



# **Water Management and Conservation Plan**

## **Cannon Beach, Oregon**

**January, 2006**

Revisions: Jan. 2010 cf



**Water Management and Conservation Plan  
Prepared For  
The City of Cannon Beach**

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# Cannon Beach Water Management and Conservation Plan: Contents

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# Executive Summary

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The City of Cannon Beach presents its 2005 Water Management and Conservation Plan (WMCP) to the Water Resources Department (WRD) and interested parties. The City is submitting this plan in response to its request for a permit extension to one of the City's water rights. The extension application triggered the need to prepare a Water Management and Conservation Plan as directed under Oregon Administrative Rules (OAR) 690-315 and 690-086.

The City believes this WMCP outlines a way to effectively manage its present water rights and provide a means for developing a comprehensive strategy for meeting its municipal water supply needs over the next 20 years. Moreover, the plan attempts to enhance management techniques of the State's water resources, including an increased effort to improve the efficiency of the water system, thereby meeting the intent of the regulations defined under the new Division 86 rules.

## Meeting the WMCP Criteria

Approval of this WMCP is contingent upon Cannon Beach meeting the criteria outlined under OAR 690-086-0130. Accordingly, the City has prepared a concise statement addressing each of the review criteria cited in that regulation.

- ***Inclusion of specific elements under 690-086-125:*** The current plan includes specific sections that address each element – a description of the City's water supply system and history, an updated conservation plan, a new curtailment plan, and a 20-year supply strategy, as well as a list of affected local governments to whom the plan has been made available and a proposed schedule for update in year 2020. A draft of Cannon Beach's plan was made available to Clatsop County Health Department and City Planning Department from which no comments were received.
- ***Projections of future water needs:*** The City is projecting to need only a limited increase in water in the next 20 years. Presently, the City uses about 0.57 mgd on average (table 5-6), with a recorded peak demand of about 0.97 mgd (fig. 5-1). By 2025, this demand increases only 0.096 mgd to an average of 0.67 mgd. The 2025 peak day is also expected to increase modestly to between 1.2 and 1.33 mgd (depending on the results of the City's planned conservation efforts). These projections are consistent with the City's planning data for increases in population and employment and have been reviewed for consistency with comprehensive plans developed by the Cannon Beach Planning Department.
- ***Water conservation measures under OAR 690-086-0150:*** The City has developed a conservation program targeted at reducing peak day demand. That program is designed to incorporate each of the elements noted under OAR 690-086-0150 (4) and addresses the City's goal of reducing unaccounted water to less than 10% and achieving a 5% reduction in peak day demand for years 2015 and 2025. A summary of the actions and related benchmarks for the conservation program are outlined in Table ES-1.
- ***Identification of resource issues:*** The sources of water being drawn upon by the City are a combination of ground and surface waters. The issues defined under OAR 690-086-140 (5)(i) apply to the waters that impact streams.

- ***Curtailment plan:*** The City developed a water emergency supply plan, approved by council in February 2006. Within that plan, is a curtailment plan that was prepared pursuant to ORS 536-780 and consistent with OAR 690-019-0090. The curtailment plan element represents one of the three tools available to the City to meet a water emergency. The curtailment plan includes three stages of alert, triggers for each stage, and curtailment actions that will satisfactorily promote conservation practices.
- ***Use beyond permit extension:*** As part of this submittal, the City has developed a schedule for using water under its water rights to serve its anticipated 20-year demand. The City will not be looking for any new rights but will seek to make optimal use under its existing permits. By year 2025, the City will pump as much as 0.7 mgd on an average daily basis over the year and utilize as much as 1.2 to 1.33 mgd on a peak day – thereby utilizing about 50% of its present inventory of municipal rights totaling 2.65 mgd. The City intends to use this WMCP as record for that planned use and also intends to certificate its unperfected right by the time it submits an update of this plan in 2020.

**Table ES-1  
City of Cannon Beach  
5-Year Conservation Benchmarks**

<b>Benchmark</b>	<b>Date</b>	<b>Frequency</b>
<b>On-Going Efforts</b>		
Leak detection and reporting	October 2006	N/A
Reservoir Inspection	—	Annually
Meter testing	—	Quarterly
Automated irrigation of parks	—	Daily
Leak detection visits	—	On-call
Master meter testing	—	Bi-annually
Reduced water usage at City facilities	—	Daily
Bill stuffers	—	Monthly
<b>New Programs</b>		
Water auditing (track non-revenue use)	March 2006	Annually
Meter replacement program	June 2005	20 Year
Meters testing (>2")	February 2006	Bi-annually
Leak repair (all leaks from 2006 survey)	October 2006	Weekly
Pressure reducing valve installation (75 psi max.)	July 2009	Monthly
Distribute conservation brochures and kits	June 2007	Annually
Rain sensor installation in city parks	January 2007	—

## **Proposed Schedule for Updating Plan**

In accordance with administrative rules, the City proposes to submit a progress report on or before October 2010 (5 years) to review noted benchmarking and water use progress. Since Cannon Beach does not anticipate the need for any new source of water over the next 20 years, the City proposes to submit an updated WMCP at the end of the 10-year period in 2020.



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# Section 1

## Overview

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### 1.1 General System Description

The City of Cannon Beach is located in Clatsop County on the Northern Oregon Coast, approximately 80 miles northwest of Portland (see **Figure 1.1**). The terrain is generally conducive to development of land for residential and commercial uses. Land elevations around the City vary from approximately 10 feet near the Pacific coastline and Elk Creek to as high as 300 feet on the northern and eastern edges of the Urban Growth Boundary (UGB). The lands west of U.S. Highway 101 are predominantly below 100 feet in elevation.

Presently, the City serves a population of about 1,640 persons. Due to the City's location and attractive summertime features, there are large seasonal shifts in population associated with seasonal home use, motel occupancy, and daily tourism. The majority of the water customers are residential in nature with some light to moderate commercial users located throughout the service area. Presently, there are no large scale commercial or industrial users within the system.

The City owns and operates the water distribution network that extends delivery of potable water to a variety of customers within the city limits. Water is supplied year round from three springs east of the City. Additional water is supplied from the West Fork of Ecola Creek during the summer months. Water from Ecola Creek is filtered through a City owned slow sand filter plant. Water is stored in two reservoirs (total storage volume 2.6 MG) that provide fire suppression, equalization during high peak flows, and protection during emergency conditions. Other operational facilities include over 20 miles of distribution piping and two booster pump stations that provide water pressures to high elevation (>150' EL) customers.

### 1.2 Purpose

Recently, the City applied for a permit extension for one of its water rights. The application for an extension triggered the need to prepare this Water Management and Conservation Plan (WMCP) in accordance with Oregon Administrative Rule (OAR) 690-315 and 690-086("Division 86"). This new plan, in conjunction with pre-existing and on-going efforts, is intended to comply with Division 86 rules.

### 1.3 Proposed Progress Report and Update Schedule

Following the administrative rules, the City proposes to submit a progress report on or before October 2010 (five years) to review noted benchmarking and water conservation progress. Since Cannon Beach does not anticipate the need for any new source of water over the next 20-years, the City is not planning to submit an updated WMCP until 2020, the required 10-year period.

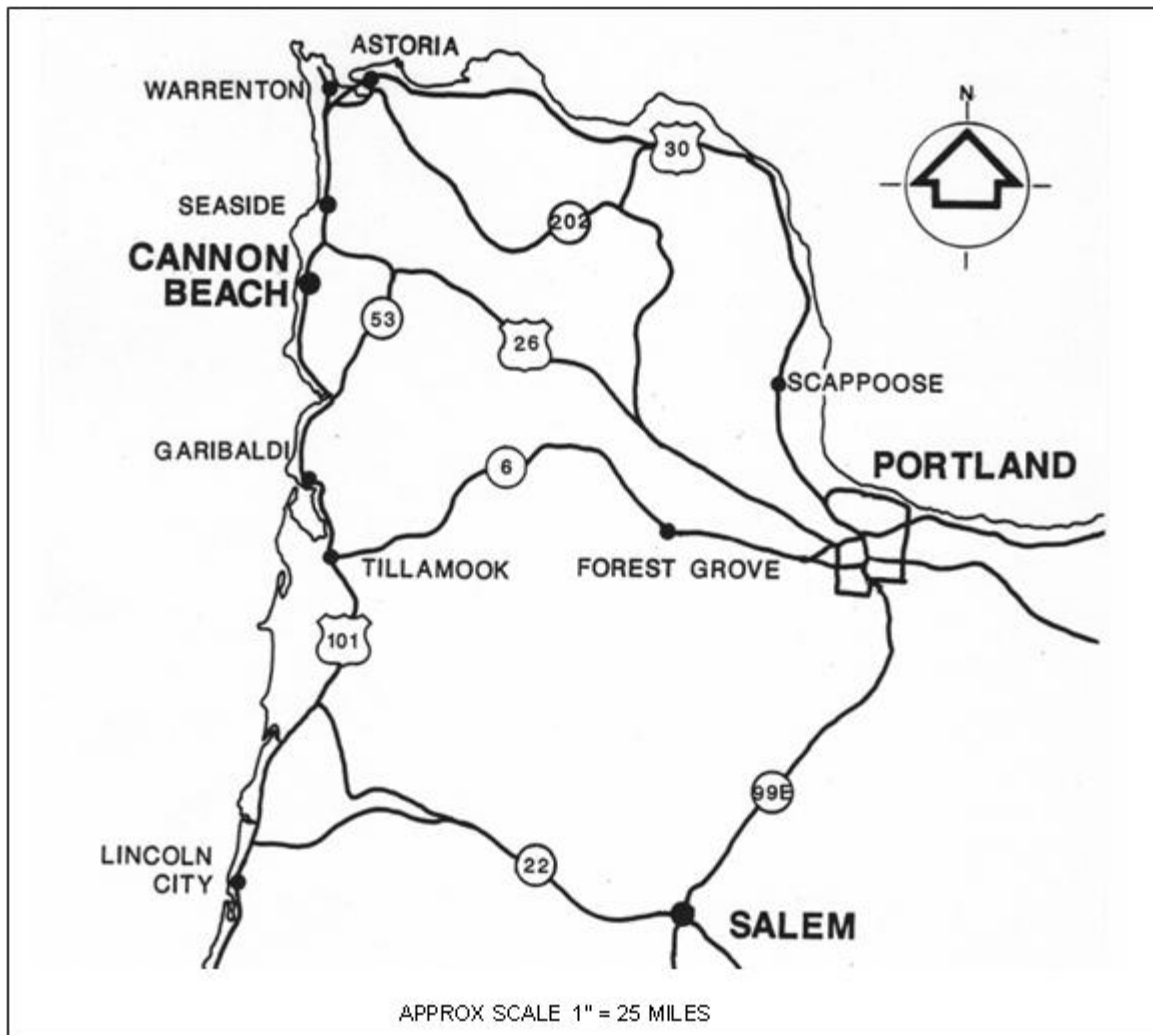


Figure 1.1

## 1.4 Summary of Data Sources

Throughout this WMCP are references to data, most of which were obtained from City files including records of pumping withdrawal, customer billings, land use planning, operational control, and conservation program implementation. Historical data related to service area, such as connections and demand, was obtained from the City's utility billing system, the City's water system management software, and the Water System Master Plan. Historic and future demographic data was also obtained in coordination with Clatsop County.

## 1.5 Input During Plan Development

To develop this WMCP, City staff from all stake-holding City departments including Water, Parks, and Wastewater have worked together to examine a range of water management alternatives. A draft WMCP was also submitted to Clatsop County from which no comments were recieved. A final version of this plan was presented to City Council and approved February 2006.

## **1.6 Document Organization**

This WMCP is organized in a manner consistent with the Division 86 rules. Section 2 describes the water supply system, including key demographic information, water consumption, and the type of infrastructure present in the water system. Section 3 identifies the conservation measures the City has implemented and proposed new measures with associated benchmarks for each new measure. Section 4 describes the three tools available to the City in the event of a water emergency, including a water curtailment plan. Section 5 uses the information presented in Section 2 to forecast future demand, compare that demand to present water rights, and assesses the need for additional source water diversions.



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## Section 2

# Water Supplier Description

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### Introduction

The following is a brief description of the water supply system for the City of Cannon Beach. The information provided is intended to create an inventory of its current service territory, the sources of supply and water rights, and the facilities used to divert, treat, and deliver that water, as well as to assess the adequacy and reliability of supplies subject to potential future restrictions. Specific elements set forth in OAR 690-086-140 are indexed (as required) and referenced below.

WMCP Section	Topic	OAR	Page
2.1	Service Area and Population	690-086-0140(2)	10
2.2	Sources of Supply	690-086-0140(1)	11
2.3	Summary of Water Rights	690-086-0140(5)	12
2.4	Adequacy and Reliability	690-086-0140(3)	13
2.5	Water Usage History	690-086-0140(4)	15
2.6	Customer Classification	690-086-0140(6)	17
2.7	Unaccounted Water	690-086-0140(9)	18
2.8	Water System Facilities	690-086-0140(8)	18
2.9	Interconnections	690-086-0140(7)	22

## 2.1 Service Area and Population

### 2.1.1 Service Area

The City is located in Clatsop County, on the Pacific Northwest Coast of Oregon, 80 miles west of Portland and 25 miles south of Astoria. The City of Seaside lies eight miles to the north and Arch Cape lies 5 miles to the south. Terrain is generally conducive to development of land for residential and commercial uses. Land elevations around the City vary from approximately 10 feet near the Pacific coastline and Elk Creek to as high as 300 feet on the northern and eastern edges of the Urban Growth Boundary (UGB). Lands west of U.S. Highway 101 are predominantly below 100 feet in elevation.

Cannon Beach is surrounded by the rugged natural beauty of forests, ocean beaches, and rivers. Only four miles in length, and with a population about 1,640, Cannon Beach is a popular and picturesque resort area, playing host to an estimated over 400,000 visitors annually.

Due to the City's location and attractive summertime features, there are large seasonal shifts in population associated with seasonal home use, motel occupancy, and daily tourism. The majority of the water customers are residential in nature with some light to moderate commercial users located throughout the service area. Presently, there are no large scale commercial or industrial users within the system. The current City Comprehensive Plan appears to resist industrial and large scale commercial enterprises.

A layout map of the Cannon Beach service area is provided in Section 5, Exhibit 5-2. The map delineates the Urban Growth Boundary (UGB) and the current City Limit Boundary line.

## 2.1.2 Population Estimates

Clatsop County has experienced an average annual rate of growth of 0.75 % over the past 30 years (1970 to 2000). The official County population for the year 2000 is reported to be 35,630. A summary of the historical County population is displayed in table 2-1, along with the average growth rates by decade since 1970. As shown, the County's growth rate has decreased from the 1.33% level in the 1970's to about 0.68% experienced within the 1990's.

<b>Table 2-1 Historical Population</b>				
<b>Historical Population</b>	<b>1970</b>	<b>1980</b>	<b>1990</b>	<b>2000</b>
Clatsop County	28,473	32,489	33,301	35,630
Cannon Beach	779	1,187	1,293	1,588

By contrast, Cannon Beach's population has more than doubled from its 1970 population of 779 people to its present day total of about 1,640 people. This represents an annualized growth rate of 2.4% (table 2-2) over the last thirty years.

<b>Table 2-2 Annualized Growth Rate</b>				
<b>Annualized Growth Rate</b>	<b>1970-1980</b>	<b>1980-1990</b>	<b>1990-2000</b>	<b>30-Year Avg.</b>
Clatsop County	1.33%	0.25%	0.68%	0.75%
Cannon Beach	4.30%	0.86%	2.08%	2.40%

## 2.2 Sources of Supply

### 2.2.1 Groundwater Source

The primary source of drinking water supplying Cannon Beach comes from springs (three) located about 1.5 miles due east of the Pacific Ocean in the Coast Range. Township, range and section information can be found in section 2.3.1, table of Groundwater Rights. Groundwater status has been granted by the Oregon State Health Department and certificated water rights have been issued by the Oregon Water Resources Department for all three springs. The springs are in close proximity to one-another being separated by about 500 feet in distance. The watershed (Exhibit 2-4) lies within a 220-acre tract of city owned property called the Ecola Creek Forest Reserve and is bounded by Clatsop State Forest and Weyerhaeuser Company owned lands. Access to the springs is limited to pedestrian traffic and authorized personnel. Service roads to the springs are gated and locked.

The three springs emerge from hillsides at approximately the same elevation 192, 201, and 218 feet (±) above sea level. The construction characteristics of each spring source are essentially the same consisting of hatched and locked concrete buried spring boxes, fed by infiltration galleries of PVC pipe imbedded in coarse drainage rock. Overflow, transmission, and drain piping vary in size and construction material according to flow expectations and ground conditions. Screening has been

provided at all exposed pipe ends to prevent rodent intrusion. All developed spring capture areas have been capped to curtail surface water infiltration.

Water is transmitted from the springs to a 1-million gallon concrete storage reservoir via 12-inch (primarily) PVC transmission piping a distance of about 2-miles along service roads.

Due to its  $218 \pm$  feet of elevation, the main spring can flow by gravity (i.e., without the use of pumps) to storage. However, this can only be done when the spring is used as the sole source (6-months typically). When used in combination with the other springs, flow must be transmitted by pumping. The pumps are located at the treatment facility (discussion below) and have a combined capacity of 900 gpm.

## **2.2.2 Surface Water Source**

To meet new governmental regulations and increasing demands for water, the City constructed a Water Treatment Facility in 1995 to treat its withdrawal of raw water from Ecola Creek. The facility is a slow sand filtration type. Use of the facility is seasonal. Typically, operations run June through mid-October, depending on the spring's ability to meet demand. Supply and demand is exclusively weather related. Extended warm, dry weather, such as is common for this coastal area through the summer season, increases the demand while decreasing spring yield supply. The spring supply is then supplemented with the surface water source.

The facility and point of diversion is located about 1.25 miles east of the Pacific shoreline at the foot of the Coast Range adjacent to the West Fork of Ecola Creek. The intake structure at the point of diversion interface is constructed of gabions, armored against the erosive forces of the river with large basalt riprap. The gabion structure serves as an effective fish and debris screen (ODF&W). Located at the point of diversion are three intake pumps, each of 250 gpm capacity. Only the amount needed to make up the deficit plus that needed for treatment plant operations is withdrawn from the Creek.

The surface water right at Ecola Creek is specified as "conditional use" and can only be used as a secondary source when the groundwater (springs) cannot meet the City's water demand. The current status of this surface water source is non-perfected and non-certificated. The City has applied for an extension of time, for completion, of the water right.

## **2.3 Summary of Water Rights**

### **2.3.1 Groundwater Rights**

The City holds three water right certificates issued from Water Resources Department on three springs for a maximum water withdrawal limit of 2.6 cubic feet per second (1167 gallons per minute) for domestic/municipal use. As noted below (table 2-3), these three springs date back to at least the 1930's for their respective priority dates. The Oregon State Health Department has declared these springs to be "groundwater" sources due to their manner and efficacy of construction.

**Table 2-3**  
**Groundwater Source(s)\***

	<b>Spring 1</b>	<b>Spring 2</b>	<b>Spring 3</b>
<b>Name</b>	Main	Haskell	Howell
<b>Location</b>	5 10 30	5 10 33,NENW	5 10 33,SENW
<b>Priority Date</b>	October 16, 1916	May 25, 1933	August 20, 1936
<b>Application Number</b>	S5202	S14958	S16524
<b>Permit Number</b>	S3135	S10936	12321
<b>Certificate Number</b>	1988	11616	19540
<b>Authorized Municipal Use</b>	1.0 cfs	0.6 cfs	1.0 cfs

\*Oregon WRD considers all springs to be surface water. Oregon State Health Dept. deems these springs to be groundwater by virtue of their developed containment.

### 2.3.2 Surface Water Right

The “surface” water right is specified as “conditional use” and can only be used as a secondary source when the “groundwater” (springs) cannot meet the City’s water demand. The current status of this surface water source is non-perfected and non-certificated. The City has applied for and been granted an extension of time, for completion, of the water right. The new authorized date for completion is October 1, 2021.

**Table 2-4**  
**Surface Water Source**

<b><u>West Fork Elk Creek</u></b>	
Location:	5 10 33,NWNW
Priority date:	April 15, 1977
Permit Number:	S-41717
Certificate Number:	Pending
Application Number:	S55694
Completion Date:	Oct. 1, 2021
Authorized Municipal Use:	<u>1.5 cfs = 673 gpm</u>

### 2.3.3 Water Diverted for Use

Daily readings are taken from the City’s four master meters. The quantities presented in table 2-5 are derived from daily recordings of the meter located at the downstream side of the main reservoir, the Midtown Tank. Water leaving the tank through this meter represents distribution system demand. It includes customer’s metered usage, known non-metered usage, and unknown losses.

**Table 2-5**  
**5-year System Demand**

	<b>Groundwater</b>					<b>Surface Water</b>				
	<b>01</b>	<b>02</b>	<b>03</b>	<b>04</b>	<b>05</b>	<b>01</b>	<b>02</b>	<b>03</b>	<b>04</b>	<b>05</b>
Instant Max. (GPM)	750	750	750	750	750	475	475	475	475	475
Annual Qty. (MG)	183.1	161.5	171.5	176.1	201.6	6.0	12.7	11.8	28.6	6.6
Monthly Avg. (MG)	15.25	13.46	14.29	14.67	16.8	1.5	4.2	3.9	9.5	3.3
Daily Avg. (MGD)	0.51	0.45	0.48	0.49	0.56	0.05	0.14	0.13	0.32	0.11



## 2.4 Adequacy and Reliability

The three spring sources (combined) can provide water for the City's demand during nine months of the year (typically). Water production of the springs begins decreasing about mid-spring season and continues tapering off through mid-December until such time that heavy seasonal rains have recharged the aquifer. The declining spring yields impact the City mostly during the months of June, July, and August; the peak of Cannon Beach's tourist season. Spring water production is totally dependent upon and related to seasonal precipitation. Around 1977, a particularly dry year, two of the springs shut down production altogether and the Main Spring's (Permit # S3135) production dropped down to the low 100 gallon per minute stage, which produced a water crisis in the City.

In 1977, the City applied for a water right permit to obtain surface water from the West Fork of Elk Creek (also known to the State Water Resources Department as Ecola Creek). When additional water is needed, the City pumps water from the creek to the City's water filtration plant to supplement the spring water source. Generally, the water filtration plant is in operation during the months of July, August, and September. However, the filtration plant has been operated beginning as early as June and as late as December during drought periods. As Cannon Beach continues to grow, the filtration plant will likely increase its time in operation as water demand grows.

**Oregon Water Resources Department retains an "in-stream" certificated (#72551) water right on the West Fork Elk (Ecola) Creek with a priority date, 10/11/1991.** All four of the City's water rights predate the in-stream right, and therefore precludes the possibility of being "cut-off" from source waters. Certificate #72551 (copy), addressing specific limits, conditions, and beneficial use is inserted as **Exhibit 5.6**.

Table 2-6 summarizes the annual production from each of the City's groundwater and surface water sources over the past five years, as well as their relative contributive percentages in comparison with the City's total water production. As illustrated in Table 2-6, the springs (groundwater) serve as the primary source for the City.

<b>Table 2-6</b> <b>City of Cannon Beach</b> <b>5-Year Summary of Annual Water Production</b>						
Annual Production in Million Gallons						AVG % of Supply
Source	2000-2001	2001-2002	2002-2003	2003-2004	2004-2005	
Springs	183.2	161.6	171.5	176.1	201.6	93%
Ecola Creek	6.0	12.7	11.8	28.2	6.6	7%
Totals (MG)	189.2	174.3	183.3	204.3	208.2	
Avg. Day (MGD)	0.52	0.48	0.50	0.56	0.59	

Annual Production - Water year Oct. through Sept.

Table 2-7 shows how dependence on the individual sources shifts during the City's summer season when compared to annual usage (table 2-6).

**Table 2-7**  
**City of Cannon Beach**  
**5-Year Summary of Peak-Season Water Production**

Production in Million Gallons						AVG % of Supply
Source	2001	2002	2003	2004	2005	
Springs	92%	80%	80%	65%	80%	80%
Ecola Creek	8%	20%	20%	35%	20%	20%
Peak-Season Totals (MG)	75.0	60.9	65.3	79.4	36.5	
Avg. Day (MGD)	0.625	0.507	0.544	0.661	0.304	

Peak Season - June through September

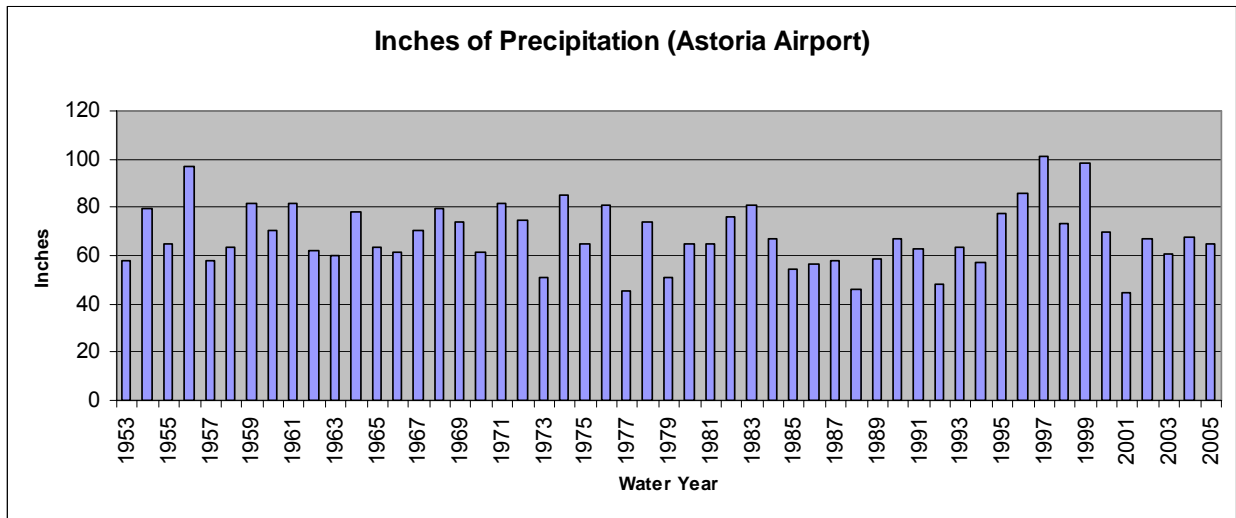
The data shown is consistent with the City's annual water use reporting to Oregon Water Resources Department, as required under OAR 690-085.

### Threats to Adequacy and Reliability

Potential and conceivable threats to the adequacy, reliability, and quality of the drinking water sources include:

- Catastrophic failure or extended disruption of the spring yield from seismic activity or other land dislocations (e.g. landslide).
- Extensive loss of forest canopy due to wildfire or disease. Extensive clear-cutting could produce the same results by increasing evaporation and run-off rates, thereby diminishing percolate.
- Dislocation of stream course from deluge and/or landslide event.
- Deluge during summer or peak (demand) season causing excessive turbidity of surface water source. This would make the source unusable for filtration.
- Loss of source water transmission line due to landslide.
- Drought – In this context, drought is defined as the weather conditions that lead to an insufficient amount of precipitation, over an extended period of time, to recharge the watershed (ground waters and surface waters), to a level that can meet the City's normal water use demands or that raises concern over the ability of the City to meet demand, at any given time of year. For Cannon Beach, drought conditions can be identified as being accumulated rainfall of 55 inches (measured at Astoria Airport) or less in a water year (October through September). As illustrated in the graph below (Fig. 2-1), there have been seven years, between 1973 and 2005, where rainfall has fallen below 55 inches in a water year.
- Operational and maintenance contingencies legislated to accommodate and protect endangered or protected salmonid species (ESA).

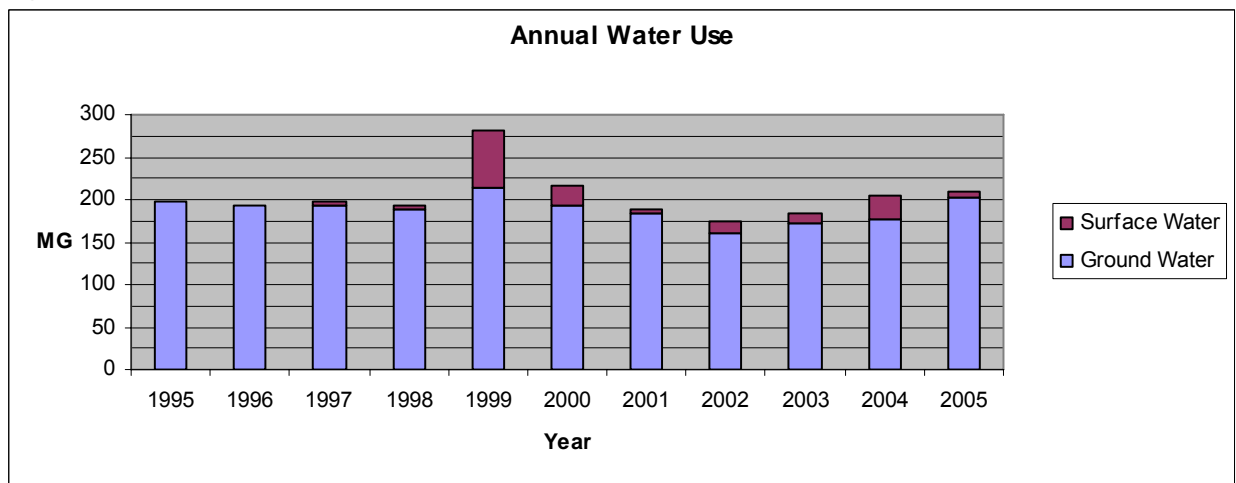
**Fig. 2-1**



## 2.5 Water Usage History

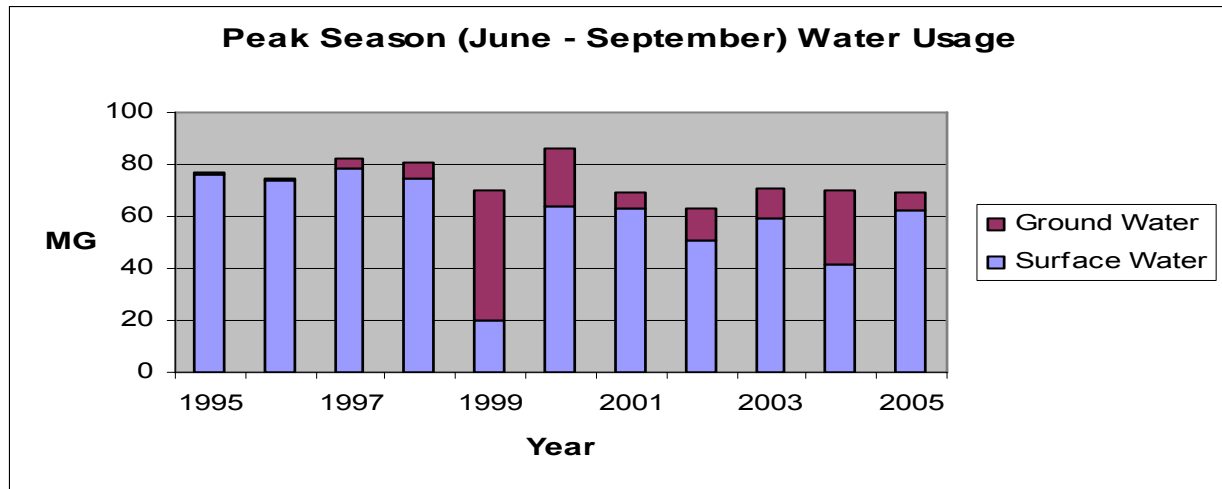
From the Annual Water Use Report(s) submitted to the Water Resources Department, a graphical representation of the annual and peak season water usage histories of years 1995 through 2005 is provided in Figures 2-2 and 2-3. Annual usage patterns appear to be relatively consistent through the ten year period.

**Fig. 2-2**



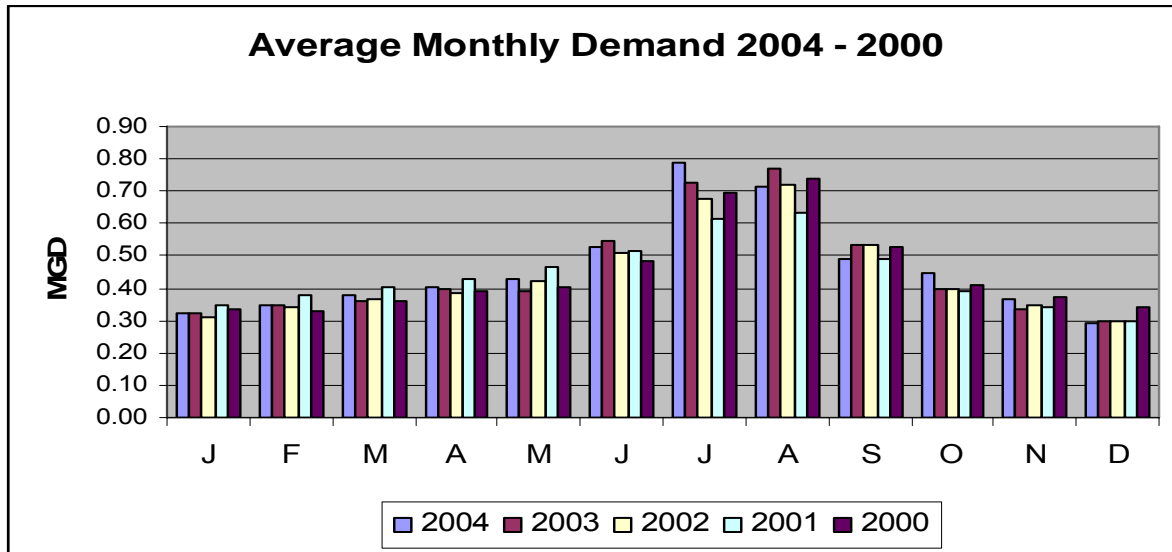
However, Figure 2-2 demonstrates the variation of water source usage through the peak season. It is expected that the pattern of seasonal variation will continue into the future.

**Fig. 2-3**



It may also be helpful to see the trend in usage through the Average Monthly Demand illustrated in Figure 2-4 below.

**Fig. 2-4**      **Average Monthly Demand 2004 – 2000**



A five-year summary of water use is presented in table 2-8 below. Average day use for the period ranges from 0.48 to 0.59 MGD.

**Table 2-8**  
**City of Cannon Beach**  
**5-Year Summary of Annual Water Production**

Annual Production in Million Gallons						AVG % of Supply
Source	2000-2001	2001-2002	2002-2003	2003-2004	2004-2005	
Springs	183.2	161.6	171.5	176.1	201.6	93%
Ecola Creek	6.0	12.7	11.8	28.2	6.6	7%
Totals (MG)	189.2	174.3	183.3	204.3	208.2	
Avg. Day (MGD)	0.52	0.48	0.50	0.56	0.59	

Annual Production - Water year Oct. through Sept.

Peak day use is estimated to be about 810 GPM or 1.166 MGD. This estimate is based upon "typical numbers" (WMCP Guidebook), a ratio of 2.2 times the average day demand.

## 2.6 Customer Classification

The City has developed a description of the customers served and general water use characteristics for each customer class. The intent is to identify the characteristics of water consumption among customer classes. A brief description of the typical commercial user is also included.

All customers served by the City of Cannon Beach are metered. The residential class of customers consists of occupants of homes, duplexes, and condominiums. The water consumer in this class is typically considered non-transient; however, they are not necessarily full- time residents. The users are located predominantly within the city limits and all sites are within the urban growth boundary. It is estimated that about 10 percent of the residential class is landscaped and irrigated (sprinkled). As expected, sprinkling occurs primarily during the months of July, August, and September. The residential class of customer accounts for approximately 50 percent of the total metered water use (see table 2-9).

**Table 2-9**  
**5-year history of Water Consumption**

5-year history of water consumption							
Class	2000	2001	2002	2003	2004	Avg.	
	Million Gallons						
Residential	64.99	61.55	66.50	68.74	72.74	66.91	51.42%
Commercial	55.79	55.73	58.95	60.67	58.99	58.03	44.59%
Public	6.31	5.96	6.66	7.00	0.02	5.19	3.99%
Totals	127.1	123.2	132.1	136.4	131.8	130.1	100%

The commercial class of customers are the locations at which the purpose of the activities are for gaining a livelihood or performing a public service and which generally handle a transient population.

They include motels, shops, schools, and convention centers. The commercial class of customer accounts for approximately 45 percent of the total metered water use (see table 2-9).

Water used for city services such as for parks irrigation, fire protection, and utilities operations, are classified as public water. The public class of customer accounts for approximately 5 percent of the total metered water use (see table 2-9).

Cannon Beach does not have an industrial customer base.

## 2.7 Unaccounted Water

Unaccounted water, here, is the calculated difference between metered water that discharges from the main storage reservoir and all metered customers (all customers are metered). Known non-metered uses include water for fire protection, water for street cleaning and sewer main cleaning, water for flushing mains and hydrant flow testing, and for the cleaning and refilling of reservoirs. Water main breaks are another source of known non-metered uses. System leakage, in this context, is the difference between known non-metered uses and the unknown (undiscovered) losses. The water master plan (2001) does not address system leakage. (Update: a comprehensive leak detection survey conducted by an independent contractor in 2007 did not reveal significant leakage. Detected leaks were repaired with no apparent improvement in loss numbers.)

Numbers presented in table 2-10 are taken from City supply/demand monthly reports. The numbers represent the known and unknown losses. Reliability of their meaning is inconclusive, however, because of meter accuracy uncertainty. The City's goal is to have greater, more accurate, accountability of the known losses and reduction of unknown losses (system leakage).

**Table 2.10**  
**Unaccounted Water**

	<b>2000</b>	<b>2001</b>	<b>2002</b>	<b>2003</b>	<b>2004</b>	<b>2005</b>	<b>AVG.</b>
GPM	52.4	56.0	47.1	55.3	71.2	52.0	56.6
% Total Usage	17.83%	19.40%	15.79%	17.36%	22.09%	17.76%	18.37%

## 2.8 Water System Facilities

### 2.8.1 Water System Narrative

#### Ground Water Source

The primary source of drinking water supplying Cannon Beach comes from springs (three) located about 1.5 miles due east of the Pacific Ocean in the Coast Range. Township, range and section information can be found in the table of Groundwater Rights (2-3). Groundwater status for the springs has been granted by the Oregon State Health Department and certificated water rights have been issued by the Oregon Water Resources Department for all three springs. The springs are in close proximity to one-another being separated by about 500 feet in distance. The watershed lies within a 220-acre tract of city owned property called the Ecola Creek Forest Reserve and is bounded by Clatsop State Forest and Weyerhaeuser Company owned lands. Access to the springs is limited to pedestrian traffic and authorized personnel. Service roads to the springs are gated and locked.

The three springs emerge from hillsides at approximately the same elevation 192, 201, and 218 feet ( $\pm$ ) above sea level. The construction characteristics of each spring source are essentially the same consisting of hatched and locked concrete buried spring boxes, fed by infiltration galleries of PVC pipe imbedded in coarse drainage rock. Overflow, transmission, and drain piping vary in size and construction material according to flow expectations and ground conditions. Screening has been provided at all exposed pipe ends to prevent rodent intrusion. All developed spring capture areas have been capped to curtail surface water infiltration.

Due to its 218  $\pm$  feet of elevation, the main spring can flow by gravity (i.e., without the use of pumps) to storage. However, this can only be done when the spring is used as the sole source (6-months typically). When used in combination with the other springs, flow must be transmitted by pumping. The pumps are located at the treatment facility (discussion below) and have a combined capacity of 900 gpm.

The three spring sources (combined) can provide water for the City's demand during nine months of the year (typically). Water production of the springs begins decreasing about mid-spring season and continues tapering off through mid-December until such time that heavy seasonal rains have recharged the aquifer. The declining spring yields impact the City mostly during the months of June, July, and August; the peak of Cannon Beach's tourist season. Spring water production is totally dependent upon and related to seasonal precipitation. Around 1977, a particularly dry year, two of the springs shut down production altogether and the Main Spring's (Permit # S3135) production dropped down to the low 100 gallon per minute stage, which produced a water crisis in the City.

The Quality of the raw spring water is consistent having a temperature of 11 degrees centigrade, clarity of 0.02 NTUs, and a pH of 6.9. Water rights authorize the withdrawal of 2.6 cubic feet per second from the spring sources.

### **Surface Water Source**

Surface water is obtained from the West Fork of Ecola Creek. The point of diversion is adjacent to the water filtration plant. Because of its questionable quality, in terms of human health detriments, the water must be treated.

This source of water may become unavailable as a supplemental source if turbidity exceeds 2 NTUs. Exceeding the 2 NTU limit, say, from a rain storm, would prematurely plug the filters making them unusable in a relatively short span of time. In its brief 10-year history as a filtered source there has not been a storm event during the critical need period of peak demand.

The surface water right at Ecola Creek is specified as "conditional use" and can only be used as a secondary source when the groundwater (springs) cannot meet the City's water demand. The current status of this surface water source is non-perfected and non-certificated. The City has applied for an extension of time, for completion, of the water right.

Water rights authorize the withdrawal of 1.5 cubic feet per second from the Ecola Creek source.

### **Treatment Plant**

To meet new governmental regulations and increasing demands for water, the City constructed a Water Treatment Facility in 1995 primarily to treat its withdrawal of raw water from Ecola Creek. The facility and point of diversion is located about 1.25 miles east of the Pacific shoreline at the foot of the Coast Range adjacent to the West Fork of Ecola Creek. It is approximately one mile east of the City. The facility is a slow sand filtration type. Use of the facility is seasonal. Typically, operations run June through mid-October, depending on the spring's ability to meet demand. Supply and

demand is exclusively weather related. Extended warm, dry weather, such as is common for this coastal area through the summer season, increases demand while decreasing spring yield supply. Spring supply must then be supplemented with the surface water source.

Physical and biological mechanisms of the sand filter beds combine to provide for the removal of 99.999% removal of pathogenic organisms. Effluent is then finished with a minimal dosage (0.04 ppm) of gaseous chlorine before being transmitted to storage for eventual distribution.

Currently, the facility is capable of treating 700 gpm. Built into the design is the option of diverting the spring water source through the facility. Also provided was room for expansion of capacity.

The intake structure at the point of diversion interface is constructed of gabions, armored against the erosive forces of the river with large basalt riprap. The gabion structure serves as an effective fish and debris screen (ODF&W). Located at the point of diversion are three intake pumps, each of 250 gpm capacity. Only the amount needed to make up the deficit plus that needed for treatment plant operations is withdrawn from the Creek.

### Transmission Lines

Transmission of the source water to storage is accomplished in one of two ways; by gravity or by pumping. When the main spring yield can solely meet the demand, water will flow by gravity to the main storage reservoir (200' EL) simply by virtue of its elevation (218' EL). Gravity capacity is limited to a flow of about 400 gpm. Use of the lesser springs and/or use of the Ecola Creek source require the use of pumps for their transmission. Combined capacity of the pumps is 900 gpm.

Water is transmitted directly from the springs, or from the filtration plant (which lies en route) a distance of about 2 miles and one mile (respectively) via 12-inch (primarily) PVC transmission piping buried along service roads to a 1-million gallon concrete storage reservoir.

### Storage Tanks

Three ground-level, elevated, storage tanks provide for dependable and consistent fire flows and distribution system pressures. Their characteristics are defined in table 2-11.

<b>Table 2-11</b>					
<b>Water Storage Tank Data</b>					
	<b>Install Date</b>	<b>Construction Material</b>	<b>Capacity</b>	<b>Floor Elevation</b>	<b>Overflow Elevation</b>
North Tank	2001	Glass-fused steel	30,000 gal.	331 ft.	349 ft.
Mid-Town Tank	1977	Concrete	1.0 MG	180 ft.	200 ft.
South Tank	1987	Cor-ten steel	1.6 MG	180 ft.	200 ft.

After treatment, water is transmitted directly to the Mid-Town Tank prior to dissemination. All water leaving the tank for distribution and consumption is measured by a 6-inch turbo-meter. Surplus water is returned to stream via tank overflow piping. Water returned to stream is calculated by subtracting water measured through the 6-inch turbo from water measured through the 12-inch meter along the transmission main located at the water filtration plant exit.



The South Tank “floats” off of the distribution system; i.e., water passes through the distribution system and passively enters or exits the tank depending upon system demand. Theoretically, the Mid-Town and South Tanks should remain at the same fill levels by virtue of their elevations, which are equal (table 2-11). In truth, however, their individual fill levels are dependent upon complicated hydraulic conditions created by system demands. The South Tank is located at the extreme southern extent of the City, about one-eighth mile, east of U.S. Hwy 101.

Homes and a State Park in the Ecola area, at the northern extreme of the City, are at elevations that require pressure boosting pumps (pump station) for service. The area, Ecola Pressure Zone, is serviced by the North Tank for dependable and consistent fire flows and distribution system pressures. The tank location is north of Ninth Street, about one-eighth mile east of Ecola Park Road.

## Distribution Mains

Approximately 1688 sites are served through a network of about 26.5 miles of mains ranging from 2-inch through 12-inch piping of varying pipe materials (table 2-12). The vast majority of customer's sites can be serviced without the use of pumps due to the elevations of the North and South storage tanks. Branch service pipes, generally, are of Polyethylene (PE) material. Depending upon service site elevation, water pressures range from 20 psi to 80 psi. The average service pressure in Cannon Beach is about 70 psi. a schematic of the distribution system has been provided at the end of Section 2, at Exhibit 2-1

**Table 2-12**  
**Cannon Beach Distribution System Pipe Summary**

<b>Material</b>	<b>12 inch</b>	<b>10 inch</b>	<b>8 inch</b>	<b>6 inch</b>	<b>4 inch</b>	<b>2 inch</b>	<b>1 inch</b>	<b>Total</b>
PVC (ft)	19,000	250	47,140	16,375	16,235	14,575		113,575
AC (ft)	9,275	250	1,810	11,180				22,515
DI (ft)	200			750				950
PE (ft)						360	510	870
<b>Total (ft)</b>	<b>28,475</b>	<b>500</b>	<b>48,950</b>	<b>28,305</b>	<b>16,235</b>	<b>14,935</b>	<b>510</b>	<b>137,910</b>

Source: Water Master Plan, EES January 2001

## Master Meters

The City presently uses four master meters for water accountability (table 2-13). Plans for future master meter installation sites include: Ecola Pressure Zone, South Tank, and Tolovana Park.

**Table 2-13**  
**Master Meter Inventory**

<b>Size</b>	<b>Master Meter Location</b>	<b>Function</b>
12"	On transmission main adjacent to WTP	Measures water delivered to storage, from springs and/or Water Treatment Plant (WTP)
10"	WTP	Measures surface water diverted to the treatment facility
8"	WTP	Measures spring water diverted to the treatment facility
6"	Downstream MidTown Tank	Measures water delivered to distribution system

## Pressure Boosting Stations

Two areas in the distribution system are at elevations that are dependent upon booster pumps to provide system pressures. At the northern extremity, Ecola State Park and area homes are at elevations above 200 feet. A pump station, located at the intersection of 7<sup>th</sup> & Ash Streets, pressurizes service sites through mains en route to the 30,000 gallon storage of the North Tank. Pressure stabilization and fire protection are provided by the tank. Incorporated, is an automatically actuated, natural gas driven motor and pump for use during power outages.

About mid-town and east of U.S. Hwy. 101, Sunset area homes are at elevations at or near the capacity of the City's, gravity energized, distribution system. Pressure boosting for the area is provided by two alternating pumps. The booster station also provides for fire protection and has backup power (table 2-14).

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**Table 2-14**  
**Booster Pump Stations**

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<b>Service Area</b>	<b>Sites Served</b>	<b>Maximum Elevation Served</b>	<b>Pumps</b>	<b>Backup Power</b>	<b>Fire Protection</b>
Ecola Pressure Zone	35	300 ft.	3 ea. 7.5 h.p.	Y	Y
Sunset Pressure Zone	20	210 ft.	2 ea. 7.5 h.p.	N	N

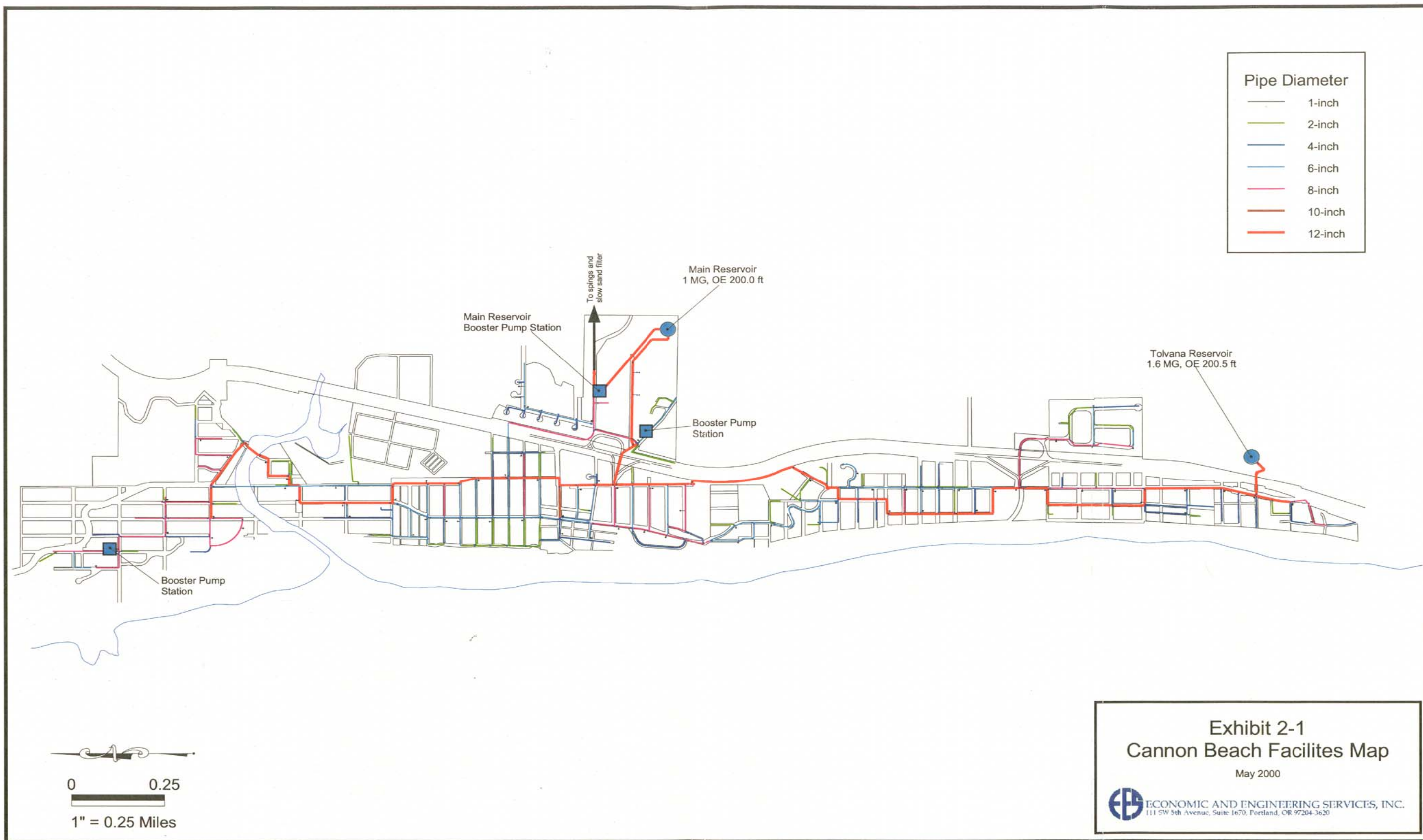
A schematic of the City of Cannon Beach water system is provided in appendix C. It shows the sources of water, storage facilities, treatment facilities, major transmission and distribution pipelines, and pump stations.

There are currently no major planned additions or extensions to the system. Future improvements are limited to routine main replacement and upgrade.

## 2.9 Interconnections

There are no interconnections or interties with other municipalities. It is a "Stand-alone" system.

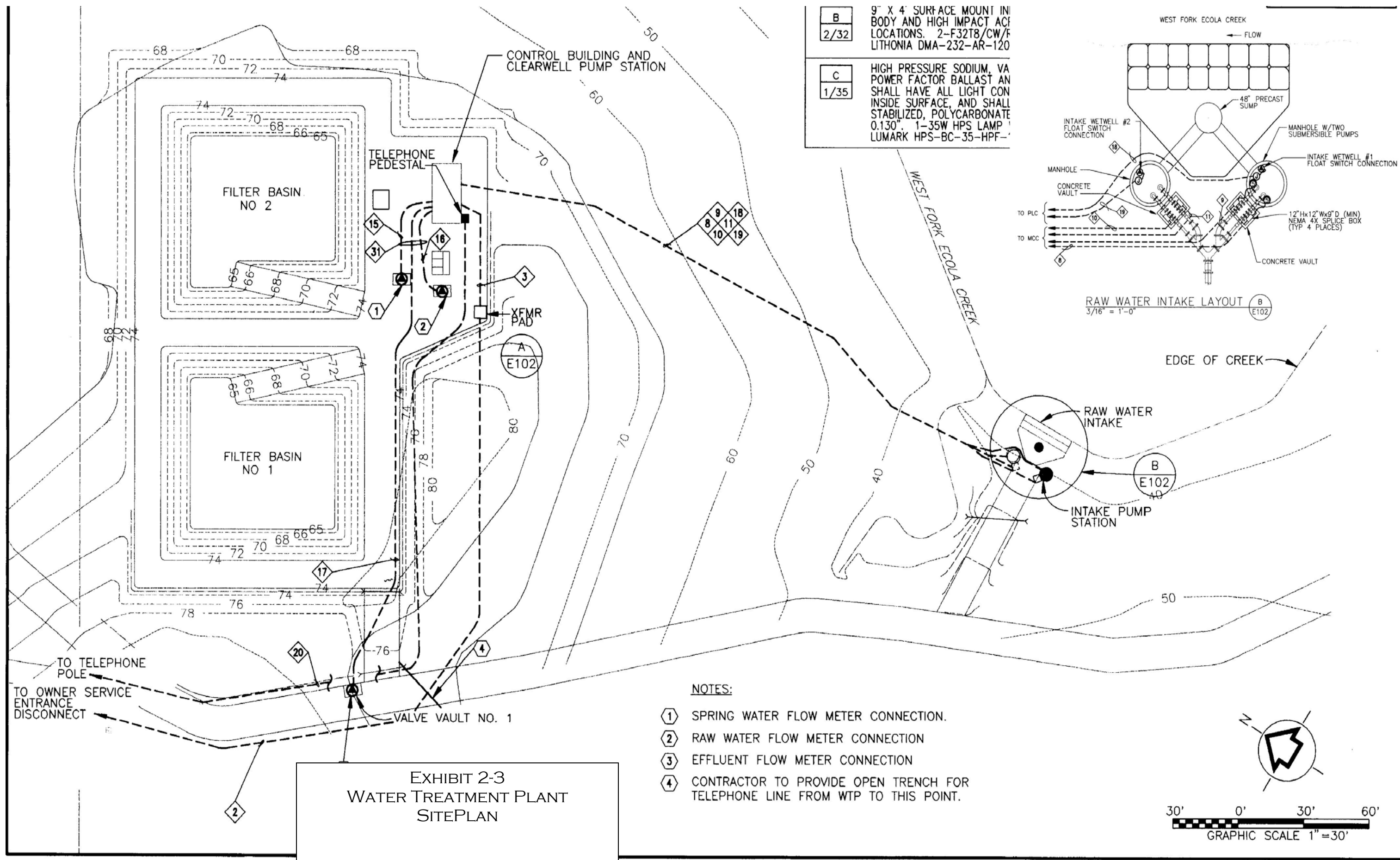














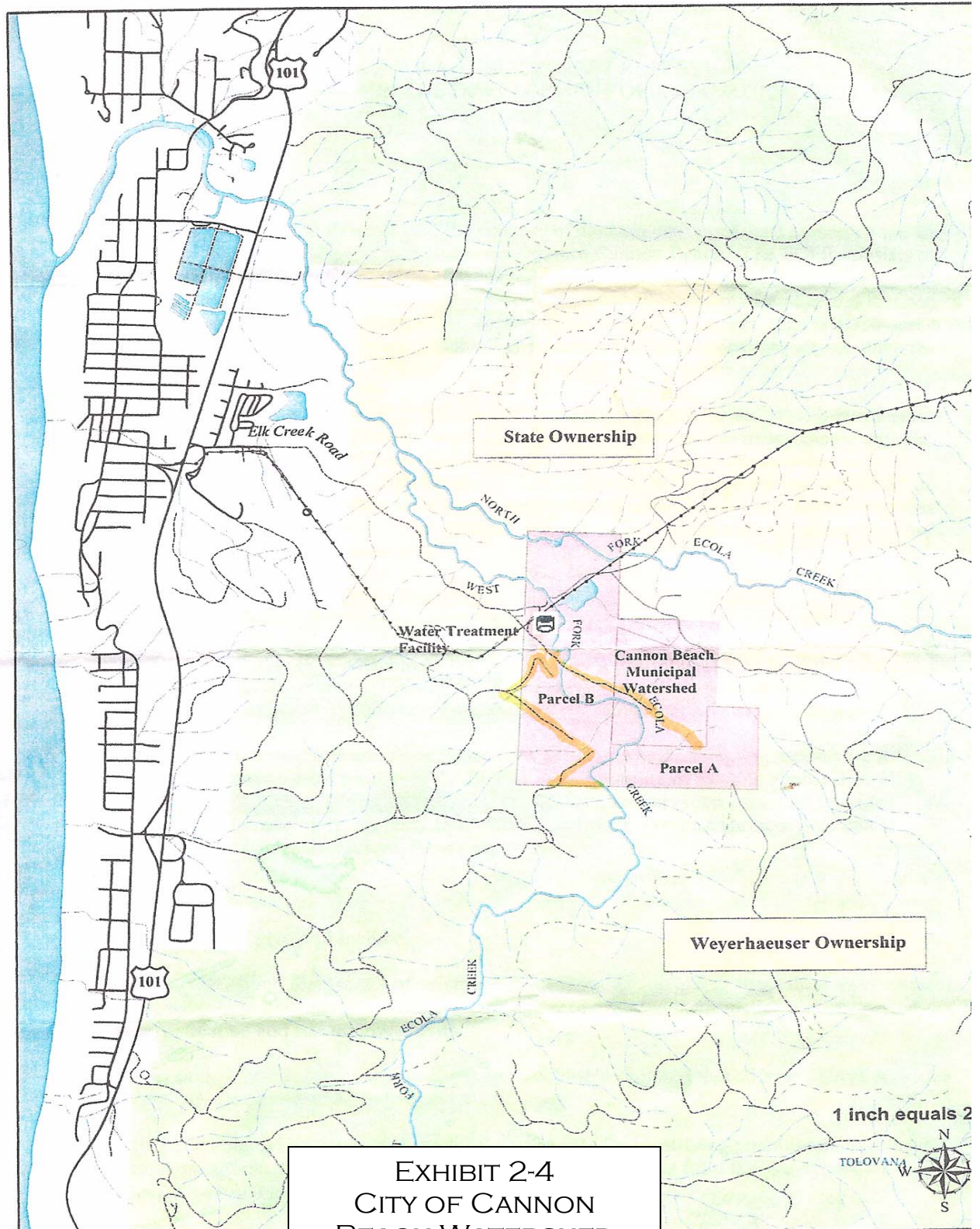


EXHIBIT 2-4  
CITY OF CANNON  
BEACH WATERSHED



## EXHIBIT 2-5

### **SOURCE WATER ASSESSMENT SUMMARY BROCHURE**

**CITY OF CANNON BEACH  
PWS # 4100164**

#### **WHAT IS A SOURCE WATER ASSESSMENT?**

The Source Water Assessment was recently completed by the Department of Environmental Quality (DEQ) and the Oregon Health Division (OHD) to identify the surface areas (and/or subsurface areas) that supply water to Cannon Beach's public water system intake and to inventory the potential contaminant sources that may impact the water supply.

#### **WHY WAS IT COMPLETED?**

The Source Water Assessment was completed to provide information so that Cannon Beach's public water system staff/operator, consumers, and community citizens can begin developing strategies to protect the source of their drinking water, and to minimize future public expenditures for drinking water treatment. The assessment was prepared under the requirements and guidelines of the Federal Safe Drinking Water Act (SDWA).

#### **WHAT AREAS ARE INCLUDED IN CANNON BEACH'S DRINKING WATER PROTECTION AREA?**

The drinking water for the City of Cannon Beach is supplied from two sources. The primary source originates from a series of springs located on City owned property and the supplement source is supplied by a surface water intake on the West Fork Elk Creek (also known as West Fork Ecola Creek). The Source Water Assessment addresses only the surface water component of Cannon Beach's drinking water supply. The groundwater supply will be addressed in a separate report. The public water system serves approximately 1588 citizens that is augmented by a large tourist and transient populations that can swell the population to 10,000 plus in the summer months. The intake is located in the Necanicum River Watershed in the Necanicum Sub-Basin of the Northern Oregon Coastal Basin.

The geographic area providing water to Cannon Beach's intake (the drinking water protection

area) extends upstream approximately 13 miles in a southerly direction and encompasses a total area of 8.3 square miles. The boundaries of the Drinking Water Protection Area are illustrated on the figure attached to this summary.

#### **WHAT ARE THE POTENTIAL SOURCES OF CONTAMINATION TO CANNON BEACH'S PUBLIC DRINKING WATER SUPPLY?**

The primary intent of this inventory was to identify and locate significant potential sources of contaminants of concern. The delineated drinking water protection area is primarily dominated by managed forest land uses. The potential contaminant sources identified in the watershed include various regions of managed forest land owned by the City of Cannon Beach and other public and private entities. This provides a quick look at the existing potential sources of contamination that could, if improperly managed or released, impact the water quality in the watershed.

#### **WHAT ARE THE RISKS FOR OUR SYSTEM?**

A total of three area-wide potential contaminant sources were identified in Cannon Beach's drinking water protection area. Two of these areas are located in the sensitive areas and one is a high- to moderate-risk source within "sensitive areas". The sensitive areas within the Cannon Beach drinking water protection area include areas with high soil permeability, high soil erosion potential, and areas within 1000' from the river/streams. The sensitive areas are those where the potential contamination sources, if present, have a greater potential to impact the water supply. The information in this assessment provides a basis for prioritizing areas in and around our community that are most vulnerable to potential impacts and can be used by the Cannon Beach community to develop a voluntary Drinking Water Protection Plan.

#### **NEED MORE INFORMATION?**

Cannon Beach's Source Water Assessment Report provides additional details on the methodology and results of this assessment. The full report is available for review at:

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Contact City staff if you would like additional information on Cannon Beach's Source Water Assessment results.

## EXHIBIT 2-5

TABLE 2. INVENTORY RESULTS - LIST OF POTENTIAL CONTAMINANT SOURCES

PWS# 4100164 CANNON BEACH, CITY OF

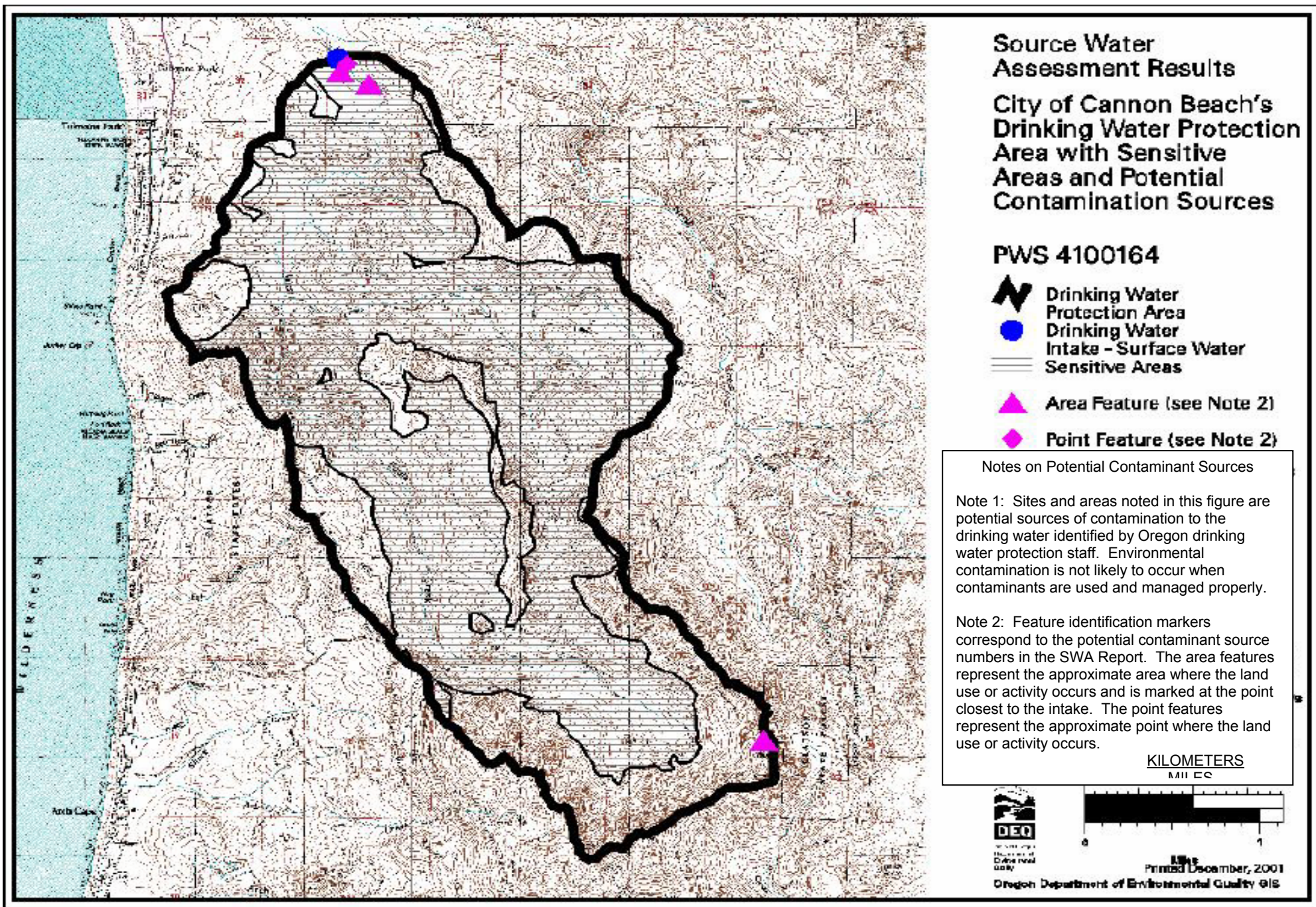
Reference No. (See Figure)	Potential Contaminant Source Type	Name	Approximate Location	City	Method for Listing	Proximity to Sensitive Areas	Relative Risk Level (1)	Potential Impacts	Comments
1	Drinking Water Treatment Plants	City of Cannon Beach, Drinking Water Treatment Works	Just downstream of the Ecola Creek intake	Cannon Beach	Field-Observation Interview	Just outside DWPA for ELK CREEK - WEST FORK	Lower	Treatment chemicals and equipment maintenance materials may impact groundwater or surface water source.	Risk reduced to Lower because drinking water treatment plant is downstream of the intake and is a slow sand filtration plant.
2	Managed Forest Land - Clearcut Harvest (< 35 yrs.) - Sporadic. Incomplete observation.	Managed Forest - Willamette Industries	Almost the entire DWPA	Cannon Beach	Field-Observation Interview	Within sensitive area. for ELK CREEK - WEST FORK	Higher	Cutting and yarding of trees may contribute to increased erosion, resulting in turbidity and chemical changes in drinking water supply. Over-application or improper handling of pesticides or fertilizers may impact drinking water source.	
	Managed Forest Land - Broadcast Fertilized Areas						Moderate	Over-application or improper handling of pesticides or fertilizers may impact the drinking water source.	
3	Managed Forest Land - Broadcast Fertilized Areas - Not actively managed for timber harvesting.	Managed Forest - City of Cannon Beach	55 Ac. Parcel just E of the Water Works Filter	Cannon Beach	Field-Observation Interview	Within sensitive area. for ELK CREEK - WEST FORK	Lower	Over-application or improper handling of pesticides or fertilizers may impact the drinking water source.	Risk reduced to Lower because this area is not actively managed for timber harvesting and the City has reportedly never used pesticides or fertilizers. In addition, the City has a "no application" policy for City maintained property.
4	Managed Forest Land - Broadcast Fertilized Areas	Managed Forest - ODF, Clatsop State Forest	Uppermost portion of DWPA at Onion Peak	Cannon Beach	Field-Observation	Outside sensitive areas. for ELK CREEK - WEST FORK	Moderate	Over-application or improper handling of pesticides or fertilizers may impact the drinking water source.	Actual management status unknown. PWS should verify. No visual observation of site - site location is based on

Note: Sites and areas identified in this Table are only potential sources of contamination to the drinking water. Environmental contamination is not likely to occur when contaminants are used and managed properly.

(1) Where multiple potential contaminant sources exist at a site, the highest level of risk is used.

(2) See Table 3 for database listings (if necessary).







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## Section 3

# Water Conservation Element

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The City of Cannon Beach has never formalized and submitted a Water Management and Conservation Plan (WMCP) to the Water Resource Department (WRD). However, as a matter of principle and prudence, the City has since its incorporation, engaged in many conservation related activities, practices, and measures.

The breadth and depth of conservation measures required in the new Division 86 rules is greater than Cannon Beach's existing measures, however, and this section of the WMCP demonstrates the City's commitment to implementing a new program which will improve its water resources management techniques and thereby meet the intent of the new rules.

While limited resources hamper the ability to offer a full scale conservation program as seen at larger cities, Cannon Beach's new conservation program represents a targeted approach to encouraging customers to conserve. Specifically, Cannon Beach chooses to focus efforts on conservation measures which are intended to reduce peak demand by the residential, commercial and public classes. Cannon Beach's efforts also represent a new level of commitment by the City to take steps necessary to ensure that internal practices promote efficient water management.

On the following pages, the City describes the conservation measures implemented over the previous 20 years, and then details its new conservation program per Division 86 rules. For easy reference, organization of this section of the WMCP closely matches the organization of the new rules.

### 3.1 Previous Efforts

As stated earlier, the City of Cannon Beach has never before formalized a WMCP. City water department policies and procedures relating to water management and conservation have evolved over the years as time and resources became more available. Current and past practices devised to mitigate water waste and loss includes:

- Timely review and revision of billing rate structures
- Planned replacement of obsolescent components
- Recurrent inspection and repair of storage facilities
- Prompt identification, and repair or replacement, of leaking pipes and appurtenances
- Strategic replacement of customer meters
- Continuous tracking of virtually all water diversion and usage
- Monthly auditing of water distribution
- Immediate attentiveness to suspected leaks reported by public
- Routine pressure testing of fire hydrants
- Customer leak notification and support activities
- Random dissemination of conservation messages and educational materials
- Purchase of leak detection equipment
- Retrofit of public restrooms with water saving fixtures and devices

From the private sector, the City has witnessed the dissemination of water saving fixtures (“give-a-ways” if you will) to encourage conservation. Oregon Energy Trust has been retained to evaluate public facilities. The City is a Green Power Community with EPA’s Green Power Partnership.

## 3.2 Water Use and Reporting

Cannon Beach’s water-use reporting is done in compliance with OAR 690-085. The report is submitted annually by October 15th on the form provided by the Water Resources Department using the "Flow Meter Method" approved by the Department in OAR 690-085-0015 (5). Badger Company brand meters are located at each source which record cumulative water volume over the full range of discharge. These meters are read daily by City personnel. There have been no withdrawals in the last 10 years that were not recorded and the reported monthly volumes are accurate within plus or minus 15%.

## 3.3 Rate Structure and Metering

Without exception, all customer sites receiving water service from the City are metered and read on a monthly basis. Exemption from monthly water and sewer billing is only allowed for public uses. Water bill adjustments for water leakage are not allowed. However, if the leakage did not involve the sewer system a request can be made for reduction of the billing for the sewer portion. The Public Works Committee reviews each request and makes adjustment as appropriate.

The City has had an ordinance requiring review of the user rates every two years since 1983. The present rate structure can be described as being a “combined - fixed charge and volume rate” method. That is; a fixed monetary charge is attached to a volume of water usage at or below a specified value; in this case the value is 400 (or 800) cubic feet. Usage at or below this value results in a minimum charge in accordance with the billing rate schedule (table 3-1). Usage over the specified value (overage) results in a rate charge for each 100 cubic feet over the minimum (400 or 800). The customer pays the minimum charge plus the overage rate.

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**Table 3-1**  
**Billing Rate Schedule**  
(ao 1/15/2006)

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Water	Minimum	≤	400 cubic feet = \$13.57
	Overage	>	400 cubic feet = \$3.39 / 100 cf
Sewer (winter)	Minimum	≤	400 cubic feet = \$12.38
	Overage	>	400 cubic feet = \$3.86 / 100 cf
Sewer (summer)	Minimum	≤	800 cubic feet = \$12.38
	Overage	>	800 cubic feet = \$3.86 / 100 cf

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## 3.4 Additional Conservation Measures

The City has also undertaken several additional projects that were not identified in 3.1 Previous Efforts, including:

- Replacement of toilets with 3.5 gallons per flush and larger with high efficiency 1.6 gallons per flush models at all public facilities
- Installation of sensor controlled water dispensing fixtures
- Use of smaller inside diameter branch service piping

- Comprehensive use of corrosion resistant plumbing materials
- Use of meters with “state-of-the-art” leak detection features

### **3.5 Planned Conservation Measures**

The conservation program described within the following subsection was developed based on careful analyses of the characteristics of historical demand patterns and customer demographics, as described below. The City’s available water rights currently meet annual average and peak period demands. However, capacity limits based on operational elements are approaching summertime peak period demands. That is, customers located at higher elevations and/or at distribution extremities, are experiencing lower, sometimes marginal, water pressures. And, the south Tank is not recovering to its full capacity during peak period demands. For this reason, the City will focus its conservation measures on peak demand reduction and those elements of the customer base most affected by related activities.

Historically, about half the annual consumption in each of the residential, commercial, and public customer classes, occurs during the months of June, July, August and September. Such peaking is typical in the Northwest, especially for residential customers. Cannon Beach, however, also experiences a similar pattern for its commercial and public users, whose seasonal demand typically does not vary to such a great degree. Accordingly, the City’s conservation program will be focused on peak demand reduction for all three classes. And, although the City is already taking steps to reduce its own contribution to peak day demand, such as irrigating parks during the early mornings, it will also look to further encourage additional ‘wise use’ by City staff.

In year 2002, the estimated per capita consumption for the residential class was approximately 170 gallons. Cannon Beach attributes the low per capita demand on the age of water-using fixtures in single and multi-family residences.

Since over 30% of residences have been constructed or remodeled since 1994 (the year a federal mandate was invoked requiring low water use fixtures in new construction and remodels), the City estimates that essentially all of these homes have low water use fixtures now in place. The City, however, recognizes the need to continue to build on its present conservation activities. To do so, the City is planning to undertake several new conservation actions over the next ten years. Details of those plans are outlined in the following subsections.

#### **3.5.1 Improved Water Auditing**

A water audit has been performed monthly and annually by the City since 1997. Over the past six years, the City’s average annual unaccounted for water has been about 18.5% (see Table 3-2). Currently, the City’s calculation relies on a simple computation of the difference between the amount discharged from storage and that measured at customer’s meters. The City has not attempted to identify non-metered authorized or unauthorized uses in the past. The City believes that if it starts to track non-metered authorized uses, such as flushing, fire flow through hydrants, and street cleaning activities, then the annual estimate of unaccounted for water may improve, i.e. drop below 18%. The City will begin a program to track, by estimation, non-revenue, non-metered, water usage starting in June 2006 and factor this number into all subsequent auditing reports for year 2006 and beyond. In addition, the City will annually review water usage at city facilities to identify conservation opportunities. Fire hydrant meters will be used to account for all uses except fire protection. The Fire Department will provide estimated water use information.



**Table 3-2  
Unaccounted Water**

	<b>2000</b>	<b>2001</b>	<b>2002</b>	<b>2003</b>	<b>2004</b>	<b>2005</b>	<b>AVG.</b>
GPM	52.4	56.0	47.1	55.3	71.2	52.0	56.6
% Total Usage	17.83%	19.40%	15.79%	17.36%	22.09%	17.76%	18.37%

### **3.5.2 Meter Testing and Maintenance**

Meter testing and maintenance is performed on an “as needed” basis. The City will perform accuracy testing of production meters beginning in year 2006, and every two years thereafter. Customer meters, 2-inch and smaller will be replaced with “state-of-the-art” Automated Meter Reading (AMR) systems utilizing leak detection functions. Customer meters, 3-inch and larger, will be tested on a five year schedule. Upon testing, all meters will be brought into manufacturer’s accuracy specifications or will be replaced. Meters nearing or surpassing the 20-year length of service are scheduled for replacement.

### **3.5.3 Leak Detection and Repair**

Water line leaks are generally repaired within 24 hours of their discovery. A leak repair database has been kept up-to-date since 1988. Regarding the prevention of leaks, the City has, for the past 25 years, been proactive by strategically replacing mains and branch services prior to their failure. The main replacement program continues to this day through the 20-year Water Master Plan (2001).

The City is budgeting for comprehensive leak detection services for fiscal year 2007 and every five years thereafter. Results of the detection service will be used to outline maintenance program to schedule repair of all detected leaks. State-of-the-art leak detection equipment has been purchased and staff routinely checks fire hydrants after their use. A time budget of two hours per month is provided for systematic routine spot checks for leakage.

### **3.5.4 Public Education and Assistance**

Public education is an important component of the City’s overall water conservation program. The following public education measures are planned:

- Continue free leak detection tests for residential customers who suspect a leak. City staff will help determine the location of the leak if the leak is outdoors and offer free brochures with conservation information and a free conservation kit when applicable.
- Distribute water conservation brochures, and conservation kits at community events such as the Public Works Week open house, and provide brochures at City Hall. Brochures include tips on water saving irrigation techniques and methods to reduce consumption indoors.
- Provide information on City consumption programs with links to other water conservation sites on the City’s website.

### **3.5.5 Additional Conservation Measures**

Under Division 86 rules, the City is not required to specifically address the items listed under OAR 690-086-0150(6). However, the City is planning to distribute free water conservation kits to residential customers upon request and at the Public Works Week open house. The kits will also be distributed to customers when warranted during any on-site water leak detection visits. Additionally, the City is committed to leading the community in the effective and efficient use of water and, beginning in June 2007, will install rain sensors at each of the two city parks to optimize irrigation

use at those two facilities. Wetlands are used to finish wastewater treatment on a ten acre parcel. Reused or reclaimed water is not permitted in Cannon Beach. There is no irrigation served by the water system.

### 3.5.6 Conservation Savings

Cannon Beach anticipates that the savings gained from the conservation measures identified above will reduce peak demand in years 10 and 20 by 7.8% of total system demand estimated for those years. Table 3-3 identifies the approximate percentage savings for each measure as estimated by Cannon Beach staff.

**Table 3-3**  
**5-Year Conservation Measure Savings**

<b>On-Going Efforts</b>	<b>Estimated Savings</b>
Complete leak detection survey and reporting	0.1%
Visual inspection of reservoirs	0.0%
Meter testing and maintenance program	1.0%
Automated parks irrigation	1.0%
Leak detection visits	0.0%
Reduced operational usage at City facilities	1.0%
Educational opportunities	1.0%
<b>Planned Programs</b>	0.5%
Improved water auditing (track non-revenue use)	1.0%
Meter replacement program	1.0%
Water line replacement program	0.1%
Production meter testing	1.0%
Comprehensive leak detection service	0.1%
<b>Total Savings</b>	<b>7.8%</b>

The City anticipates that the greatest conservation savings, in terms of decreasing water losses, will come from the meter related programs and the improved tracking of non-metered uses. The meter program may initially increase customer demand numbers as aged and slowing meters are replaced by accurate meters. However, once customers realize they are using and paying for increased amounts, they will scale back on their usage. Experience indicates that once a faulty meter is repaired or replaced, average and peak demand associated with that meter decreases a substantial amount, depending upon how poorly the meter read before its repair or replacement. Theoretically, current water loss (unaccounted water) estimates should decline with the implementation of the planned conservation measures.

### 3.5.7 Main Replacement Program

Approximately 98% of the City's Water lines have been replaced since year 1970, making the system relatively new. Predominant in the system is water main and service branch pipe of PVC or Polyethylene (82%). There is virtually no ferrous pipe in the system.

Replacement of remaining Asbestos-Cement pipe (5000 feet) is to occur over the next five years at about 1000 feet per year. Upon replacement of the AC pipe the City will continue to upgrade/replace its pipe system by age and size priority. PVC and Polyethylene pipe are the only materials used for the replacement.

### 3.6 Summary of 5-Year Benchmarks

A summary of the relevant benchmarks for the City's on-going and planned conservation activities are outlined in the Table 3-4.

Table 3-4 5-Year Conservation Benchmarks		
Benchmark	Date	Frequency
<b>On-Going Efforts:</b>		
Complete leak repairs from 2007 survey	June 2008	NA
Visual inspection of reservoirs	NA	Annual
Meter testing program	NA	On-going
Automated parks irrigation	June 2007	NA
Leak detection visits	NA	On-going
Production meter testing	April 2006	Annual
Conservation awareness efforts at Public Works Week open house	May 2007	Annual
<b>Planned Programs:</b>		
Improved water auditing	June 2006	Monthly
Revolving meter replacement	NA	On-going
Meter testing >2"	January 2007	Annual
Distribute conservation materials	January 2007	On-going
Install rain sensors in City parks	June 2007	NA
Comprehensive leak detection	June 2007	NA
Main Replacement	Continuous	Annual

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## **Section 4**

# **Curtailment Plan Elements**

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The City believes that there are four primary scenarios in which the City may not be able to meet potable water demand: shortages due to weather conditions, mechanical or structural failure, contamination, or any combination thereof. The City's response to water supply emergencies such as these is described below.

The City Council is in the process of adopting a water curtailment ordinance. This ordinance allows the City Manager authority to declare a water supply emergency and enact the water curtailment plan. In the event that a stage three water emergency is determined, the ordinance allows for the policing of customer activities and the issuance of citations (warnings and fines) to encourage customers to abide by the curtailment plan measures. A copy of the draft ordinance is included at Section 4.4.

### **4.1 Production Capacity and Historic Demand**

The current maximum production capacity for the Cannon Beach water system is 1.3 million gallons per day (mgd) – or 900 gallons per minute (gpm) - through combinations of its surface and groundwater sources. There are two reservoirs in the distribution system that provides a total of 2.6 million gallons of treated water storage. Except in emergency situations, these reservoirs must be maintained at maximum levels to provide water for fire suppression and unexpected short-term water emergencies, such as water main breaks. Also, system pressures are reliant on storage tank levels.

Maximum daily distribution system demand has been as high as 0.97 mgd, in July 2004, representing 75% of maximum capacity. Production capacity is greater than historic demand. Should production capacity be reduced by some unforeseen short-term circumstance, the production deficit can be supplied from water stored in the system's reservoirs for a limited length of time, depending on seasonal demands. Using stored water to meet maximum daily demands, however, puts the utility at risk for meeting crisis water demands (e.g., a significant fire requiring large quantities of water).

### **4.2 Water Shortage Identification**

Some situations may occur that create the potential for a supply shortage. These situations include but are not limited to:

- An extended period of dry, hot weather
- Water rights withdrawal limitations

- Contamination of source water supplies
- Interruption of commercial power supply to a critical part of the City water system
- Major water transmission-line break
- Reservoir failure
- Other major catastrophic event.

If one or more of these scenarios creates the need for water curtailment, the actions taken will vary depending on the time of year and the expected duration of the situation. The following guidelines will be considered during a curtailment event:

- Maximize public health and safety
- Meet Safe Drinking Water Act standards
- Minimize disruption to the public
- Protect and enhance the public's trust in the City
- Be consistent in phasing in curtailment measures as water shortage continues
- Apply measures in a fair and equitable manner in the best interest of the public
- Maximize coordination of responses with other departments within the City
- Minimize impact on the environment
- Limit liability

In general, the response to a water shortage is development of strategies that create a reduction in daily demand for water. This water curtailment plan identifies four stages of water shortage. The first stage is an alert to the potential of a water shortage, and the fourth stage is a critical water shortage that threatens the ability of the City to deliver water to customers for life sustaining and safety needs.

### **4.3 The Curtailment Plan**

This curtailment plan is designed to guide water management staff in the event of a water shortage.

These curtailment measures consist of four severity stages, and they can affect the city as a whole or only specified service areas. At each stage, restrictions imposed at the previous level(s) remain in force. The plan provides flexibility and enforcement capability. At any stage, additional restrictions can be imposed if they are deemed necessary. In some extreme cases, some stages can be skipped (e.g., expectation of an extended water production capacity reduction). Should the plan have to be implemented, notification to the general public will be primarily through the local news media. Direct contact will be made with large customers and institutions as the need requires.

#### **Stage 1 - Early Warning for a Potential Water Supply Shortage**

The Stage 1 warning is reached when maximum daily production is just meeting the daily demand, or when there is expectation of a potential supply deficiency, or when 100% capacity is met but stream flow levels are dropping and there are predictions of unusually long term hot weather. When such a situation occurs, the Water Operations Supervisor, Water Maintenance Supervisor, Utilities Division Manager and on duty water operations staff (the Water Utilities Management team) will meet to assess the situation. If the Water Utilities Management team determines that a potential water shortage does exist, the team will consult with the Public Works Director. Under a Stage 1 warning, the Director has the authority to activate some or all of the voluntary curtailment measures described below.

Actions for which the City has direct control are the easiest to curtail:

1. The City will limit water use for street sweeping and hydrant & water line flushing.
2. City Parks and Recreation Department shall irrigate at maximum efficiency.
3. The Fire Department will limit training exercises to those that do not use water.
4. The City will make conservation information available at the Post Office, Chamber of Commerce, Public Library, Utility Billing and other City offices, local news media, and to neighborhood associations.
5. The City will remind customers of Cannon Beach's water waste ordinance (Municipal Code 13.04.\_\_\_\_\_).

Stage 1 curtailment for citizens will be voluntary. The City will request that customers reduce or eliminate nonessential water use, to follow odd/even outdoor watering schedules based on address, and to limit outdoor watering to the early morning or late evening.

## **Stage 2 - Water Supply Shortage**

A Stage 2 water shortage is reached when maximum production is not meeting daily demand and reservoir storage falls to 90% capacity. The Water Utilities Management team will assess the situation daily, and may initiate the following restrictions:

1. Limit Parks & Recreation Department nonessential water use, and irrigate only in off-peak hours.
2. Limit hydrant and water main flushing to emergencies only.
3. Ask customers to voluntarily restrict all irrigation and other nonessential outdoor water use and to limit all outdoor water use to the hours between 8:00 pm and 8:00 am. The following practices are deemed nonessential:
  - a. Watering or irrigating of lawns, grass or turf except for:
    - New installations after June 1
    - Athletic fields frequently used for organized play
    - Park and recreation areas of a particular significance and value to the community as approved by the City Manager
  - b. Use of City supplied water to wash sidewalks, streets, driveways, walkways, parking lots, or other impervious surfaces except where necessary for public health or safety
  - c. Use of City-supplied water to wash vehicles (including boats and watercraft) except at facilities equipped with water recirculation equipment or where necessary for public health or safety (e.g., garbage trucks or food transport) or as required by law.

## **Stage 3 - Severe Water Supply Shortage**

A Stage 3 water shortage is reached when maximum production is not meeting daily demand and reservoir storage falls to 85% capacity. The Water Utilities Management team will assess the situation daily. The Public Works Director will notify the City Manager and City Council of the shortage and submit a report of what measures are being implemented. At Stage 3, the Public Works Director may declare a Water Emergency (Municipal Code 13.04.\_\_\_\_\_). The Public Works Department will keep the media notified regularly about the status of the shortage, and may initiate the following restrictions:

All outdoor nonessential water use shall be prohibited except where necessary for public health or safety or as noted in the exceptions below. Violators may be cited and water service may be discontinued for repeat violations per Municipal Code 13.04.\_\_\_\_\_. The following practices are deemed nonessential:

1. Watering or irrigation of lawns, grass or turf shall not occur unless it is:
  - New lawn, grass or turf that has been seeded or sodded after June 1 of the year in which the restrictions are imposed, and in such cases watering may only occur until the vegetation is established. Such watering shall occur only between the hours of 8:00 pm and 8:00 am.
  - Park and recreation areas of a particular significance and value to the community as approved by the City Manager. Such watering shall occur only between the hours of 8:00 pm and 8:00 am.
2. Use of City-supplied water to clean, fill or maintain levels in decorative streams, ponds or fountains unless it has a recirculating water system.
3. Use of City-supplied water to fill swimming, wading or other pools with a capacity in excess of 100 gallons. Water may be added to swimming pools to replace volume lost due to evaporation and normal loss due to usage.
4. Use of City-supplied water to wash down sidewalks, streets, driveways, walkways, parking lots or other impervious surfaced areas except where necessary for public health or safety.
5. Use of City-supplied water to wash vehicles (including boats and watercraft) except at facilities equipped with water recirculation equipment. Washing of vehicles for public health and safety purposes (e.g., garbage trucks or food transport) is allowed as required by law.

#### **Stage 4 - Critical Water Shortage**

A Stage 4 water shortage is reached when maximum production is not meeting daily demand and reservoir storage falls to 75% capacity. Because a water shortage of this severity threatens the ability of the City to deliver essential water supplies to its customers and provide adequate water storage and pressure for fire suppression, Stage 4 restrictions are mandatory.

The Public Works Director will notify the City Manager and City Council of the shortage and submit a report of what measures are being implemented. At Stage 4, the Public Works Director may declare a Water Emergency (Municipal Code 13.04.\_\_\_\_). The Public Works Department will keep the media notified regularly about the status of the shortage, and may initiate the following restrictions:

1. All outdoor nonessential water use shall be prohibited except where necessary for public health or safety. Violators may be cited and water service discontinued for repeat violations per Municipal Code 13.04.\_\_\_\_. All institutional accounts shall restrict water use to fire protection and other critical functions only.
2. Customers who receive water service from the City but who reside outside the City limits may have their water service disconnected temporarily.
3. The Fire Department shall modify operations as necessary to maintain stored water levels and system water pressure for as long as possible. Public Works shall work closely with the Fire Department to alert them of areas where there may be low pressures and/or supply.
4. In the event that a service level or other area of the city is without water, potable water shall be made available at appropriate locations within the city limits. Water shall be trucked to these sites and dispensed free of charge to City water customers.

The Water Emergency shall be in effect until such time as the Public Works Director notifies the City Manager when, in his/her opinion, the water shortage is over and an emergency situation no longer exists.

## **4.4 Relevant Municipal Codes (proposed)**

Public Works staff will be proposing to City Council ordinance language in general semblance to the following:

Section 13.04.\_\_\_\_\_ Water waste. Where water is wastefully or negligently used on a customer's premises, the utility may discontinue the service if such conditions are not corrected within five days after giving the customer written notice.

Section 13.04.\_\_\_\_\_ Declaration of water emergency; order. The utility may, by written order of the Public Works Director, declare a water emergency and impose such limits on water use or consumption as it deems necessary under the circumstances. The utility shall provide as much notice to the public of the order and limits imposed as is practicable under the circumstances. Any deficiency in the notice given shall not affect the validity of the order.

Section 13.04.\_\_\_\_\_ Water use contrary to emergency order prohibited. Use of water by any person contrary to the limits imposed by any water emergency order is prohibited. Each such use shall be considered a separate violation, punishable as described in section 13.04. \_\_\_\_\_

Section 13.04.\_\_\_\_\_ Penalty. Any person violating any of the provisions of this Code shall, upon conviction thereof, be punished by a fine not exceeding \$500, or by imprisonment in the County jail for a period not exceeding six months, or by both such a fine and imprisonment. Each day on which a violation occurs or continues shall be deemed a separate and distinct offense.





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## Section 5

# Water Supply Element

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### 5.1 Future Service Area

#### 5.1.1 Population

Cannon Beach has previously conducted population forecasts (projections) through its Planning Department and more recently through its Water Master Plan (2001). The basis for the information provided in those studies has since been updated making those forecasts obsolete. In the absence of an updated, bona fide, population forecast study for the City of Cannon Beach, the following simplistic projection is made based upon Clatsop County population projections prepared by the Office of Economic Analysis (OEA), *Forecast of Oregon's County Populations and Components of Change, 2000 – 2040* (release April 2004).

The OEA provided population projections for Clatsop County through the year 2040. These projections indicate a county increase of 2590 people from the year 2000 population of 35,700, to an estimated 38,290 people by year 2025. This growth represents an average annual rate of about 0.3% over the twenty-five years period. The OEA expects projected growth rates for the County to slow from 2.9% between 2000 and 2005 to 0.92% between 2020 and 2025. Table 5-1 shows the OEA's actual (2000-2005) and projected growth for Clatsop County in five-year increments for the period 2000 through 2025. Portland State University (PSU) has provided for Cannon Beach a certified census figure of 1588 for April 2000 and a certified population estimate of 1650 for July 2005. PSU's numbers as-well-as projections for the remainder of the period for the City are included for comparison in table 5-1.

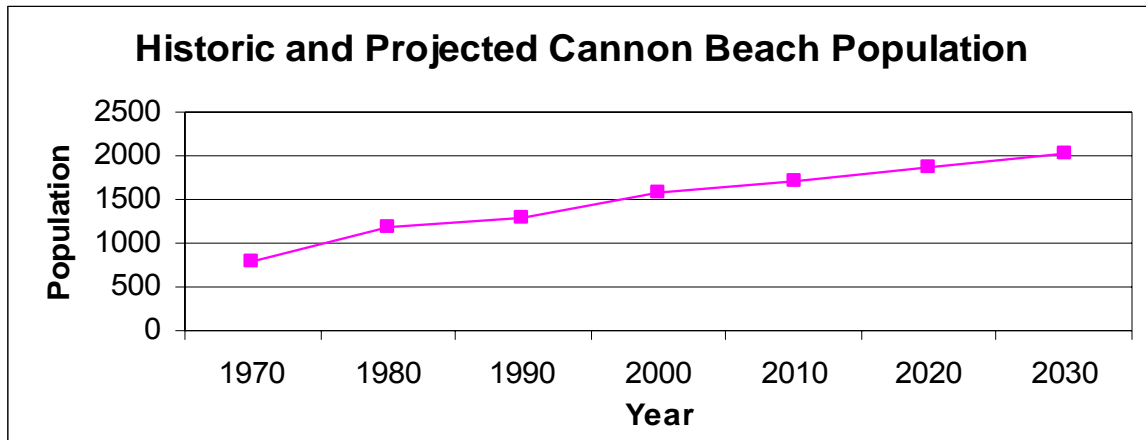
Table 5-1 Projected 5-year Incremental Growth Rate							
	2000	2005	2010	2015	2020	2025	Avg.
Clatsop Population	35700	36734	37162	37652	37939	38290	
Percent Growth <sup>3</sup>		2.9%	1.16%	1.3%	0.76%	0.92%	1.41%
Cannon Beach Population	1588 <sup>1</sup>	1650 <sup>2</sup>	1716 <sup>4</sup>	1785 <sup>4</sup>	1856 <sup>4</sup>	1930 <sup>4</sup>	
Percent Growth <sup>3</sup>		4.45%	4.49%	4.0%	4.0%	4.0%	4.18%
<b>Percentage of Clatsop County Population</b>							
Cannon Beach	4.4%	4.5%	4.6%	4.7%	4.9%	5.0%	

<sup>1</sup> Certified census figure – Portland State University  
<sup>3</sup> 5-year growth rate

<sup>2</sup> Certified population estimate – Portland State University  
<sup>4</sup> Projected growth rate at estimated rate (4.0%)

A graphical representation of historic and projected future population growth is provided in figure 5 below.

**Fig. 5**



**Table 5-2**  
**Annualized Growth Rates**

Annualized Rate	2000-2005	2005-2010	2010-2015	2015-2020	2020-2025
Clatsop County	0.58%	0.23%	0.26%	0.15%	0.18%
Cannon Beach	0.89%	0.89%	0.88%	0.88%	0.88%

From the population projections, it is calculated that the County will grow at an average of 0.28% annually and the City at an average of 0.88% annually (table 5-2). City growth by year 2025, by this projection, will be an additional 342 persons (21.5%) over the year 2000 population. This seems to be a reasonable estimation, given the historic record for Clatsop County/Cannon Beach populations (table 5-3).

**Table 5-3**  
**Historic Population and Growth**

	1970	1980	1990	1999	2000
Clatsop County	28,473	32,489	33,301	34,750	35,622
Cannon Beach	779	1,187	1,293	1,425	1,460

**Percentage of Clatsop County Population**

Cannon Beach	2.74%	3.65%	3.88%	4.10%	4.10%
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## Annualized Growth Rate

	1970-1980	1980-1990	1990-1999	Total (1970-1999)
Clatsop County	1.33%	0.25%	0.47%	0.69%
Cannon Beach	4.30%	0.86%	1.36%	2.19%

EES 2001 Water Master Plan

It is essential to acknowledge that the service population for the City fluctuates seasonally. The actual population, at any given time, varies greatly due to seasonal and weekend recreational use of the area. A cursory analysis of the City's 1999 water meter records indicated that approximately 30% of the City's residential connections experienced between three and nine months of zero recorded use.

## Projected Peak Service Population

Because of Cannon Beach's unique characteristics, the City's permanent population is not always an effective measurement, particularly as it relates to the provision of City services. In order to accurately assess the impact of population on City services, it is necessary to define other components that constitute the City's population. In addition to permanent residents, this includes persons staying in the City's motel room, persons using dwellings for occasional use (second homes) and persons visiting the community for the day. Although dated, Table 5-4 still serves to illustrate projected populations during peak use periods.

**Table 5-4**  
**Projected Peak Service Population**

	Permanent	Commercial	Temporary	Transient	Total
1993	1,310	2,668	2,664	4,545	11,187
1995	1,320	2,716	2,799	4,545	11,380
2000	1,403	2,954	3,138	4,695	12,190
2005	1,486	3,192	3,474	4,845	12,997
2010	1,569	3,430	3,813	5,025	13,837
Change					
1993-2010	19.7%	28.5%	43%	10.5%	23.6%

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Table 5-4 explanation:

Permanent Residents: The number of permanent residents is based on the City's population projection for full time residents.

Commercial Residents: The number of commercial residents was determined as follows: the total number of motel units, recreational vehicle sites and camp sites; assume a 100% occupancy rate; and 2.8 persons per room. Future growth was based on the following assumptions: no additional motel zoning, which is current existing City policy; build-out of existing motel property, to the maximum density, including redevelopment of existing motel property; a limited number of new motel units in existing commercial zones; and no change in the number of persons per unit.

Temporary Residents: The number of temporary residents was determined as follows: the number of dwelling units held for occasional use (second homes); assume that 75% are occupied; and 4.0 persons per dwelling unit. Future growth was based on the following assumptions: an annual growth

rate of 22.5 dwelling units; and no change in the occupancy rate or the number of persons per dwelling unit.

Transient Residents: The number of day visitors was determined by the number of on-street and off-street parking spaces available in the City's commercial zones. It was assumed that there were three persons per vehicle. Future growth was based on the assumption that there would be limited numbers additional off-street parking associated with new commercial development. It was also assumed the persons per vehicle would not change.

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### **5.1.2 Land Use**

It is anticipated that the City's major land use category will continue to be single-family residential (see Exhibit 5-1). The City's long term growth should not significantly affect the current distribution of land use categories, and as such, each customer class should continue to exhibit the same share of the City's total water consumption. The City's water service area boundaries coincide with those of its City limits. The City's Comprehensive Land Use Plan notes that limited growth will occur outside the current city limits into the urban growth boundary (UGB), (see Exhibit 5-2).

## **5.2 Future Demand**

### **5.2.1 Average Annual Demand**

Planning for future water demands will be based on consumption statistics drawn from current meter records. The following are several generally accepted water use definitions that are commonly used in evaluating water consumption statistics for any water utility.

Annual Use: Expressed in gallons, the figure is taken directly from the master meter records. This figure includes all domestic consumption, losses and water used in fire fighting. Annual use is important in assessing the adequacy of the water sources.

Average Daily Demand (ADD): Expressed in gallons per day, the figure is also taken directly from master meter records and includes all water uses and all water losses. The average daily demand is one of several factors that will be used in determining the storage requirements for the City.

Maximum Monthly Demand (MMD): Expressed in gallons, it is the highest monthly meter reading for a year. This figure is useful in determining the seasonal peaking factors and designing the system for peak flows.

Maximum Daily Demand (MDD): Expressed in gallons per day, it is the maximum volume of water use experienced or anticipated on any given day. In Cannon Beach this typically occurs in the summer season.

Maximum Instantaneous Demand (MID): Expressed in gallons per minute, it is the theoretical maximum amount of water that will ever be used at one time and is used as a design parameter in assessing the gallons per minute per connection plus estimated fire flow of 750 gpm. Since the only variable in this consumption statistic is the number of connections, the MID will always be increasing since the number of connections is always increasing. The value of 0.6 gallons per minute per connection is a generally accepted value commonly used in estimating the maximum daily demand when actual instantaneous peak flow records are not available. The City has the equivalency of 2088 meters and therefore a maximum instantaneous demand of 1253 GPM.

## Growth Analysis

Due to the vacation and recreational residential nature of Cannon Beach, it is likely that the single largest variable in the overall water use at any given time is the actual population or the number of occupants in the community. In short, the more people in the community on any given day or weekend, the more that water will be used. Unfortunately, the City has no control over either the resident population or the transient populations. The actual population is likely controlled more by the other factors, such as the weather (more people come to the beach in “good” summer weather than during wetter winter weather). Fortunately, as the size of the actual population increases, the peak demand on the system does not increase on a directly proportional basis. Rather, the peak is “softened” due the larger statistical base of water service connections. This information is an important statistical fact related to peak water flows.

Growth is expected to continue proportionally across all City customer classes. That is, the public and commercial services will grow at the same rate as the residential class. Growth is expected to occur primarily within the current city limits and the urban growth boundary; however future expansion of the urban growth boundary may be approved.

The City reviewed the water system capacity in terms of equivalent dwelling units (EDUs). Equivalent dwelling units are a way of characterizing the total capacity need in the water system as if the City was made up entirely of single-family dwellings. There are a multitude of methods for calculation of EDUs. However, based on current water billing information, the total existing EDUs are estimated to be 3150 EDUs. The total number of single-family water accounts is 1,368. According to water flow records, single family users account for 43.43 percent of Cannon Beach’s water flow. Dividing the number of single-family dwelling units by their percent of total flow provides an estimate of the system-wide EDUs (3150).

Growth EDUs are estimated based on the estimated future residential dwelling units from the City’s database on properties, water billings, and the current proportion of EDUs to dwelling units. The existing number of residential dwelling units (including single family, multifamily, and condos) is estimated to be 1,689. Therefore, the ratio of EDUs to dwelling units currently is 1.865. The additional residential dwelling units projected through build-out within City Limits is estimated to be 491. Assuming the same mix of development occurs in the future as currently exists, the growth EDUs are estimated to be 916 (1.865 times 491). Total EDUs at build-out are estimated to be 4,066 (3150 current EDUs plus 916 additional EDUs from growth). This projected rate of growth will result in a design population in the year 2020 of 2605 connections. This value represents a 54% increase from the number of connections in the year 2000.

The rate of growth in water demand is presumed to be driven by the two largest customer classes - residential and commercial. Under this approach, it is assumed that use by the other customer classes will remain relatively steady and will have little impact on future water consumption. It is also presumed that the character of the residential and commercial class remains relatively the same, as well.

Future demand was calculated by estimating the future number of EDUs (4,066 in year 2020) and applying a standard rate of use per EDU. A number of 280 gallons per day per EDU was determined from the historical data. The number of expected EDUs was then computed using the rates of growth for population and employment for the residential and commercial classes, respectively. The results of that forecast are shown in Table 5-5.

**Table 5-5**  
**Usage Forecast**  
(Based on Gallons per Day per EDU)

<b>Year</b>	<b>EDU</b>	<b>MDD*</b>	<b>GPM</b>	<b>GPD/EDU</b>
2000	3150	883,000	613	280.3
2010	3608	1,011,386	702	280.3
2020	4066	1,139,771	791	280.3

Table 5-6 shows that the average daily demand (ADD) is expected to increase from about 0.52 mgd to 0.67 mgd over the period 2000 to 2025 – this is only an overall increase of just over 20% in that period. By 2025, the City’s projected population is expected to require only an additional 0.15 mgd.

**Table 5-6**  
**Projected Water Consumption**  
(Gallons)

<b>Demand</b>	<b>2000</b>	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>
ADD	518,356	570,411	594,320	616,761	641,761	666,868
Annual	189,200,000	208,200,000	216,926,800	225,117,772	234,068,935	243,406,746
G/C/D*	170.1	173.4	170.0	170.0	170.0	170.0

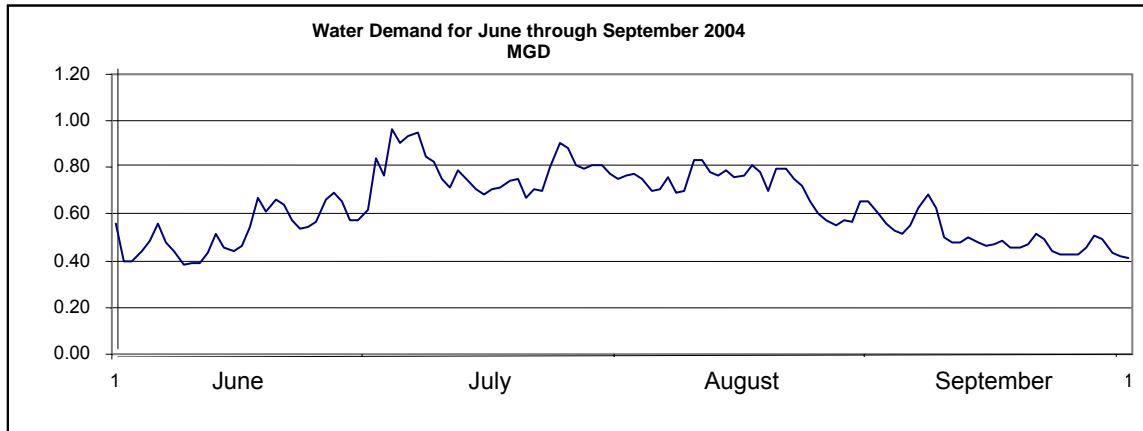
\* Gallons per capita per day

It should be noted that average daily demand (ADD) does not accurately represent peak demands placed on the system during peak season.

### 5.2.2 Seasonal Demand

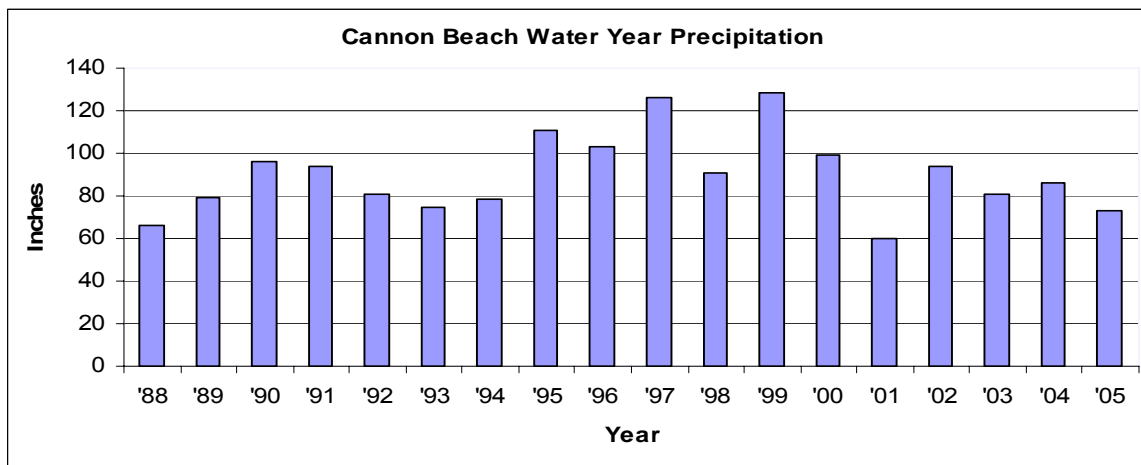
A review of water usage 2000 through 2005 indicates a peak day demand of 0.97 mgd which occurred on July 4, 2004. Figure 5-1 provides a graphical summary of the daily usage between June 1 and September 30, 2004. The resulting data indicate a peak day factor (pdf) of about 2.10 (i.e. peak day use compared to year 2004 ADD (0.46 mgd)). By comparison, this number (pdf) is comparable to other communities of similar size and composition in the region.

**Fig. 5-1 Summer Water Usage 2004**



However, since the summer of 2004 was not abnormally dry (see Fig. 5-2), the peaking factor could trend higher if persistent periods of hot, dry weather were to be experienced in the future.

**Fig. 5-2 Annual Rainfall 1988-2005**



Using a peaking factor of 2.0 the MDD can be anticipated. At the end of the current projection period, in the year 2025, it is projected that about 925 gallons of water per minute will need to be available for use during a peak-day. City water records indicate that spring water yields typically decline, late August to early September, to around 300 gpm during a normal year of about 75 inches of precipitation. This means 625 gpm will be needed from the surface water source to make up the difference during a peak demand day in 2025. 625 gpm is 92.8% of the City's surface water right of 673 gpm (1.5 cfs).

**Table 5-7  
Maximum Daily Demand (MDD)**

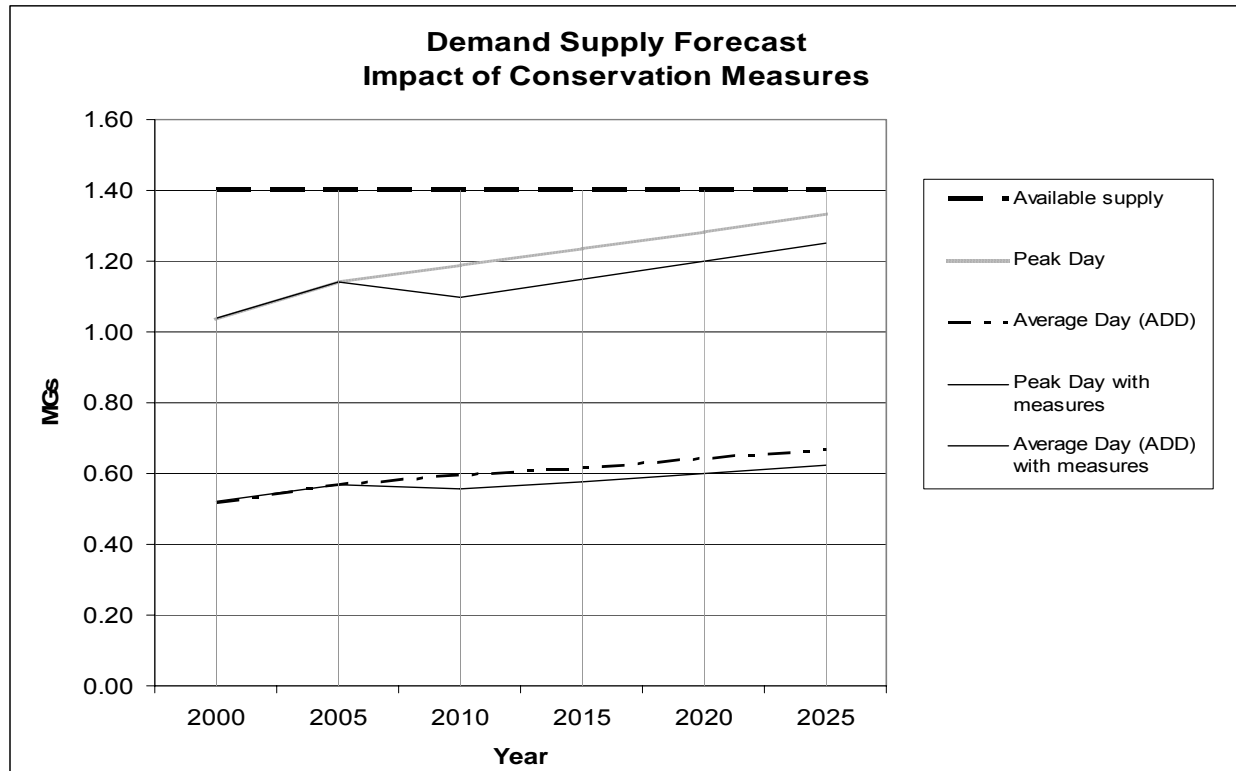
	2000	2005	2010	2015	2020	2025
ADD	518,356	570,411	594,320	616,761	641,761	666,868
MDD	1,036,712	1,140,822	1,188,640	1,233,522	1,283,522	1,333,736
GPM	719.9	792.2	825.4	856.6	891.3	926.2

### 5.2.3 Impact of Conservation on Peak Demand

Figure 5-3 illustrates the estimated impact of proposed conservation measures on demand projections. Maximum available water supply ( $1.4 \text{ MG} = 300 + 673 \times 1440$ ) presumes a moderately dry water-year of about 70 inches precipitation resulting in spring yield of 300 gpm and withdrawal of 673 gpm (100%) from the City's surface water-right on Ecola Creek.



**Fig. 5-3**



### 5.3 Schedule for Beneficial Use

The City currently operates under four separate water rights, all of which allow for municipal use. Of the four municipal rights, only one has not been certificated (extension granted) – that governing the Elk Creek source. In order to solidify its present permit limit, the City has developed a timeline for applying beneficial use of its unperfected right. That schedule is shown in Table 5-8. The City's water needs are based on the demand forecast previously presented with adjustments to reflect conservation savings.

**Table 5-8  
City of Cannon Beach  
Water Right Perfection Schedule**

<b>S41717 673 GPM</b>	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>
Instantaneous Demand From this source(achieved)	673 gpm				
Peak Daily Demand Forecast from this source*	492 gpm	525	557	591	626

\* From Table 7, MDD in gpm minus 300 gpm (of spring source) equals the amount of make-up water from surface water source.

## 5.4 Long-Range Supply Plan

### 5.4.1 Capacity Assessment

Daily stream flow data collected by WRD\*\* the period from between October 1, 1974 and September, 1986 reflects flow characteristics of the creek for the 12-year span. There has been no further monitoring of the stream flows since then. The collected data, though, is helpful, relevant and applicable in that it illustrates the potential for a broad range of flows through the full spectrum of weather and climate of the area. It captures flow extremes from extended drought to deluge. The collected data typifies potential stream flows of Elk Creek and other northwest coastal streams. Recorded mean daily stream flows ranged from 3.7 to 1730 cubic feet per second during the monitoring period.

Most relevant to this discussion, however, are the flows during the most critical time periods that impact all users of the West Fork Elk Creek water basin – namely, the low flows of the summer months. A study of the reported stream flows of June 1 through September 30 of the twelve year monitoring period appear to average flow-minimums of about a 5.1 cfs (see Table 5.9). From table 5.9, the Min/Max Spread can be interpreted to reveal real drought conditions such as is in year 1979 (and perhaps 1980). Likewise, low flows at the beginning of the period generally portend low end-of-period flows since flows tend to decrease as the summer wears on. Nine out of twelve monitored years had decreasing flows through to September.

**Table 5.9**  
**Elk Creek - Period (June-September) flow breakdown**

	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986
<b>Min</b>	5.1	6.8	5.6	6	3.7	5.3	5	4	9.2	4.7	4.4	4.2
<b>Max</b>	95	188	176	194	50	58	199	112	174	118	400	124
<b>Spread</b>	89.9	181.2	170.4	188	46.3	52.7	194	108	164.8	113.3	395.6	119.8
<b>Start June 1</b>	14	40	161	27	15	58	25	11	31	35	21	25
<b>End Sep 31</b>	5.1	6.8	20	29	5.6	14	33	16	9.2	7.2	7.5	22
<b>Spread</b>	-8.9	-33.2	-141	2	-9.4	-44	8	5	-21.8	-27.8	-13.5	-3

Cubic feet per second

Source      \*\*[http://apps2.wrd.state.or.us/apps/sw/hydro\\_report/gage\\_data\\_request.aspx?station\\_nbr=14299140](http://apps2.wrd.state.or.us/apps/sw/hydro_report/gage_data_request.aspx?station_nbr=14299140)

All water rights granted to the City, both certificated and time-extended, are for sources that contribute to the waters of the West Fork of Ecola Creek. It should be noted that the recorded flow measurements include the waters that were diverted for municipal use. In other words; the measured flows would have been higher without the City's withdrawal of water. There are no existing City records of water withdrawal during the WRD monitoring period to determine the impact on the stream. It is estimated that an average 1.22 cfs (500-600 gpm) was a typical municipal summer withdrawal from the West Fork Elk Creek through the recording period. This means, for instance, that the recorded flow at September 31, 1975 of 5.1 cfs would translate to 6.32 cfs (5.1 + 1.22 cfs) removing the municipal influence.

From the collected data then, we can see that:

- Stream flows can range from 3.7 – 400 cfs (includes municipal use of 1.22 cfs)
- End of summer flows ranged from 5.1 – 33 cfs (includes municipal use of 1.22 cfs)
- Cumulative water rights amount to 4.1 cfs\*\*\*\*
- Projected peak daily demand 2025 = 2.06 cfs
- Projected avg. daily demand 2025 = 1.76 cfs
- Projected avg. daily demand 2010 = 1.56 cfs
- Projected avg. daily demand 2000 = 1.36 cfs
- 

\*\*\*\*of the cumulative 2.6 cfs water right granted on the spring sources, only about 0.66 to 1.11 cfs remain available for use during summer months depending on rainfall.

Through the water right sources, effective available water to the City for withdrawal is estimated to be between 2.16 (969 gpm) and 2.61 cfs (1171 gpm).

#### 5.4.2 Projected 20-year withdrawal

As previously mentioned, there is granted to the City of Cannon Beach, water rights for 4.1 cubic feet per second of water; 2.6 cfs from springs and 1.5 cfs from West Fork Elk Creek. Summer spring water yields decrease to about 0.66 to 1.11 cfs available water. Adding the available summer spring-water source to the Elk Creek source provides about 2.16 to 2.61 cfs. These estimates should carry the City to about year 2030 before considering pursuit of additional sources of water supply.

**Table 5-10**  
**Long-range, projected need of water from Elk Creek Source (four water rights)**


















	2010	2015	2020	2025	2030	2035	2040
<b>Peak Daily Demand</b>	1.84	1.9	1.98	2.06	2.12	2.20	2.26
<b>Average Daily Demand</b>	0.92	0.95	0.99	1.03	1.06	1.10	1.13

Additional helps may be found at:

- Exhibit 5-3 WMCP Review Process
- Exhibit 5-4 Lifecycle of the Water Right Application to Certification
- Exhibit 5-5 WMCP Requirement Checklist



## Land Use

	C1 - Limited Commercial		OS - Open Space		R3 - Residential, high density		City Limits
	C2 - General Commercial		OSR - Open Space/Recreational		RAM - Residential Alternative/Manufactured Home		Urban Growth Boundary
	E - Estuary		PK - Park Management		RL - Residential, lower density		
	IN - Institutional		R1 - Residential, moderate density		RM - Residential Motel		
	MP - Maunfactured Dwelling & Recreational Vehicle Park		R2 - Residential, medium density		RVL - Residential, very low density		

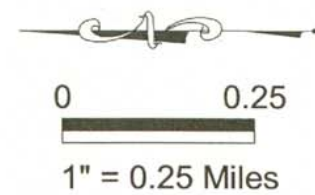


Exhibit 5-1  
Cannon Beach Land Use Map

May 2000

 ECONOMIC AND ENGINEERING SERVICES, INC.  
111 SW 5th Avenue, Suite 1670, Portland, OR 97204-3620





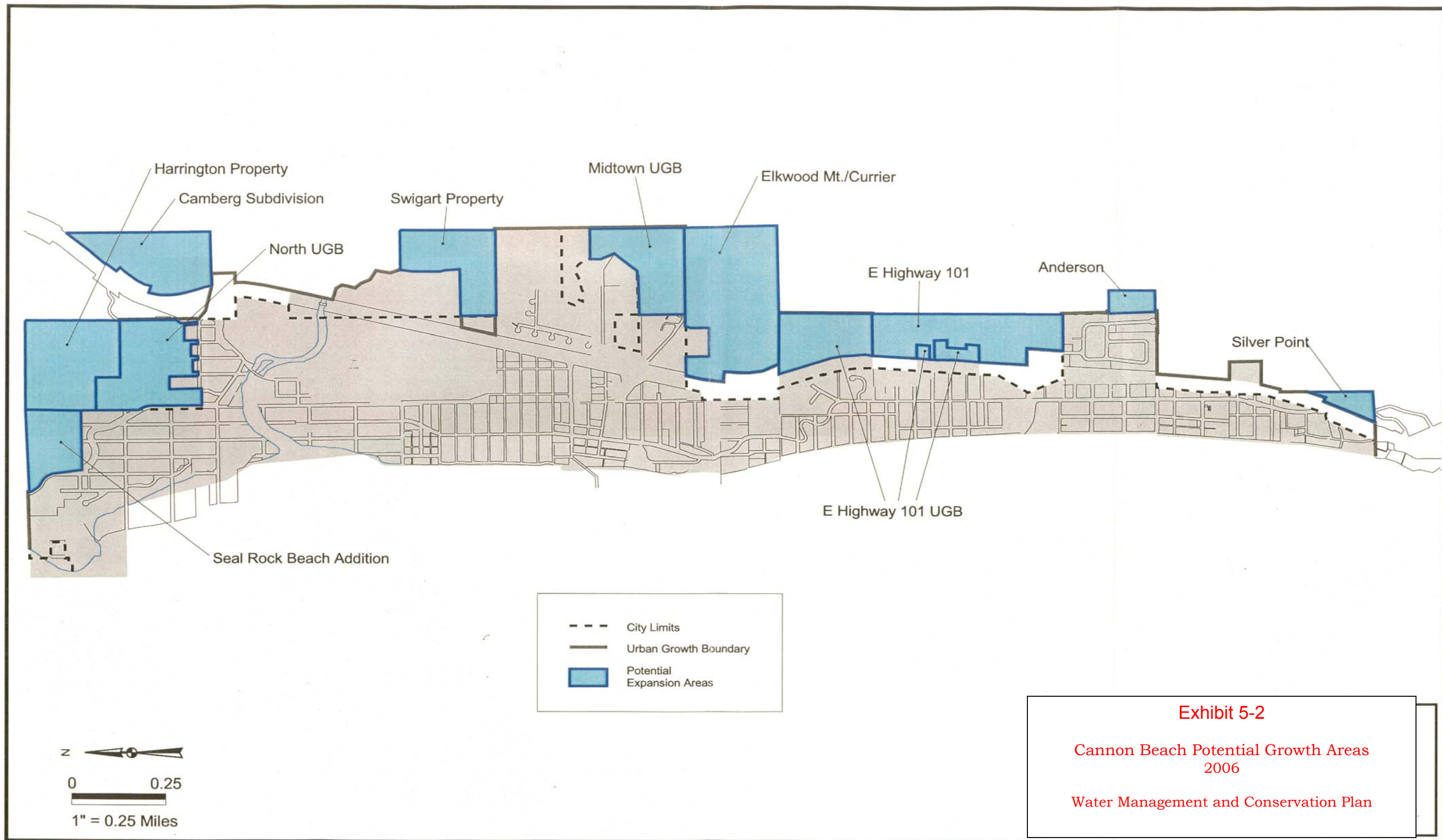


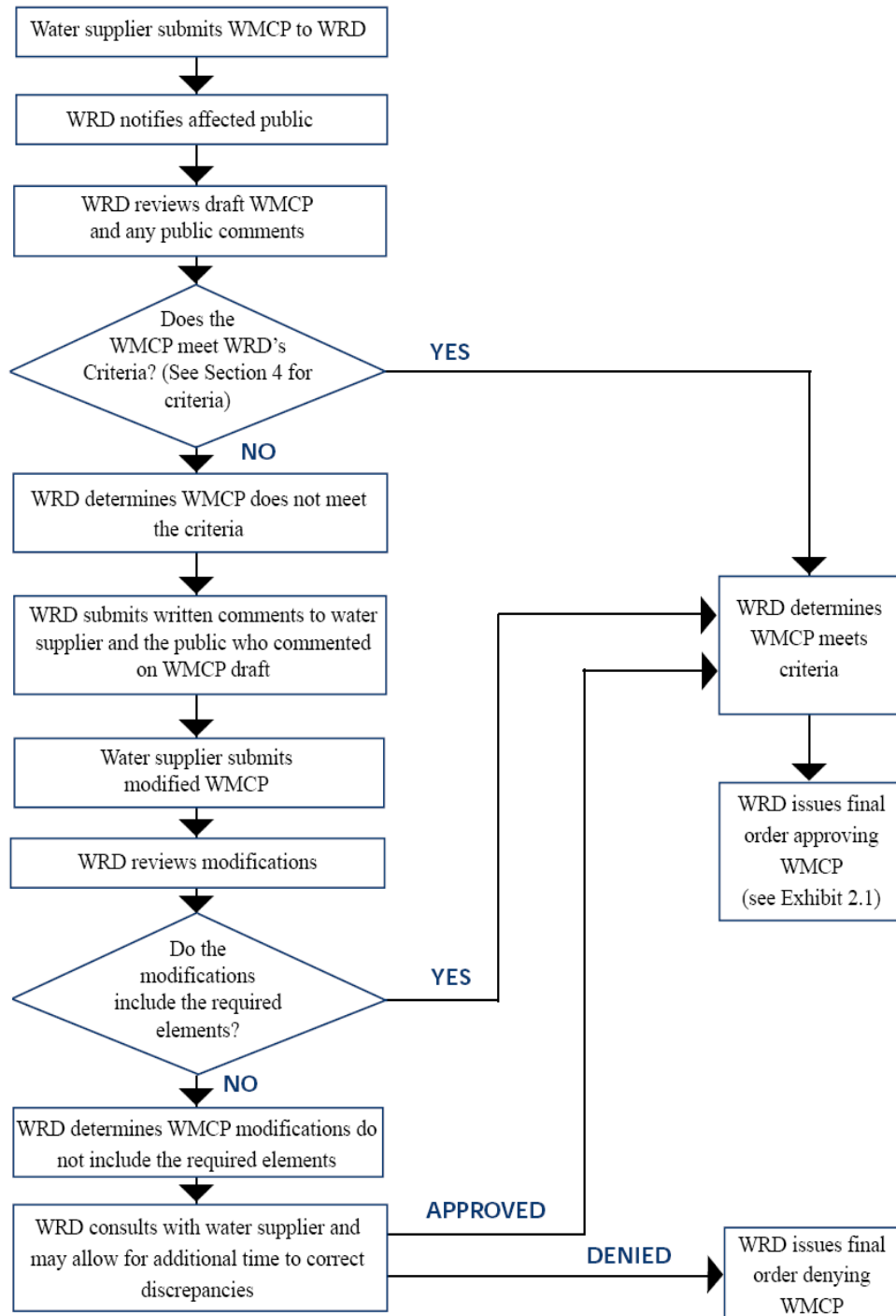
Exhibit 5-2

Cannon Beach Potential Growth Areas  
2006

Water Management and Conservation Plan

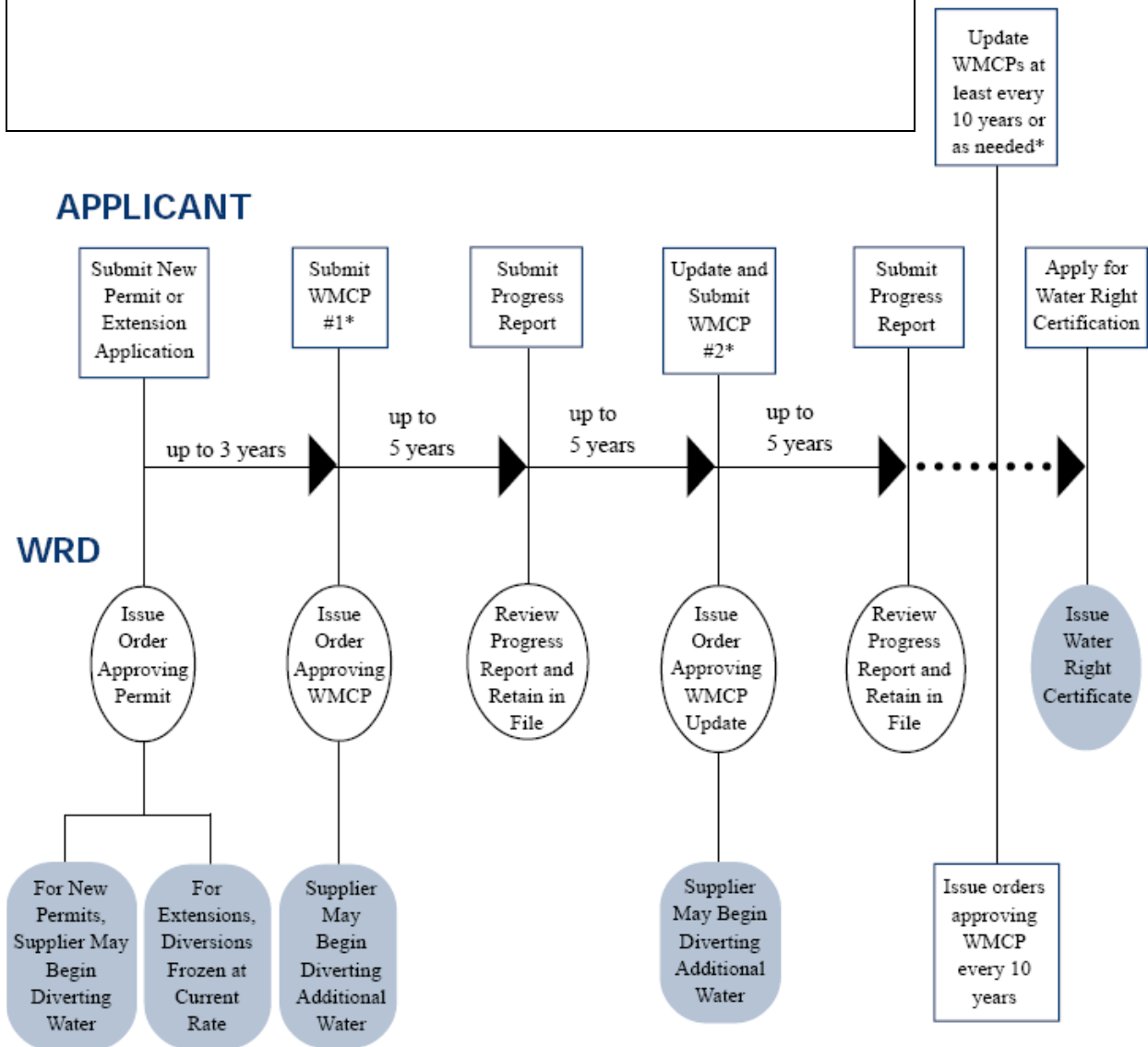
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## EXHIBIT 5-3 WMCP REVIEW PROCESS





# Exhibit 5-4 Typical Lifecycle Water right Permit Application to Certification



\* Each new WMCP or WMCP update must forecast and justify water use for 20 years.

Note: The lifecycle displayed above is a representation of a typical water right lifecycle. The time frame and process shown may not mirror the time frame and process experienced by all water suppliers.

EXHIBIT 5-5  
GUIDANCE SECTION CHECKLIST

For all the tasks that apply, place a check in the first box. Check the second box once the task is completed. Boxes pre-checked ☒ represent tasks required to be performed by all water suppliers.

Sections and Tasks		OAR Reference	Guidance Pg. No.
<b>Water Supplier Description</b>			
<input checked="" type="checkbox"/>	Description of supplier's source(s)	690-086-0140 (1)	18
<input checked="" type="checkbox"/>	Delineation of current service area	690-086-0140 (2)	19
<input checked="" type="checkbox"/>	Assessment of adequacy and reliability of existing supplies	690-086-0140 (3)	19
<input checked="" type="checkbox"/>	Quantification of present and historic use	690-086-0140 (4)	20
<input checked="" type="checkbox"/>	Summary of water rights held	690-086-0140 (5)	20
<input checked="" type="checkbox"/>	Description of customers served and water use summary	690-086-0140 (6)	21
<input checked="" type="checkbox"/>	Identification of interconnections with other suppliers	690-086-0140 (7)	22
<input checked="" type="checkbox"/>	System schematic	690-086-0140 (8)	22
<input checked="" type="checkbox"/>	Quantification of system leakage	690-086-0140 (9)	22
<b>Water Conservation Element</b>			
<input checked="" type="checkbox"/>	Full metering of systems	690-86-0150 (4)(b)	24
<input checked="" type="checkbox"/>	Meter testing and maintenance program	690-86-0150 (4)(c)	25
<input checked="" type="checkbox"/>	Annual water audit	690-86-0150 (4)(a)	26
<input type="checkbox"/>	Leak detection program	690-86-0150 (4)(e)	27
<input type="checkbox"/>	Leak repair or line replacement program	690-86-0150 (6)(a)	28
<input checked="" type="checkbox"/>	Rate structure based on quantity of water metered	690-86-0150 (4)(d)	29
<input checked="" type="checkbox"/>	Rate structure and billing practices that encourage conservation	690-86-0150 (6)(d)	31
<input checked="" type="checkbox"/>	Public education program	690-86-0150 (4)(f)	32
<input type="checkbox"/>	Technical and financial assistance programs	690-86-0150 (6)(b)	33
<input type="checkbox"/>	Retrofit/replacement of inefficient fixtures	690-86-0150 (6)(c)	33
<input type="checkbox"/>	Reuse, recycling, non-potable opportunities	690-86-0150 (6)(e)	34
<input type="checkbox"/>	Other measures, if identified by supplier	690-86-0150 (6)(f)	34
<input checked="" type="checkbox"/>	Progress report on previous WMCP	690-86-0150(1)	36
<input checked="" type="checkbox"/>	Documentation of water use measurement and reporting	690-86-0150(2)	36
<input checked="" type="checkbox"/>	List of measures already implemented or required under contract	690-86-0150(3)	36
<b>Water Curtailment Element</b>			
<input checked="" type="checkbox"/>	Assessing water supply	690-086-0160(1)	38
<input checked="" type="checkbox"/>	Stages of alert	690-086-0160(2)	39
<input checked="" type="checkbox"/>	Triggers for each stage of alert	690-086-0160(3)	39
<input checked="" type="checkbox"/>	Curtailment actions	690-086-0160(4)	40
<b>Water Supply Element</b>			
<input checked="" type="checkbox"/>	Delineation of current and future service areas	690-086-0170(1)	42
<input checked="" type="checkbox"/>	Population projections for service area	690-086-0170(1)	42
<input checked="" type="checkbox"/>	Prepare schedule to fully exercise each permit	690-086-0170(2)	42
<input checked="" type="checkbox"/>	Prepare demand forecast	690-086-0170(3)	43
<input checked="" type="checkbox"/>	Comparison of projected need and available sources	690-086-017 (4)	45
<input type="checkbox"/>	Analysis of alternative sources	690-086-0170(5), (8)	45
<input type="checkbox"/>	Quantification of maximum rate and monthly volume	690-086-0170(6)	46
<input type="checkbox"/>	Mitigation actions under state and federal laws	690-086-0170(7)	46
<b>Other Items</b>			
<input checked="" type="checkbox"/>	List of affected local governments and their comments	690-086-0125 (5)	47
<input checked="" type="checkbox"/>	Date for submittal of next update	690-086-0125 (6)	48
<input type="checkbox"/>	Documentation, where additional time is requested to meet previous benchmarks or metering	690-086-0125 (7)	48

EXHIBIT 5-6  
Cert. #72551

STATE OF OREGON  
CERTIFICATE OF WATER RIGHT

THIS CERTIFICATE ISSUED TO

Oregon Water Resources Department  
158 12th Street NE  
Salem, Oregon 97310

The specific limits for the use are listed below along with conditions of use.

Source: WEST FORK ELK CREEK tributary to ELK CREEK

County: CLATSOP

Purpose: Providing required stream flows for Coho and fall chinook salmon, resident and sea-run cutthroat trout, and winter steelhead for migration, spawning, egg incubation, fry emergence, and juvenile rearing.

To be maintained in:

WEST FORK ELK CREEK FROM THE HEADWATERS (SENW, SECTION 22, TOWNSHIP 4N, RANGE 10W WM); TO THE MOUTH AT RIVER MILE 0.0 (SWSW, SECTION 28, TOWNSHIP 5N, RANGE 10W, WM)

The right is established under Oregon Revised Statutes 537.341.

The date of priority is 10/11/1991.

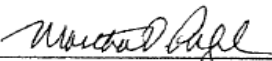
The following conditions apply to the use of water under this certificate:

1. The right is limited to not more than the amounts, in cubic feet per second, during the time periods listed below:

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
33.0	33.0	33.0	33.0	20.0	10.0	5.0	5.0	5.0	14.3	33.0	33.0

2. The water right holder shall measure and report the in-stream flow along the reach of the stream or river described in the certificate as may be required by the standards for in-stream water right reporting of the Water Resources Commission.
3. For the purposes of water distribution, this instream right shall not have priority over human or livestock consumption.
4. The instream flow allocated pursuant to this water right is not in addition to other instream flows created by a prior water right or designated minimum perennial stream flow.
5. The flows are to be measured at the lower end of the stream reach to protect necessary flows throughout the reach.

Witness the signature of the Water Resources Director,  
affixed AUGUST 20, 1996.

  
Martha O. Page

Recorded in State Record of Water Right Certificate number 72551.

IS71935