor or surviving district, then each affected district is represented by one member when the percentage of electors or owners of land is at least 20 percent but less than 40 percent of the successor or surviving district. When the percentage is between 40 and 60 percent, they are represented by two members.

At the first regular election held in the surviving or successor district, two or three board members are required to be elected as provided for in ORS 198.910(3).

Effect of Consolidation or Merger
Once a consolidation is effective, the successor district succeeds to all the property, contract rights, and powers of the former districts. The former districts must turn over to the board of the successor district all funds, property, contracts, and records of the former districts, and uncollected taxes, assessments, or charges levied by the former districts become the property of the successor district. The successor district board must levy taxes and assessments for the liquidation of any prior existing indebtedness in accordance with the debt distribution plan.

Where two or more districts have merged or consolidated, the tax rate of the surviving district or successor district is that rate that would produce the same tax revenue as the merging or consolidating districts would have cumulatively produced in the year of consolidation or merger if the consolidation or merger had not occurred. *Oregon Constitution Article XI, Section 11(3)(d).*

ANNEXATION
Annexation is the process by which territory may be added to a special district.

A district may consist of contiguous or noncontiguous territory located in one or more adjoining county. If any part of territory to be annexed is within a city, the petition must be accompanied by a certified copy of a resolution of the governing body of the city approving the petition.

A district may not, by annexation or otherwise, include territory included within another district formed under the same principal Act when the other district is authorized to perform and is performing the services the affected district is authorized to perform unless:

- Withdrawal of such territory is proposed and the territory is actually withdrawn by means of withdrawal proceedings conducted in the other district simultaneously with the annexation proceedings, and the proposed boundary changes are approved for both districts; or

- The Principal Act provides for automatic withdrawal of the affected territory in such case.

The boundary lines of a special district must include only such territory as may reasonably be served by the facilities or services of the district. Therefore, if property proposed to be annexed cannot be served by the district, the county board may remove that territory or the annexation may be challenged in court on that ground.

Application of Statutes
The process of annexation to special districts is governed by ORS 198.850 through 198.869. Those statutes refer to other statutes that indicate particular procedural requirements. The processes provided for in those statutes apply to annexation to special districts that are listed in ORS 198.010. Annexations to districts not listed in that statute would be accomplished pursuant to the statute creating the particular district (principal Act). Territory within a district may not be included within or annexed to another district subject to the same principal act.

Initiation of Annexation
A proceeding to annex territory to a special district may be initiated by any one of the following methods:

- By electors. Pursuant to ORS 198.850(1) electors of an area who wish to annex to a special district may file an annexation

petition with the county board of the county in which the territory proposed to be annexed is located. Prior to filing the petition with the county board, the petition must be approved by the board of the affected district, by endorsement on the petition, and by any other agency which is required by the principal Act of the particular district to endorse or approve the petition.

- By the district board. Pursuant to ORS 198.850(3), annexation may be initiated by a resolution of the district board by adoption of a resolution setting forth the following:
  - The intention of the district to initiate
  - The annexation of territory to the district and citing the principal Act of the district.
  - The name of the district and the proposed territory to be annexed.
- By the county board. The county board may initiate an annexation to a special district by the same process indicated above. See ORS 198.850(3).
- Other agencies. If authorized by the principal Act, any other agencies so authorized may initiate an annexation to a special district pursuant to the process indicated above. See ORS 198.850(3).
- By a landowner. An owner of land may petition the county for annexation of such land. A public hearing is held, but no election. See ORS 198.857.
- By a city. A city may propose annexation of city territory to a special district to receive services. Such annexation is initiated by a resolution or motion of the city delivered to the district board. If the district board approves the proposal from the city, the board calls an election in the district and the city calls an election in the city on the same day. If the proposal passes in both jurisdictions, the county adopts an order annexing the city to the district. See ORS 198.866 and 198.867.

Contents of Petition

A petition by electors should include the following information:

- An endorsement on the petition by the district or any agency required by the principal Act to endorse or approve the petition.
- A statement of how the proposal complies with the local comprehensive plan for the area and any service agreement executed between a local government and the affected district.
- Whether or not any of the proposed property to be annexed is within a city. If so, a copy of a resolution of the governing body of the city approving the petition should be attached.

Where an annexation is initiated by resolution of a district or the county board, or by any other public agency authorized to do so by the principal Act, the resolution should set forth the matters indicated above. In addition, if the initiation is by a district board, it may include an effective date, which is not later than 10 years after the date of the order declaring the annexation.

Sufficiency of Petition

Before any further proceedings are conducted, the county must determine whether the petition is sufficient. The petition must:

- State that the petition is filed pursuant to ORS 198.705 to 198.955;
- State the names of all affected districts and all affected counties;
- Designate the principal act of each affected district;
- State the nature of the proposal (annexation);
- State whether the territory subject to the petition is inhabited or uninhabited. "Uninhabited territory" means territory within which there reside less than 12 electors who were residents within the territory 30 days prior to the date a proceeding for annexation is commenced (ORS 198.705(18));
- State any proposed terms and conditions, if any, to which the proposed annexation is to be subject;
- State opposite each signature whether the signers of the petition are landowners within the district or electors registered in the district or both;
- Request that proceedings be taken to annex the proposed territory;
- Include a description of the boundaries of the territory proposed to be annexed;
- Include an affidavit of the person circulating the petition stating that every person who signed the petition did so in the presence of the person circulating the petition;
- Be signed by not less than (a) 15% of the electors or 100 electors, whichever is less, registered in the area proposed to be annexed; or (b) 15 owners of land or the owners of 10% of the acreage, whichever is the greater number of signers, within the area proposed to be annexed;
- Include the printed name of each signer and the date of signing;
- If the signer is signing as an elector, include the person's place of residence, giving street and number or a designation sufficient to enable the place of residence to be readily ascertained;
- If the signer is signing the petition as a land owner, include the number of acres of land owned by the signer and the name of the county whose assessment roll is used for the purpose of determining the signer's right to vote;
- If the signer is a legal representative of a property owner, the signature shall be accompanied by a certified copy of the signer's authority to sign as a legal representative;
- Include endorsement on the petition by the district or any agency required by the principal act to endorse or approve the petition;
- Include whether or not any of the proposed property to be annexed is within a city. If so, a copy of a resolution of the governing body of the city approving the petition should be attached; and
- Where an annexation is initiated by resolution of a district or the county board, or by any other public agency authorized to do so by the principal act, the resolution should set forth the matters indicated above. In addition, if the initiation is by a district board, it may include an effective date, which is

not later than 10 years after the date of the order declaring the annexation.

Notice of Hearing

The county board must set a date for hearing on the petition, which hearing shall be held not less than 30 days nor more than 50 days after the date the petition is filed. The county board shall cause notice of the hearing to be posted in at least three public places and published by two insertions in a newspaper. The notice should state:

- The purpose of the proposal,
- The boundaries of the proposed annexation,
- The time and place of the hearing on the petition, and
- That all interested persons may appear and be heard.

Hearing

At the time and place announced in the notice, the county will conduct a hearing pursuant to ORS 198.805. All interested persons may appear and be heard. The county must determine at the hearing whether the proposal is consistent with the local comprehensive plan and intergovernmental service agreements and if the area could be benefited by the annexation. The county must adopt written findings of compliance with those criteria. The county may adjourn the hearing from time to time but not exceeding four weeks in all without additional notice. The county may alter the boundaries proposed in the petition to either include or exclude territory based upon benefit of such inclusion or exclusion. The board may not modify the boundaries to exclude from the proposed area any land that could be benefited nor may the board include any land that may not be benefited.

If the county board determines that any land has been improperly omitted from the proposal and that the owner of such property has not appeared at the hearing, the board shall continue the hearing and order notice given to the non-appearing owner requiring the owner to appear before the board and show cause, if any, why the land of the owner should not be included in the proposal. Service of such notice is prescribed by ORS 198.805(2).

At the conclusion of the hearing, the board should make its determination, consistent with the above criteria, and adopt findings in support of that determination.

If the board approves the petition, as presented or as modified, or if the boundary commission does so and transmits its approval to the county board, the board shall enter an order declaring approval of the petition.

Election

The county board must order an election on the proposed annexation to be held in the territory proposed for annexation to the special district and in the special district in the following circumstances:

- If the annexation petition is signed by less than all of the owners of all of the lands in the territory proposed to be annexed and the county board receives the requisite number of requests for an election pursuant to ORS 198.815; or
- If the annexation petition is signed by less than the majority of the electors registered in the territory proposed to be annexed and by the owners of half or less than half of the land in the territory and the county board receives the requisite number of requests for an election pursuant to ORS 198.815.

The election must be held both in the territory proposed to be annexed and in the affected district on the same day. After the election, the district board must certify the results of the election in the district to the county board. The county shall order the annexation only if a majority of the votes in the territory to be annexed and a majority of the votes in the district are in favor of the annexation. Without such double majority, the county board shall declare that the proposal has failed.

If the annexation petition is signed by all the owners of land in the territory proposed to be annexed, or is signed by a majority of the electors registered in the territory proposed to be annexed and by the owners of more than half of the land in the territory, an election in the territory and in the district shall be dispensed with. Also, if an individual landowner files a petition to annex this land, there is no election.

After the hearing on the petition, if the county board approves the petition as presented or as modified, or if an election is held, and the electors approve the annexation, the county board shall enter an order describing the boundaries of the territory to be annexed and declaring it annexed to the district.

After the election, if any, is held, if it is determined by the county board that the majority of the votes cast were in favor of the annexation to the district, the board shall enter an order approving the annexation. The order shall be entered within 30 days after the date of the election.

Effect of Annexation

After the date of entry of an order by the county board annexing territory to a district, the annexed territory becomes subject to all outstanding indebtedness of the district, including bonded debt, in the same manner as other territory in the district.

City Annexation to a District

The governing body of a city may adopt a resolution or motion to propose annexation to a district for the purpose of receiving services from the district. Upon adoption of such annexation proposal, the governing body of the city shall certify to the district board a copy of the proposal.

The district board shall then approve or disapprove the city's annexation proposal. If the district board approves the proposal, the board shall adopt an order or resolution calling an election in the district. The order or resolution shall:

- Provide for giving notice of the election.
- Designate the district or the territory within which the election is to be held.
- Fix a date for the election.
- State the substance of the question to be submitted to the electors.
- Specify any terms or conditions provided for in the annexation proposal.
- Contain such other matters as may be necessary to provide for or give notice of the election and to provide for the conduct thereof in the canvass of the returns thereupon.

In addition, the order or resolution may contain a plan for zoning or sub-districting the district as enlarged by the annexation if the principal act for the district provides for election or representation by zone or sub-district.

The district board must certify a copy of the resolution or order to the governing body of the city. Upon receipt of the resolution or order from the district board, the city shall call an election on the date specified in the order or resolution of the district board. The election must be held on a date specified in ORS 255.345 that is not sooner than the 90th day after the date of the district order or resolution calling the election.

If the electors of the city approve the annexation, the city governing body must certify to the county board of the principal county for the district the fact of approval. If the electors of the district approve the election, the district board must certify the results of the election to the city and the county board. Upon receipt of the certificate from the city and the district, the county board enters an order annexing the territory included in the city to the district. Thereafter, the city territory is annexed to the district and is subject to all liabilities of the district in the same manner and to the same extent as other territory included in the district.

Contracts to Annex

Pursuant to ORS 198.869, a special district and a landowner may contract regarding provision of ex-territorial service and consent to eventual annexation of property to the district. Such agreement must be recorded in county records and, when recorded is binding on all successors with an interest in that property.

WITHDRAWAL OF TERRITORY

Territory of a special district can be withdrawn from the district pursuant to the procedures contained in ORS 198.870 to 198.882. Generally speaking, withdrawal of territory from a district may occur when the territory to be withdrawn has not been or cannot be served by the district.

Initiation of Withdrawal

A withdrawal of territory from a special district may be initiated by either of two methods:

- A property owner within the district may petition the county board to withdraw the owner's property from the district.
- The electors of an area within a special district may petition the county board to withdraw their property from the district.

Under either of the above alternatives, such petition must be signed by not less than 15% of the electors or 100 electors registered in the district, or by 15 landowners or the owners of 10% of the acreage, whichever is the greater number of signers within the district. Petitioners must cause notice of the filing of the petition to be given in writing to the secretary of the district. Within five days after the petition is filed, the petitioners must furnish the secretary of the district with a copy of the petition filed.

Procedure

With some exceptions, the statutory procedure for withdrawing territory from the special district is the same as the statutory procedure for annexing property to a district. The procedures governing the county board's conduct of hearings, adoption of orders, and calling an election, are the procedures set forth in the preceding section on annexation. The county board may approve a petition for withdrawal as presented, or may approve the petition with modified boundaries. The county board must approve the petition if it has not been, or would not be feasible for the territory described in the petition to receive service from the district. The board must deny the petition if it appears that it is or would be feasible for the territory described in the petition to receive service from the district.

Election
An election on the petition for withdrawal may or may not be required. If written requests for an election are filed by fifteen percent (15%) or one hundred (100) electors, whichever is less, an election must be held. If a sufficient number of written requests for election have not been filed at the time of the county board's final hearing on the proposed withdrawal, an election is not required, and the county board simply adopts an order withdrawing the territory from the district. If sufficient requests are timely filed, the county board must call an election on the proposed withdrawal if those requests are filed on or before the date of the board's final hearing on the withdrawal.

If a majority of the votes cast favors the proposed withdrawal of territory, the county board adopts and enters an order withdrawing the territory from the district. If a majority of the votes cast opposes the proposed withdrawal, the county board adopts and enters an order declaring the election result. The election is held district wide.

Regardless of the result of the election, the county board must cause a copy of the order to be filed with the secretary of the district.

Effect of Withdrawal
From the date of the entry of the order by the county board, the area withdrawn from a district is thereafter free from assessments and taxes levied thereafter by the district. However, the withdrawn area remains subject to any bonded or other indebtedness existing at the time of the order. The proportionate share of such indebtedness is based upon the assessed valuation, or according to the assessment role in the year of the levy, of all the property contained in the district immediately prior to the withdrawal.

Notwithstanding the above, the governing body of the district shall relieve an area withdrawn from the district from taxation for its proportionate share of outstanding bonded or other indebtedness if no district services have been provided to the withdrawn area and the area withdrawn does not exceed five percent (5%) of the equalized assessed valuation of the taxable property within the entire district prior to the withdrawal.

However, if the total unlimited taxing power of the district over the area not withdrawn does not wholly satisfy the bonded or other indebtedness incurred prior to the withdrawal, the withdrawn territory is taxed in an amount sufficient to satisfy its proportionate share of that indebtedness.

DISSOLUTION
Dissolution of a special district is a process of terminating the district's existence and disposing of any remaining assets.

Initiation
Dissolution of a special district may be initiated in one of three ways:

- By a petition of electors requesting dissolution of the district, filed with the county board. Such petition must be signed by not less than 15% of the electors registered in the district or the owners of 15% of the acreage of the district.

- By resolution of the district board filed with the county board when the district board determines that it is in the best interest of the district's inhabitants that the district be dissolved and liquidated.

- By resolution of the county board if:

- The district has failed to elect district board members to fill vacancies on the district board.

- If the territory within the district is uninhabited.

- If the county board determines it is in the best interest of the people of the county that the district be dissolved and liquidated.

Within five days after a petition is filed or a resolution of the county board is adopted, as provided for above, a copy shall be filed with the district's secretary, if any, or with any other district officer who can with reasonable diligence be located. If there are no qualified district board members at the time, the county board shall act as, or appoint, a board of trustees to act on behalf of the district regarding the dissolution proceedings.

If the district to be dissolved is located within the jurisdiction of a local government boundary commission, the dissolution must be reviewed and approved according to the boundary commission's procedures for the review of major boundary changes.

Procedures

When dissolution proceedings have been initiated, the district board must make findings of fact concerning the district's finances. Specifically, those findings must include the following:

- Description of the indebtedness and the name of the holder and owner of each, if known.

- A description of each parcel of real property and interest in real property and, if the property was acquired from delinquent taxes or assessments, the amount of such taxes and assessments on each parcel of property.

- Uncollected taxes, assessments, and charges levied by the district and the amount upon each lot or tract of land.

- A description of the personal property and all other assets of the district.

- The estimated cost of dissolution.

In addition, the district board must also propose a plan of dissolution and liquidation as required by ORS 198.925(2) and 198.930. The plan of dissolution and liquidation may include provisions for transfer and conveyance of all assets of the district to any other district or, in the case of a county service district, to the county in which the district is located.

Within 30 days after initiation of the dissolution proceeding, the findings of fact and the proposed plan of dissolution and liquidation must be filed in the office of the county clerk and must be made available for inspection by any interested person.

Within 10 days after the district board files the dissolution and liquidation plan with the county clerk, the district board calls an election to determine whether the district shall be dissolved, its indebtedness liquidated and its assets disposed of in accordance with the proposed dissolution and liquidation plan. The notice of election must briefly summarize the dissolution and liquidation plan and state that the plan is available for examination at the office of the county clerk.

An election is not required and the county board may declare the district dissolved and proceed to wind up the district's affairs, if the county board finds:

- The dissolution is in the best interest of the people of the county; and
- The territory within the affected district is uninhabited;
- The district has failed regularly to elect district board members in accordance with the district principal act; or
- For a county service district, dissolution is required because there is no public need for continuation of the district.

If a majority of the district's electors approve dissolution of the district, the district board declares the district dissolved. The district board then becomes a board of trustees which pays or obtains releases of the district's debt and disposes of the district property. If the district is located entirely within the boundaries of a single county, the district board may designate the county board as the board of trustees for the purpose of winding up the district's affairs.

After the district's affairs have been fully settled, the board of trustees deposits all of the district's books and records with the county clerk. The board of trustees must execute, under oath, and file with the county board a statement that the district has been dissolved and its affairs liquidated. As of the date of the statement, the corporate existence of the district is terminated for all purposes.

If a majority of the district's electors opposes dissolution, the district board declares the dissolution proposal failed and makes the election results a part of the district's records. No subsequent election on dissolution of the district may be held for one year after the date of the election.

Disposition of District's Assets

The board of trustees may convey all of the dissolving district's assets to another district if the other district assumes all of the debt and obligations of the dissolving district, continues to furnish the services provided by the dissolving district pursuant to the dissolution and liquidation plan, and if the consent of all known holders of valid indebtedness against the district has been obtained or the plan provides for payment of the non-assenting holders.

The board of trustees may turn over to the county treasurer any surplus funds remaining after payment of all of the district's indebtedness. If the district's assets are insufficient to pay the indebtedness, the board of trustees must levy taxes within the district for the liquidation of the indebtedness. However, if property of the district is within the corporate limits of a city, the property vests in the city upon dissolution and any property of the district located outside the city's corporate limits vests in the county upon dissolution.

Dissolution of Inactive District

The procedures for dissolution of inactive districts are somewhat different.

Special districts that fail to file for three consecutive years reports required by ORS 294.555 or 297.405 to 297.555 with the Secretary of State or Department of Revenue, as the case may be, either of those state agencies must notify the county board of the county where the district is located. Within 30 days after such notice to the county board, the county must initiate proceedings to dissolve the special district and may appoint three individuals, which are residents of the district, to assist in locating the assets, debts and records of the district.

Within 60 days after receiving the notice from either state agency, the county board must prepare a financial statement for the district and file it with the county clerk. The financial statement must include:

- The date of formation of the district.
- The date of the last election of officers and the names of such officers;
- The amount of each outstanding bond, coupon, or other indebtedness with a general description of such indebtedness and the name of the holder and owner of each;
- A description of each parcel of real property and interest in real property owned by the district;
- Any uncollected charges, taxes, and assessments levied by the district;
- A description of all personal property and of all other assets of the district; and
- The estimated cost of dissolution.

Upon filing the financial statement, the county board must enter an order calling for a hearing on the question of dissolving the district. The hearing shall be called not less than 21 nor more than 30 days after the filing of the statement. If the county is within the jurisdiction of a local government boundary commission, the county board must, within ten days after filing a financial statement, file with the boundary commission a resolution requesting dissolution of the district.

If the county is not within a local government boundary commission, the notice of hearing by the county must be given by publication once each week for not less than three weeks in a newspaper of general circulation within the district. The notice must state the time and place of the hearing and that all interested persons may appear and be heard. The notice must also state that all persons having claims against the district must present them at the time of the hearing.

After the hearing, the county board must determine whether the district is in fact operating as an active district. Once the reports required by ORS 294.555 and 297.405 to 297.555 are properly filed by the county for the district, the county must then enter an order. Such order may (a) terminate all further proceedings if the county finds that continuation of the district is necessary, or (b) continue the hearing to initiate proceedings to incorporate or annex the district area into a county service district. In such case, the county proceeds under ORS Chapter 451 to create a county service district.

If the county board finds that the district is not active and there is no need for the district, the board shall thereupon constitute a board of trustees for the purpose of paying the debts and disposing of the property of the district. Any surplus funds and assets remaining to the credit of the district after payment of the debts of the district shall be credited to the county general fund. If the district was located in more than one county, the surplus shall be apportioned and turned over to each county in which the district was located. The funds and assets are apportioned according to the proportion in each county of the assessed valuation of taxable property in the district.

If the assets of the district are insufficient to pay the debts of the district, the county board must levy taxes for the liquidation of the debts. If the only debt of the district is the cost of dissolution proceedings, the county shall pay the cost of the proceedings.

RESOURCES

Audits of Public Funds and Financial Records (ORS 297):
http://landru.leg.state.or.us/ors/297.html

County and Municipal Financial Administration (ORS 294):
http://landru.leg.state.or.us/ors/294.html

Special District Elections (ORS 255): http://landru.leg.state.or.us/ors/255.html

Special Districts Generally (ORS 198): http://landru.leg.state.or.us/ors/198.html