WOODINVILLE WATER DISTRICT

COMPREHENSIVE WATER PLAN

DRAFT

Prepared for

Woodinville Water District

09031-001-002

Prepared by

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ACRONYMS AND ABBREVIATIONS

µg/L	micrograms per liter
µmhos/cm	micro mhos per centimeter
AC	Asbestos cement
ADD	Average Day Demand
APWA	American Public Works Association
Ave.	Avenue
AWWA	American Water Works Association
BAT	Backflow Assembly Tester
Blvd.	Boulevard
CCF	100 cubic feet
CCS	Cross Connection Control Specialist
CDBG	Community Development Block Grant
cfs	cubic feet per second
CIP	Capital Improvement Program
CVWD	Cross Valley Water District
CWA	Cascade Water Alliance
CWSP	Coordinated Water System Plan
DBPR	Disinfectant/Disinfection By-Products Rule
dia.	diameter
DOE	Washington Department of Ecology
DOH	Washington Department of Health
Dr.	Drive
DWSRF	Drinking Water State Revolving Fund
EKCRWA	East King County Regional Water Association
El.	Elevation
EPA	United States Environmental Protection Agency
ERU	Equivalent Residential Unit
ESA	Endangered Species Act
ESWTR	Enhanced Surface Water Treatment Rule
ET	Evapotranspiration
fps	feet per second
ft	feet
GFC	General Facility Charge
GMA	Growth Management Act
gpm	gallons per minute
GWI	Ground Water Under the Influence of Surface Water
HAA5	Haloacetic Acid 5
HAA5FP	HAA5 Formation Potential
HCP	Habitat Conservation Plan
HHD AWSP	Howard Hanson Dam Additional Water Storage Project
HP	Horse Power
HPC	Heterotrophic plate count bacteria
IESWTR	Interim Enhanced Surface Water Treatment Rule
Inc.	Incorporated
LCR	Lead and Copper Rule
lf	linear feet
M	Million

M/DBP	Microbial Disinfection By-Products
MCL	Maximum Contaminant Level
MDD	Maximum Day Demand
MG	Million gallons
mg/L	milligrams per liter
mgd	million gallons per day
ml	milliliters
MRDL	Maximum Residual Disinfectant Levels
MTTHMP	Maximum TTHM Potential
N.	North
N/A	Not applicable
ND	not detected
NE	Northeast
NTU	Nephelometric turbidity units
NUD	Northshore Utility District
O&M	Operation and Maintenance
PHD	Peak Hour Demand
PL	Place
PL5	Pipeline No. 5
PRV	Pressure Regulating Valve
psi	pounds per square inch
PSRC	Puget Sound Regional Council
PVC	Polyvinyl chloride
PWTF	Public Works Trust Fund
Qa	Maximum annual quantity
Qi	Instantaneous withdrawal
Rd.	Road
SCADA	Supervisory Control and Data Acquisition
SDC	System Development Charge
SDWA	Safe Drinking Water Act
SEPA	State Environmental Policy Act
SnoPUD	Snohomish PUD
SPU	Seattle Public Utilities
sq ft	square feet
SRRWA	Snohomish Regional Water Authority
SSMP	Satellite System Management Program
SSP	Second Supply Pipeline
St.	Street
std.	standard
SWTR	Surface Water Treatment Rule
TAZ	Traffic Analysis Zone
TCR	Total Coliform Rule
TOC	Total Organic Carbon
TSI	Tacoma Seattle Intertie
TTHM	Total Trihalomethanes
TW	Tacoma Water
UGA	Urban Growth Area
UGB	Urban Growth Boundary
ULID	Utility Local Improvement District
VOC	Volatile Organic Chemical

WAC	Washington Administrative Code
WDM	Water District Manager
WDS	Water Distribution Specialist
WETRC	Washington Environmental Training Resource Center
Weyco	Weyerhaeuser Company
WSP	Water System Plan
WTP	Water Treatment Plant
WTPOIT	Water Treatment plant Operator (in training)
WWC	Wastewater Collection Specialist

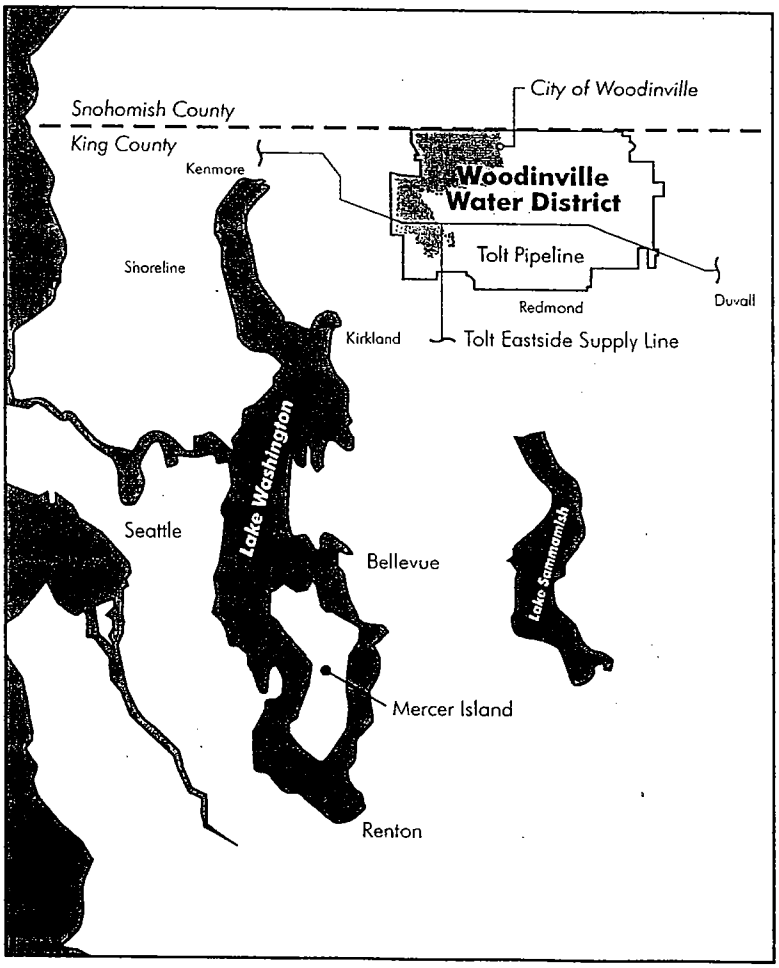
INTRODUCTION

This Comprehensive Water Plan (plan) for the Woodinville Water District (District) presents an evaluation of existing facilities, system operation, water quality, projected water demands, and existing and future requirements. Based on the evaluation, the plan updates the long-range planning strategies, the Capital Improvement Plan (CIP), and financial plan. This plan has been prepared in accordance with the requirements of Washington Administrative Code (WAC) 246-290-100 and the April 1997 Washington Department of Health (DOH) Water System Planning Handbook.

BACKGROUND

The Woodinville Water District, formerly King Water District No. 104, is a municipal corporation which was established by a special election held on August 4, 1959. The King County Board of Commissioners authorized the creation of the District by Resolution No. 20121 on August 17, 1959. The District is located in northeast King County and covers approximately 18,660 acres (29.2 square miles). The District serves the City of Woodinville and portions of unincorporated King County. The location of the service area is shown in Figure 1.

FIGURE 1
SERVICE AREA LOCATION MAP
WOODINVILLE WATER DISTRICT



AGENCY COORDINATION

A pre-planning meeting for this plan was held on November 4, 1998. In attendance were project team members from the District, HDR Engineering, and FCSG Group and representatives from DOH, King County Planning, City of Woodinville and Woodinville Fire Life Safety. Seattle Public Utilities (SPU) was invited, but declined to attend. A Planning Data Memorandum consisting of Chapters 1 and 2 of this plan, was submitted and reviewed by DOH, King County Planning, City of Woodinville, Woodinville Fire Life Safety, and SPU in April 1999.

PUBLIC COORDINATION

A copy of the draft plan will be available to the public for review and comment at the District office and at the local public library. The public will be invited to a presentation of the draft plan which will be made to the District Board.

INVENTORY OF EXISTING FACILITIES

Sources of Supply

The District's current primary water source is SPU's South Fork Tolt River Watershed, which is occasionally supplemented by the Cedar River Watershed. The water is purchased directly from SPU, and is supplied via the Tolt Pipeline. Current treatment for the Tolt and Cedar supplies includes fluoridation, chlorination, and pH adjustment through the addition of soda ash and lime for corrosion control. A new 120 MG Tolt River direct filtration treatment facility is scheduled to be operational in 2000. An ozonation facility for the Cedar River Supply is scheduled to be operational in 2004.

The District has nine active taps to the Tolt River supply: eight to the Tolt Pipeline which traverses the District from east to west, and one tap to the Tolt Eastside Supply Line, which diverts a portion of the Tolt River supply to the south.

The District currently owns and maintains an emergency standby well (and site) located in close proximity to the District's Woodinville office properties. The specific purpose of the well is to provide the District and its customers with an alternate source of water in the event a natural disaster (e.g., seismic event) or other unforeseen event disrupts the District's ability to receive a safe and reliable water supply from SPU.

Interties

The District does not have any formal interties with surrounding jurisdictions. However, the District does have informal emergency interties with both the Northshore Utility District and the City of Bothell.

Future interties will be constructed with the City of Redmond at the Trilogy at Redmond Ridge Urban Planned Development and potentially along the southern boundary of the District. The District currently provides water service to several properties just south of the District's boundaries through an interlocal agreement with the City of Redmond. Once Redmond extends its water system northward, and can provide service, the District will transfer service of the customers back to Redmond. At that point, the District anticipates having interties with Redmond at those locations.

There is potential for both formal and informal interties with the Cross Valley Water District. Cross Valley will be taking over several District customers along the Woodinville-Snohomish Road, just north of the King/Snohomish County line, sometime during 2000. The system will be separated by closing an 8-inch zone valve at the county line. This valve may serve as an emergency intertie after Cross Valley assumes service to this area.

Storage and Transmission Distribution

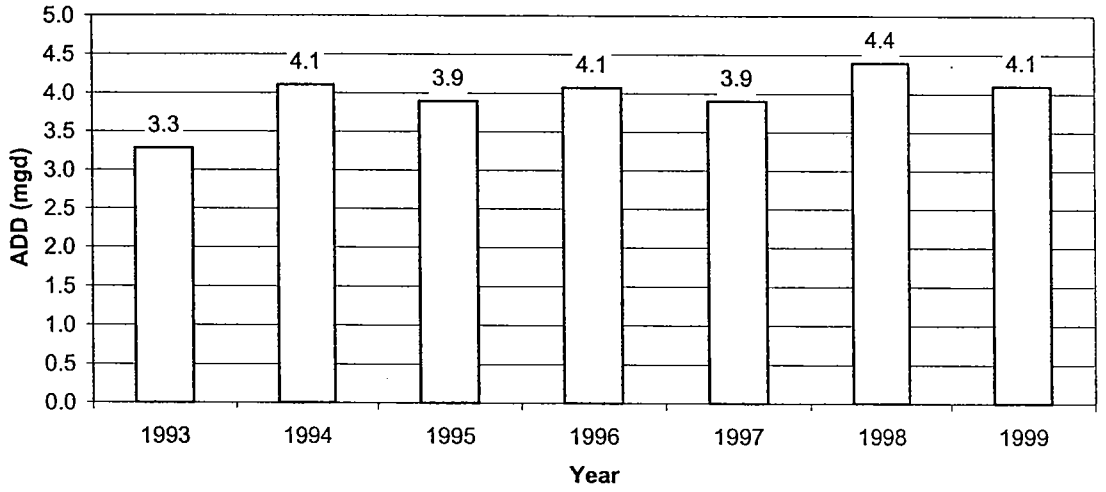
The District's system includes 253 miles of transmission and distribution piping, eight storage facilities, five pump stations (three of which are active and two standbys), and 44 pressure reducing valves (PRVs).

With its varying topography, the District operates several service zones. In some zones, water from the Tolt discharges directly into the system through a PRV. Some of the higher elevation zones require booster pumping to reach service pressures. Storage facilities provide water to meet peak demands allowing the District to maintain a fairly constant flow from the Tolt Pipeline taps. The lower pressure zones are fed directly though PRVs.

EXISTING WATER USE

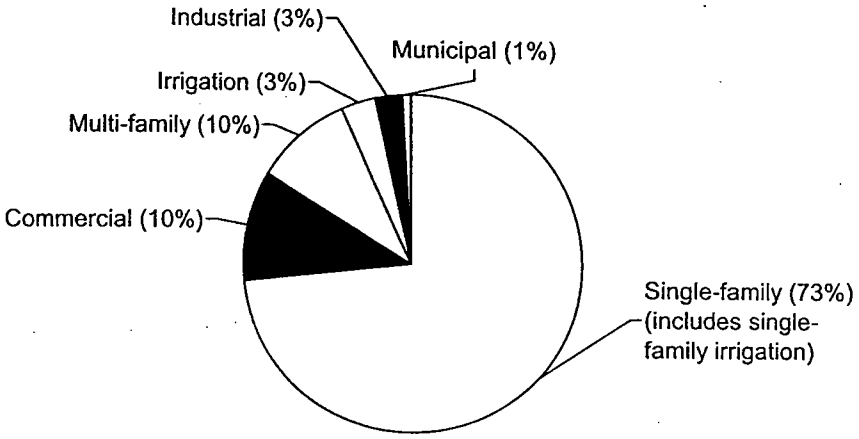
The existing District population is approximately 43,800 (1999 estimate). There are approximately 12,575 service connections (1999 estimate). Annual water usage (as Average Daily Demand (ADD)) from 1993 to 1999 is shown in Figure 2. The maximum ratio of Maximum Day Demand (MDD) to ADD from 1996 to 1999 was 3.0.

FIGURE 2
HISTORICAL WATER USAGE



The percentage of annual demand by connection type is illustrated graphically in Figure 3.

FIGURE 3
PERCENTAGE OF ANNUAL WATER DEMAND BY CONNECTION TYPE (1999)



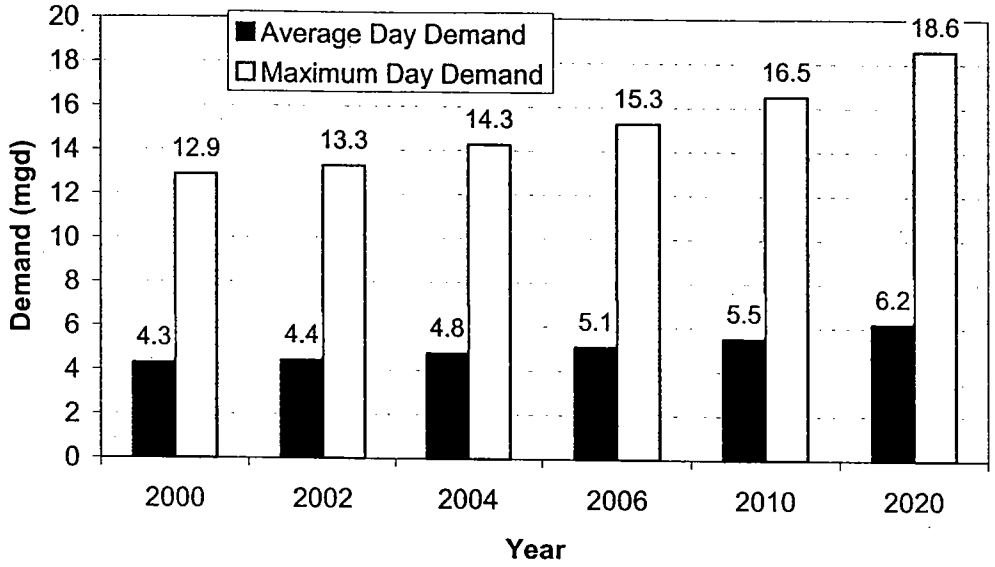
An Equivalent Residential Unit (ERU) represents the amount of water consumed by a typical single-family residence. The average usage in 1997, 1998, and 1999 for a single-family residence was calculated to be 257 gpd, 286 gpd, and 259 gpd respectively.

PROJECTED WATER DEMANDS

Future water demands for the District were estimated by analyzing land use and population. Water demands were calculated by estimating the number of future connections then multiplying that number by the water demand per connection. Water demands were calculated for each service zone and for each connection type (i.e. single-family, multi-family, commercial, industrial, municipal, and irrigation). The demand projection methodology used the integration of GIS zoning and service area mapping, existing demand and connection data, King County and City of Woodinville land use policies, and demographic data from SPU, which are based on Puget Sound Regional Council (PSRC) projections.

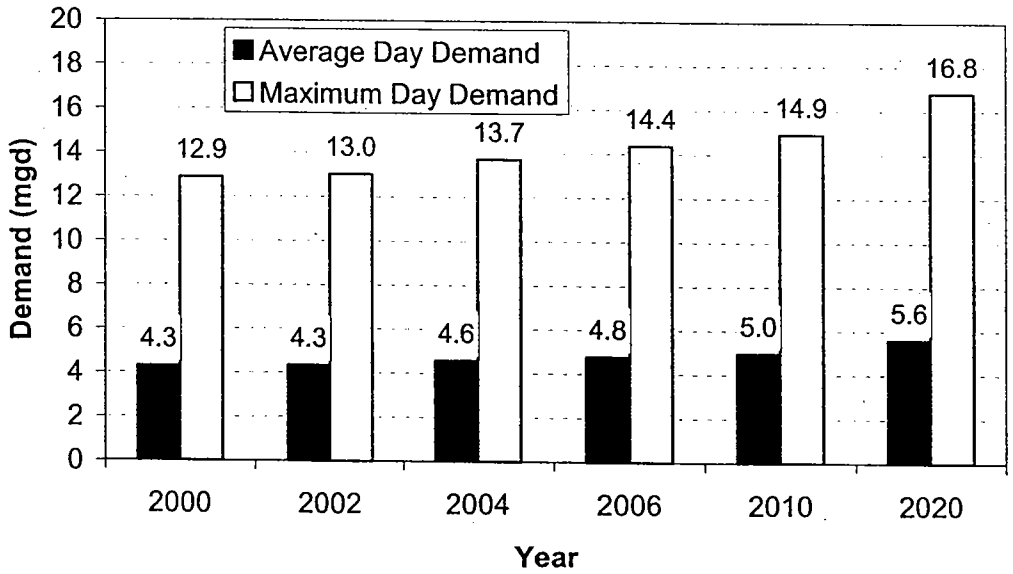
Projected total ADD and MDD for the District are shown in Figure 4.

FIGURE 4
PROJECTED WATER DEMANDS (MGD)
WOODINVILLE WATER DISTRICT



Projected future ADD and MDD with the anticipated impact of the 1% Conservation Program are presented in Figure 5 *Projected Water Demands - With Conservation*. The 1% Conservation Program is discussed in Chapter 4.2 *Conservation Program*.

FIGURE 5
PROJECTED WATER DEMANDS - WITH CONSERVATION (MGD)
WOODINVILLE WATER DISTRICT



SOURCE OF SUPPLY ANALYSIS

The District's current water supply contract with SPU will expire on January 1, 2012. Although SPU will likely not renew the contract under the current terms, the SPU water supply contract will be renewed in some form prior to 2012 to assure continuity of water supply to District customers. At the time of this writing, a revised contract with SPU could be through the District's participation in the Cascade Water Alliance, or a new individual contract. In addition, the District has been exploring future supply alternatives. The various sources of supply alternatives were examined as part of this plan.

There are two organizations under formation to address the development, operation, and management of regional municipal water supplies:

- Cascade Water Alliance (CWA). The CWA is a regional group, which would serve as a single wholesale customer to SPU. The CWA is composed of several cities and a number of water districts, which currently purchase most of their water from SPU. With the CWA, these purveyors would continue to obtain their water from SPU.
- Snohomish River Regional Water Authority (SRRWA). The SRRWA is a joint administrative entity, which is presently comprised of three public water utilities: the City of Everett (Everett), Northshore Utility District (NUD), and the Woodinville Water District. In December 1996, the SRRWA acquired the Weyerhaeuser Timber Company surface water right from the Snohomish River. In December 1996, the SRRWA submitted a draft plan of use and an application to the Department of Energy (DOE) to change the type of the water right, from "manufacturing" to "municipal" and the place of use from Weyerhaeuser's north Everett mill site to the "area serviced by the Snohomish River Regional Water Authority."

Future Source of Supply Alternatives

The potential future water supply alternatives were examined in terms of:

- Capacity: Annual Withdrawal (Qa) and Instantaneous Withdrawal (Qi), if available.
- Status: What work has been completed thus far.
- Costs: capital and operating and maintenance costs, if available.
- Likelihood that the project will occur.
- Time frame for the project to be on-line.

A comparison table of the alternatives is included as Table 1.

TABLE 1
COMPARISON OF SOURCE OF SUPPLY ALTERNATIVES
WOODINVILLE WATER DISTRICT

Source	Institution/ How Acquired	Budgetary Costs[1]	Capacity	Major Required Facilities	Likelihood to Occur and Time Frame for Source to be On-line	Water Rights	Right-of-Way Acquired	SEPA/EIS Complete	Major Permitting Complete	Other Issues[2]
Tolt and Cedar Rivers	Direct Purchase from SPU	Water Rate (Jan. 2000): Winter: $0.73/ccf Summer: $1.12/ccf Growth Surcharge: $0.46/ccf	Current District use is not limited. Currently: ADD: ~ 3.9–4.4 mgd MDD: ~ 11.8 mgd	None (SPU's Tolt Filtration Plant is under construction; Cedar Treatment Plant is in the planning stage)	Current source and most likely future sources.	Water rights are in place.	NA	NA	NA	--
Green River	Direct Purchase from TW, Wheel through SPU or CWA (via TSI)	Capital: $7 M/mgd Water Rate: ?/ccf	Average Annual: 13 mgd[3] TSI Capacity: 40 mgd The District's share would be part of SPU/CWA agreement.	Howard Hanson Dam Additional Water Storage Project; SSP (Headworks, PL5, North Branch (TSI)) Potential Future Filtration	Most likely of alternative future sources – most progressed. Time Frame: 2004 – 2005 (TSI) Time Frame: 2002 (upper reach PL5) Time frame dependent on the financial viability of the middle reach of PL5 and North Branch (TSI).	In 1986, Tacoma was granted a water right for an additional 65 mgd, which is subject to in-stream flow requirements. The place of use is "the City of Tacoma and its environs."	Yes - PL 5 No - TSI	Yes - PL 5 No - TSI (Programmatic and Project)	Yes - PL 5 No - TSI	Adoption of Tacoma Water's HCP. Corp's advancement of HHD AWSP. CWA formation Future filtration.
Sultan River (Lake Chaplain)	Direct Purchase from Everett	Capital: $2.2 M for new pipeline capacity: SnoPUD Surcharge; Wheeling Cost ?/ccf; Transmission Costs from Clearview Reservoir Water Rate: ?/ccf [4]	District's capacity of Clearview Project: 12 mgd	Clearview Project; Additional Transmission Piping from Clearview Reservoir to District	Less likely than SRRWA options.	Option would require that the place of use for Everett's existing water rights be expanded to include Woodinville.	No	No	No	Crossing Snohomish/King County Line. Challenging permit process.
Sultan River (Lake Chaplain)	Develop Source as Partner in SRRWA – Flow Swap	Capital: $5.9 M/mgd[5] plus: SnoPUD Surcharge[6] O&M: $1.6 M/year plus: SnoPUD Surcharge ?/ccf	Qa: 8.8 mgd Qi: 11 mgd	Industrial WTP; Clearview Project; WWD Transmission Piping	Undetermined - Subject to issues affecting SRRWA Plan of Use Implementation. . Time frame: Undetermined(?)	No application submitted and/or regulatory efforts have been initiated to facilitate swap.	No	No	No	Crossing Snohomish/King County Line.
Snohomish River	Develop Source as Partner in SRRWA – Direct Transfer	Capital: $7.3 M/mgd[7] O&M: $2.0 M/year	Qa: 8.8 mgd Qi: 11 mgd	Potable WTP; WWD Transmission Piping	Reasonable likelihood. Time frame: ~ 2014 – 2016	SRRWA submitted an application in 1996 to change type and place of use for current SRRWA water right.[8] Decision on change application by May 1, 2000. WWD entitled to 11 mgd share of 36 mgd (Qi) total.	Partially (Clearview Project)	Partially (Clearview Project) SEPA completed on SRRWA Plan of Use and Water Right Change	Partially (Clearview Project)	Crossing Snohomish/King County Line. Challenging permit process.
Cross Valley Ground Water	Transfer CVWD Water Rights	Capital: $4 to 5 M/mgd	Qa and Qi: 2 mgd	Ground Water Pumping; Treatment; Transmission Facilities	At one time a viable project to serve east side of District. However because of GMA, growth will occur on west side.	Woodinville may submit an application to expand the place of use of CVWD water right to include Woodinville.	No	No	No	Crossing Snohomish/King County Line.
Snoqualmie Aquifer and River	CWA and EKCRWA	Capital: $3 to $4 M/mgd	Qa and Qi: 40 mgd total capacity. (District share not determined)	Groundwater Pumping Facilities, Potable WTP; Transmission Piping	This is a potential long-term alternative. Time frame: ~ 2014 to 2020	EKCRWA and SPU have applied for two water right permits. (Snoqualmie aquifer and Snoqualmie River).	No	No (Programmatic and Project)	No	Possible In-stream benefits.
Lake Tapps	SPU or CWA	Capital: $3.7 M/mgd[9]	Qa and Qi: 65 mgd	WTP; Transmission Piping; Distribution Piping	High likelihood. Time frame: 2015	Puget Sound Energy applied for permit on June 20, 2000.	No	No	No	In-stream flow benefits.
Wastewater Reuse	King County	Capital: Not Determined	Qa and Qi: 20 mgd irrigation	Water Reuse WTP; Transmission Piping; Distribution Piping	Undetermined.	King County theoretically holds water rights for treated wastewater.	No	No	No	--

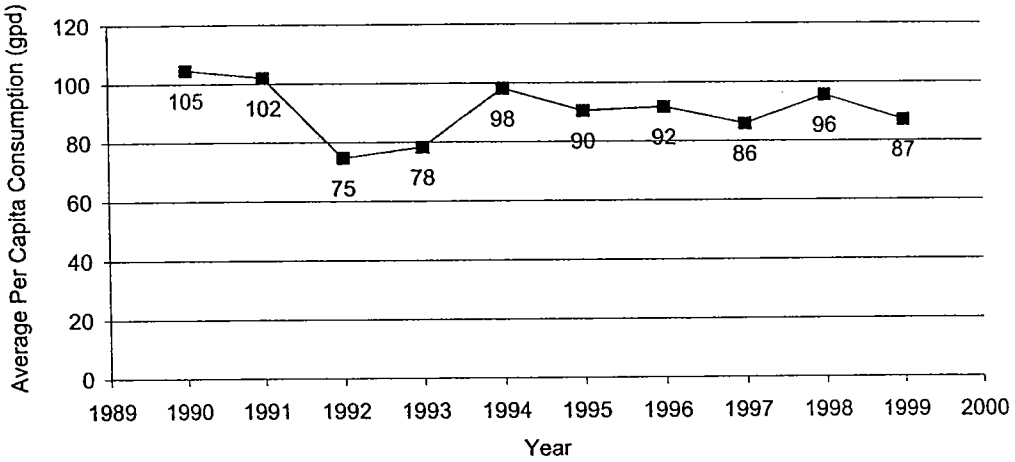
(1) Budgetary costs reflect available costs to date; additional cost components are noted. Budgetary costs between alternatives can not be compared directly.
(2) The impacts of the ESA would need to be addressed under all options.
(3) With the TSI on-line, the average annual incremental increase in SPU system yield is estimated to be 13 mgd based on a 98 percent system reliability. SPU's portion of the annual withdrawal from the Green River will be 3,300 acre-feet plus an additional 6,700 acre-ft during the drier three out of every 10 years. The amount available will vary seasonally as a function of in-stream flow requirements and storage at HHD. The maximum available will be 40 mgd.
(4) Cost for direct purchase from Everett would include wholesale rate from Everett (currently $0.65/CCF), water wheeling costs from CVWD, and potential Snohomish PUD surcharge.
(5) From SRRWA Technical Memorandum (June 1999), based on District's share of capital costs: $51.7 m for 8.8 mgd.
(6) Potential Snohomish PUD surcharge for Jackson Hydroelectric Plant, since District is outside of Snohomish PUD service area.
(7) From SRRWA Technical Memorandum (June 1999), based on District's share of capital costs: $64.6 m for 8.8 mgd.
(8) DOE has stated that water right transfers will be approved prior to new applications, unless the project is environmentally damaging.
(9) Based on a capital cost of $240 million and a capacity of 65 mgd.

ADD = Average Day Demand
ccf = 100 cubic feet
CWA = Cascade Water Alliance
CVWD = Cross Valley Water District
DOE = Department of Ecology
EKCRWA = East King County Regional Water Association
ESA = Endangered Species Act
GMA = Growth Management Act
HCP = Habitat Conservation Plan
HHD AWSP = Howard Hanson Dam Additional Water Storage Project
MDD = Maximum Day Demand
M = Million
mgd = million gallons per day
N/A = Not Applicable
O&M = Operation and Maintenance
PL5 = Pipeline No. 5
Qa = Annual Withdrawal
Qi = Instantaneous Withdrawal
SRRWA = Snohomish River Regional Water Authority
SnoPUD = Snohomish PUD
SPU = Seattle Public Utilities
SSP = Second Supply Pipeline
TSI = Tacoma Seattle Intertie
TW = Tacoma Water
WTP = Water Treatment Plant
?/ccf = undetermined cost

WATER CONSERVATION PROGRAM

In 1991, the District implemented an aggressive water conservation program. The goal was to reduce per capita consumption by eight percent by the year 2000. Per capita consumption from 1990 to 1999 is shown in Figure 6.

FIGURE 6
PER CAPITA WATER CONSUMPTION



Note: 1992 and 1993 were anomalous years. In 1992, there were mandatory water restrictions because of a drought; 1993 was unusually rainy.

Since implementation of the conservation program in 1991, the average demand has steadily decreased. Average per capita consumption decreased approximately seventeen percent from 1990 to 1999, far exceeding the eight percent goal. Average per capita consumption increased during 1998. Rainfall and solar radiation data collected at the District's Evapotranspiration Weather Station suggests that unusually low rainfall and high solar radiation in 1998 resulted in this increased usage.

The District has a full-time Public Information Coordinator who manages the conservation program for the District. The District participates in and promotes all of SPU conservation programs to its customers, including the one percent Conservation Initiative. In addition, the District implements its own programs locally and partners with other area water utilities.

The District is committed to the 1% Conservation Program. The goal of the conservation program will be to lower overall water demand by one percent per year through 2010. The District will focus on reducing residential irrigation water usage.

The emphasis of the District's continuing water conservation program is to lower peak demand, primarily by targeting landscape irrigation. Many residential customers in the District have large irrigated lots, resulting in high summertime peak water usage. The District's ratio of MDD to ADD is approximately 3.0, compared with 2.1 for the Seattle regional system. The higher ratio is due to the District's service area being largely rural, with much larger lots compared with Seattle's service area.

SYSTEM ANALYSIS

Water Quality

The District participates in a regional distribution system monitoring program with SPU and other purveyors supplied by the Tolt and Cedar River supplies. The 90th-percentile lead concentration in the regional system currently exceeds the lead action level established under the Lead and Copper Rule (LCR). The District source waters do not contain lead or copper. However, lead and copper can leach into residential water from building plumbing systems containing copper plumbing, lead-based solder, brass fixtures or some types of zinc coatings used on galvanized pipes and fittings. Each year, the District is required to send out public education materials concerning the lead concentrations. Under a bilateral compliance agreement with DOH, SPU will complete a Corrosion Control Optimization Study once the Tolt Filtration Plant is on-line. The District is in compliance with all other regulations. The District plans to meet all new regulations including the Stage 1 Disinfection By-products Rule (DBPR) with which large surface water systems (i.e., serving 10,000 or more) must comply by December 2001. In accordance with federal regulations requiring annual Consumer Confidence Reports, the District publishes an annual Water Quality Report for distribution to its entire customer base. A copy of the 1999 report is included in Appendix J.

Hydraulic Analysis

The distribution system was analyzed using the KYPIPE Version 3 hydraulic model. The system model was run for existing and 2020 ADD, MDD, and Peak Hour Demand (PHD) conditions. The hydraulic evaluation criteria are based on maintaining ranges of system pressures and velocities, as defined in the DOH WAC 246-290-230 and in *Water System Design Manual*, (DOH, June 1999). The distribution system was evaluated under the following conditions:

- Existing and 2020 PHD within each individual pressure zone under the condition where all equalizing storage is depleted. All Tolt taps are operating at the minimum hydraulic grade line guaranteed by SPU (effective in 2000). The evaluation criteria were based on maintaining a minimum pressure of 30 psi in any point in the distribution system during PHD conditions.
- Fire flows during existing and 2020 MDD, with all Tolt taps operating at the minimum hydraulic grade line guaranteed by SPU (effective in 2000) under the condition where the designed volume of fire suppression and equalizing storage is depleted. Fire flow locations were selected based on land use, major facilities (schools), pressure zones, and possible problem areas. The fire flow evaluation criteria were based on maintaining minimum pressures while delivering the required fire flow. The DOH WAC 246-290-230 requires that new distribution systems be designed to provide the MDD plus the required fire flow with a minimum pressure of 20 psi throughout the rest of the system.

Based on the hydraulic analysis, the existing distribution system is capable of meeting the PHD criteria through 2020. Isolated improvements are required to improve flows and pressures under fire flow conditions. Locations in which the maximum available fire flow was less than the design fire flow under the criteria of MDD, with equalizing storage and fire storage depleted, while maintaining 20 psi in the distribution system, are listed in Table 2. In addition, with equalizing storage and fire storage depleted, Zone 1 was unable to maintain 20 psi under MDD, even without providing a fire flow. Table 2 also shows model results for available fire flow in 2020, with the recommended CIP projects identified in Chapter 8.

TABLE 2
AVAILABLE FIRE FLOW
EXISTING AND YEAR 2020

	Available Fire Flow[1]

Service Zone	Node	Location	Existing System and Demands	2020 Demands with Improvements[2]	Zoning
4	403	NE 195th St. and 132nd Ave. NE	1,500	2,300	School
5	420	Wdnvlle Duvall Rd. and 144th Ave. NE	3,300	3,300	R-24/Comm.
5	450	144th and NE 203rd St.	2,800	3,300	Industrial
5	508	148th Ave. NE near 147th Pl. NE	550	1,000	SF
7	700	151 Ave. NE, near Wdnvlle Duvall Rd.	800	1,000	SF

(1) Under the conditions of MDD while maintaining 20 psi in the distribution system.

(2) With recommended improvements though 2020.

SF = Single-family residential

R-24 = Residential with base density of 24 dwelling units per acre.

Storage Analysis

Storage requirements for the system and individual service zones were calculated for existing, 2000, 2010, and 2020 demands. The service zones were grouped together by the storage facilities which serve the zones. In most cases, a storage facility serves more than one pressure zone through PRVs or a pump station. Several of the pressure zones are served by more than one storage facility. The required effective storage volume for each pressure zone is equal to the sum of the operational storage, equalizing storage and the larger of either emergency standby or fire storage. The storage components are defined as:

- **Operational Storage** - The volume of the distribution storage associated with source or booster pump normal cycling timer under normal operating conditions.
- **Equalizing Storage** - Utilized to meet the daily variations in demand.
- **Emergency Standby Storage** - Provides water supply during equipment failures, power failures, or during natural disasters such as earthquakes or floods.
- **Fire Storage** - Provides water for fire fighting.
- **Effective Storage** - Represents the total storage of a reservoir minus the dead storage. The dead storage is the volume of stored water that is not available to all consumers at the minimum design pressure.

Table 3 summarizes required additional storage volumes to meet the storage criteria for existing and projected 2010 and 2020 demands.

TABLE 3
REQUIRED ADDITIONAL STORAGE VOLUMES (MG)

Service Zones	Required Additional Storage (MG)		
	Existing	2010	2020
1 (510); 2 (420) and 21 (340)	0.7	1.1	1.6
11 (570) and 12 (420)	0.4	0.4	0.4
15 (670) and 22 (570)	-	-	0.1

Zone 1 (Kingsgate)

Zone 1 (Kingsgate), along with two lower Zones 2 and 21 which are fed through PRV stations, has an existing storage deficiency of 0.7 MG because of the considerable dead storage (about 60 feet) in the Kingsgate Standpipe. By 2020, Zone 1 requires an additional 1.6 MG of storage. The existing deficiency could be eliminated, and future required storage volumes reduced, if the District were to utilize the dead storage (of approximately 0.7 MG) in the existing Kingsgate Standpipe. A pre-design study to evaluate options for utilizing the dead storage from the Kingsgate standpipe and additional storage capacity is included in the CIP.

Zone 11 (Reintree)

Zone 11 (Reintree) along with Zone 12, which is fed through PRV 21, has an existing storage deficiency of approximately 0.4 MG. The required storage volume does not increase significantly by 2020 because the area is outside of the Urban Growth Boundary (UGB) and is already built to the allowable zoning density.

This required storage volume could be eliminated if the District were to successfully operate Zone 11 with Zone 9, as one zone, which the District initially intended for the two zones. If the zones were to operate one zone, existing storage in Zone 9 would be sufficient for Zones 11 and 12. Zone valves which connect the two zones, are generally closed because of difficulties in synchronizing PRV 41 with the storage facilities in Zone 9. A pre-design study to investigate operating options for Zone 9 is included in the CIP.

Zone 15 (Ringhill)

Zone 15 (Ringhill) shows a storage deficiency of 0.1 MG by 2020. It is recommended that the storage for this area be reevaluated with the next comprehensive water plan. No storage improvement is included in the CIP.

Summary of Deficiencies

System deficiencies are summarized in Table 4. The deficiencies incorporate the hydraulic model and storage analysis results, as well as consultation with District operation staff. The table includes the reference numbers for the CIP projects.

TABLE 5
20-YEAR CAPITAL IMPROVEMENT PROGRAM BY PROJECT TYPE
WOODINVILLE WATER DISTRICT

Project ID	Project Year	Project Description	1999 Project Cost	Project Year Cost	Project Costs - Funding Sources: District Percent	Project Costs - Funding Sources: District Present Worth
Source						
S-1	2003	Emergency Ground Water Supply	205,000	236,000	100	187,000
S-2	2001	Clearview Transmission Project	2,200,000	2,357,000	100	2,098,000
S-3	2014	SRRWA Project	7,300,000	12,230,000	100	5,103,000
		Subtotal Source	9,705,000	14,823,000		7,388,000
Distribution and Transmission						
D-1	2002	Zone 4 Supply	365,000	405,000	100	340,000
D-2	2005	Zone 4 Distribution System	211,000	259,000	100	183,000
D-3	2002	Feed to PRV 27/AC Pipe Replace. Sch. 3	735,000	815,000	100	684,000
D-4	2002	Feed to PRV 27	43,000	48,000	100	40,000
D-5	2003	Zone 8 Supply	422,000	484,000	100	383,000
D-6	2005	Zone 17 Supply	23,000	28,000	100	20,000
D-7	2010	Zone 7 Distribution System	75,000	110,000	100	58,000
D-8	2010	Zone 7 Distribution System	131,000	192,000	100	101,000
D-9	2010	Zone 5 Distribution System	165,000	241,000	100	127,000
D-10	2010	Connection between Zone 9S and Zone 6	439,000	641,000	100	338,000
D-11	2010	Zone 6 AC Replacement	608,000	888,000	100	468,000
D-12	2005	Zone 6 Distribution Grid	97,000	120,000	100	85,000
D-13a	2000	AC Pipe Replacement Schedule 1	275,000	284,000	100	268,000
D-13b	2001	AC Pipe Replacement Schedule 1	264,000	282,000	100	251,000
D-14a	2000	AC Pipe Replacement Schedule 2A	328,000	339,000	100	320,000
D-14b	2001	AC Pipe Replacement Schedule 2A	314,000	337,000	100	300,000
D-15a	2000	AC Pipe Replacement Schedule 4	675,000	699,000	100	659,000
D-15b	2001	AC Pipe Replacement Schedule 4	647,000	693,000	100	617,000
D-16a	2000	AC Pipe Replacement Schedule 5	301,000	312,000	100	294,000
D-16b	2001	AC Pipe Replacement Schedule 5	287,000	307,000	100	273,000
		Subtotal Distribution	6,405,000	7,484,000		5,809,000
Storage						
St-1a	2000	Reintree Standpipe - Predesign Study	20,000	21,000	100	20,000
St-1b	2000	Reintree Standpipe - Design	75,000	78,000	100	74,000
St-1c	2001	Reintree Standpipe - Construction	1,254,000	1,343,000	100	1,195,000
St-2a	2009	Kingsgate Standpipe - Design	60,000	85,000	100	47,000
St-2b	2010	Kingsgate Standpipe - Construction	965,000	1,408,000	100	742,000
		Subtotal Storage	2,374,000	2,935,000		2,078,000
Pumping						
P-1a	2000	Kingsgate Pump Station - Pre-design	20,000	21,000	100	20,000
P-1b	2000	Kingsgate Pump Station - Design	25,000	26,000	100	25,000
P-1c	2001	Kingsgate Pump Station - Construction	284,000	304,000	100	271,000
P-2	2000	Ringhill Pump Station Control Modifications	50,000	52,000	100	49,000
P-3	2000	South Hollywood Pump Station	334,000	346,000	100	326,000
		Subtotal Pumping	713,000	749,000		691,000
Miscellaneous Projects						
O-1a	2000	New Administration Building Project	765,000	792,000	100	747,000
O-1b	2001	New Administration Building Project	732,000	784,000	100	698,000
		Subtotal Miscellaneous Projects	1,497,000	1,576,000		1,445,000
		Total System Improvements	20,694,000	27,567,000		17,411,000

approval by the DOH, the District will adopt the updated Cross-Connection Control Program by resolution. The updated program will be incorporated into this Comprehensive Plan by this reference.

CAPITAL IMPROVEMENT PLAN (CIP)

The CIP was developed based on the findings of the system analysis. The CIP itemizes the requirements and costs for system improvements, and expansions including pump stations, storage reservoirs, transmission, and distribution.

The CIP schedule covers through 2020. A six-year annual schedule was developed for 2000 through 2005. For the remaining years, projects are scheduled in five-year increments. Projects were selected and prioritized on the schedule using the following criteria of importance:

1. Compliance with regulatory/health and safety requirements.
2. Transmission, distribution, storage improvements.
3. System reliability/repair.
4. Scheduling of project budgets for financing.

Major CIP improvements include:

- Clearview Transmission Project

  A conveyance system to transfer water from the City of Everett's water supply system to the Clearview Reservoir.

- Emergency Ground Water Supply

  Installation of a sodium hypochlorite feed system to bring the District's existing ground water well on-line as an emergency supply.

- SRRWA Source Alternative

  A project to develop a source as a partner in the SRRWA. (Plan of Use proposal is listed in the CIP).

- Zone 1 (Kingsgate) Storage and Pump Station

  Construction of a booster pump station to utilize the existing dead storage. (An initial pre-design study is included to evaluate system configurations). Construction of an additional 1.0 MG standpipe located adjacent to the existing facility.

- Zone 11 (Reintree) Storage

  Construction of the storage facility is included in the CIP as a placeholder. An initial study is included to evaluate storage options for the zone which include either constructing a new storage facility or operating Zone 11 and Zone 9 as one pressure zone.

- Distribution Projects

  Replacement/installation of distribution piping to improve fire flow conditions, replace existing AC pipe, and strengthen distribution grid.

Table 5 summarizes the 20-year CIP projects by type (distribution and transmission, storage, and pumping).

TABLE 4
SYSTEM DEFICIENCIES

Zone	Deficiency	CIP Ref.
Transmission and Distribution		
4 (420)	System has difficulty providing fire flow to school near 195th and 132nd Ave. NE while maintaining pressures in northwest portion of service zone during MDD due to restricting 10-inch DI pipe which feeds the zone from Zone 5, restricting 6-inch AC pipe which feeds the northwest portion of the service area, and higher elevations in the northwest corner of Zone 4.	D-1 D-2
5 (420)	During MDD, the system has difficulty drawing water from Zone 9 to provide fire flow to high density residential, commercial and industrial areas in Zone 5 because of restricting 6-inch AC pipe and 6-inch DI pipe which feed PRV 27.	D-3 D-4
5 (420)	System has difficulty meeting fire flow criteria in SF, residential area in Zone 5 on 148th Ave. NE near 147th Pl. NE because of restricting 6-inch AC pipe along 148th Ave. NE.	D-9
7 (650)	System has difficulty meeting fire flow criteria in SF residential area in Zone 7, near 151 Ave. NE and Woodinville Duvall Rd because of restricting 6-inch, dead-end AC and CI pipe.	D-7 D-8
6 (570), 3 (260), 10 (420), 15 (670), 9 (570)	AC pipe replacement and need to strengthen distribution grid with enlarged pipe diameter.	D-11 D-13
Source		
8	Service zone needs source redundancy. Currently, zone is served solely by PRV 23 from Zone 9.	D-5
17	Service zone needs source redundancy; currently PRV 32 and PRV 38 serve the zone from Zone 10.	D-6
Storage		
6	If needed, Zone 6 may have difficulty utilizing the storage from Zone 9S (South Hollywood Reservoir) because of restricting 6-inch AC pipe and circuitous pipeline route.	D-10 D-12
11	As it is currently operated, Zone 11 is in need of storage. Storage options include: upgrading the Reintree Pump Station to utilize storage from the Brookside Reservoir operating Zone 11 and Zone 9 as one zone in order to utilize the Wellington Standpipe, or constructing a new storage facility in Zone 11.	S-1
1	Additional storage required in Zone 1.	S-2
Pumping		
1	A pump station is needed to utilize dead storage from existing Kingsgate Standpipe.	P-1
15	Need modifications to optimize operation of Ringhill Pump Station.	P-2
9	Project is underway to construct pump station to utilize dead storage from South Hollywood Reservoir.	P-2

DI = Ductile Iron CI = Cast Iron AC = Asbestos cement

CROSS-CONNECTION CONTROL PROGRAM

District Resolution No. 3320 (October 5, 1999) establishes the District's Cross Connection Program and outlines the program requirements. A copy of Resolution 3320 is included in the appendix. The District protects the public water supply with premise isolation cross connection control protection and by installation of approved air gaps or approved backflow prevention assemblies at the property line.

At present, premise isolation is required for commercial connections only. The District is in the process of updating its Cross-Connection Control Program and is coordinating the review with the DOH. Upon approval by the DOH, the District will adopt the updated Cross-Connection Control Program by resolution. The updated program will be incorporated into this Comprehensive Plan by this reference.

CAPITAL IMPROVEMENT PLAN (CIP)

The CIP was developed based on the findings of the system analysis. The CIP itemizes the requirements and costs for system improvements, and expansions including pump stations, storage reservoirs, transmission, and distribution.

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- Emergency Ground Water Supply

  Installation of a sodium hypochlorite feed system to bring the District's existing ground water well on-line as an emergency supply.

- SRRWA Source Alternative

  A project to develop a source as a partner in the SRRWA. (Plan of Use proposal is listed in the CIP).

- Lake Tapps Source Alternative

  A project to develop Lake Tapps as a source of supply.

- Zone 1 (Kingsgate) Storage and Pump Station

  Construction of a booster pump station to utilize the existing dead storage. (An initial pre-design study is included to evaluate system configurations). Construction of an additional 1.0 MG standpipe located adjacent to the existing facility.

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- Distribution Projects

  Replacement/installation of distribution piping to improve fire flow conditions, replace existing AC pipe, and strengthen distribution grid.

Table 5 summarizes the 20-year CIP projects by type (distribution and transmission, storage, and pumping).

Table 5 CIP Projects

FINANCIAL PLAN

The financial analysis summarizes the District's financial status and evaluates the ability of the District to financially support necessary capital improvements identified in the CIP. It also addresses rate and financing options, and potential long-term problems, including both capital and operating requirements. The various sources considered include outside low-interest loan/grant programs, rates, connection charges, and debt financing. Finally, it reviews the District's current rate structure with respect to financial policies and conservation objectives.

Funding Options

The funding options available to the District for capital projects consist primarily of debt mechanisms or cash funding through various user charges.

State Funding Programs

Several state programs were identified as potential funding sources for the utility improvements. The Public Works Trust Fund (PWTF) is the most attractive program for the District.

The emphasis of PWTF loans on replacement and rehabilitation fits well with the District's plan to replace portions of its transmission and distribution system at an estimated cost of $8.3 million over the next 10 years. The District has received a PWTF loan of $1.8 Million for the year 2000. The District should continue to apply for PWTF loans in the future and the District is eligible for $10 million from the PWTF every two years. In addition, the District should participate at the 15 percent level to receive the .5 percent PWTF loan rate. The benefits of participating at the 15 percent level and receiving the .5 percent rate reduces the overall interest rate on borrowing by 40 basis points or .4 percent versus the District participating at the 5 percent level and receiving a 2 percent interest rate. This calculation assumes the District issues revenue bonds to cover their portion at a net effective interest rate of 6 percent. Translated into dollars, the District would save $4,000 annually for every $1 million of PWTF loans outstanding by participating at the 15 percent level versus the 5 percent level. The economics of this financing strategy hold true until the alternative interest rate, such as that on revenue bonds equals 9.5 percent.

Existing District Funds and Reserves

The District has several funds containing cash and investments. Most are restricted in their use, or have minimum requirements, which limit or preclude their use for funding capital programs.

- **Construction Fund** - The projected Construction Fund beginning balance for 2000 is estimated at $9,800,000 and is assumed to be available to support project costs. This includes the proceeds of the 1999 bond issue.
- **Rate Stabilization Fund** - The projected fund balance is $854,000 at the beginning of 2000. This fund is restricted in use to meeting unanticipated or emergency revenue shortfalls and would not normally be available to support capital project costs.
- **Bond Reserve Fund** - The District will have approximately $1,100,000 in its bond reserve fund after the 1999 Bond Issue is distributed in compliance with its bond covenants. These funds must remain in place as required by those bond covenants.

General Facilities Charges/System Development Charges

General Facilities Charges (GFCs) or System Development Charges (SDCs) are sources of funding typically used by utilities to support capital needs. The District's current GFC is $2,260 for a 5/8" and 3/4" meter. This current level appears both fair and appropriate, and it is not recommended that the District adjust this charge.

Historical District Financial Performance

A review of the consolidated audited income statement of revenues and expenses shows that the District is providing positive cash flow and well exceeds its bond covenant obligations. A review of the District's Balance Sheet shows that the District is financially healthy. Retained earnings are steadily growing while liabilities are remaining steady or declining.

Capital Financing Strategy

Table 6 shows the projected sources of revenue that the District will use to fund its proposed Capital Improvement Program. The District issued $5,000,000 in Revenue Bonds in 1999 and has been selected to receive a Public Works Trust Fund Loan for $1,800,000 in 2000. These two debt issues along with existing reserves should enable the District to finance its Capital Program without difficulty.

TABLE 6
CAPITAL PROJECTS FINANCING

	2000	2001	2002	2003	2004	2005	2006
Capital Projects to be Financed	$3,099,000	$5,637,956	$1,522,211	$551,033	$86,064	$682,920	$706,822
Connection Charges	$500,000	$300,000	$270,000	$243,000	$218,700	$200,000	$200,000
Rates	$457,023	$234,141	$207,692	$536,596	$541,617	$610,595	$571,650
Use(Addition) of Reserves(*)	$2,141,977	$5,103,815	$1,044,518	($228,563)	($674,253)	($127,675)	($64,828)
Debt Financing	$0	$0	$0	$0	$0	$0	$0
Ending Reserve Balance	$10,038,023	$6,868,285	$6,167,181	$6,704,104	$7,713,562	$8,226,915	$8,703,089

* Includes 1999 Bond and 2000 PWTF Loan

Projected Revenue Requirements

The financial analysis shows that the SPU wholesale water costs will drive Woodinville rates for the foreseeable future. Figure 7 shows the correlation between projected Seattle wholesale costs and projected Woodinville user rates. Wholesale water costs will increase from 49 percent of Woodinville's operating expenses in 1999 to 58 percent by 2005.

FIGURE 7
CUMULATIVE RATE INCREASES

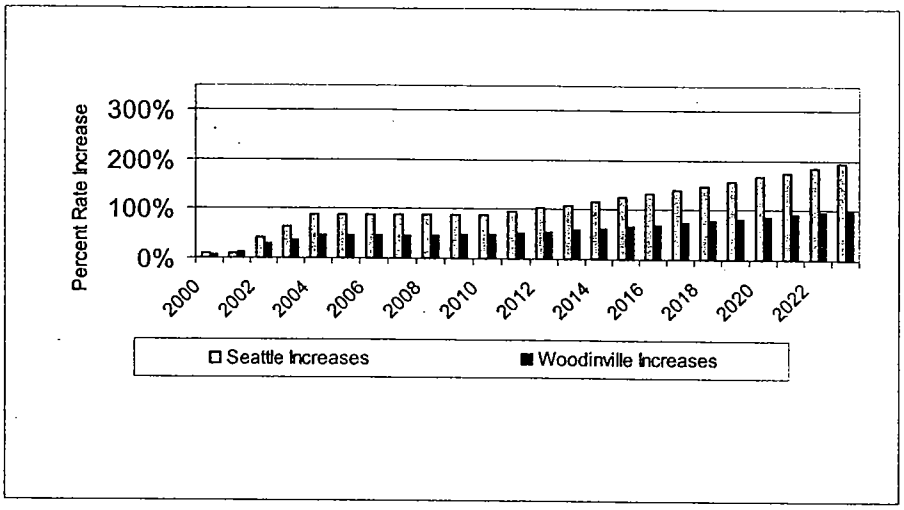
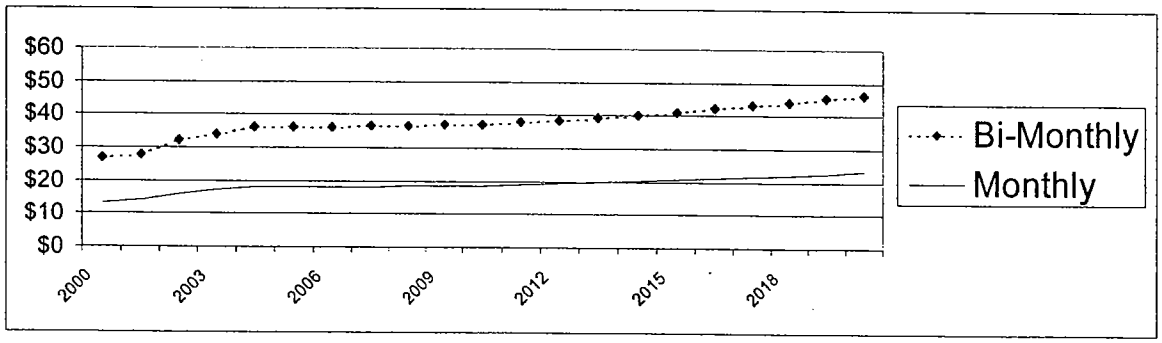


Figure 8 shows the impact on a typical single family residence bill from these projected rate increases.

FIGURE 8
SINGLE FAMILY RESIDENCE MONTHLY AND BI-MONTHLY BILL



Rate Structure

Woodinville Water District has essentially kept the same rate structure since 1992. The structure was put in place in 1992 in response to droughts and shortages that occurred that year. The Commissioners modified the structure in 1999 by increasing the volume charge and adding a fourth block to send a stronger conservation signal to their customers.

The current rate structure (shown in Table 6) has four blocks for its bi-monthly residential bills, with each block costing more per unit than the previous block. For example, a customer will currently pay, under the new rates, $1.70 for their 10th CCF for the bi-monthly bill but will pay $4.00 per CCF for the 52nd CCF they use in that period.

TABLE 7
SINGLE FAMILY RESIDENCE BLOCK STRUCTURE CHANGE

	0 – 12 CCF	13 – 25 CCF	28 – 50 CCF	Over 50 CCF
1999 Structure	$1.60	$2.25	$2.90	$2.90
2000 Structure	$1.70	$2.50	$3.25	$4.00

The District currently charges its non-residential customers a volume charge of $2.05 per CCF for usage up to their winter average and $2.40 per CCF for water usage over their winter average. For billing purposes, the winter average is determined by evaluating the customers' actual water usage as metered during the winter months.

Some examples of possible rate structure enhancements that the District commissioners could consider in the future:

- Smaller blocks to further encourage conservation. This would force more usage into the higher "more expensive" blocks. The District Board of Commissioners generally does not consider this to be a viable option.
- Adjusting the residential structure to one more based on each residence average winter usage, similar to the commercial basis. The District could charge customers a certain price for their winter average or some fraction there of, and then establish a series of usage blocks of fixed size which begin at the benchmark volume.
- Developing a pattern-based rate structure. This structure would have a conservative user discount and actively reward customers that use less water. Examples of this program could include sending a rebate check at the end of the year if the customer met certain conservation goals or having an automatic adjustment on their bills to reward them if their usage history conforms to some targeted pattern. Additional studies may be required to implement a pattern-based rate structure.

BACKGROUND

History

The Woodinville Water District (District), formerly King Water District No. 104, is a municipal corporation which was established by a special election held on August 4, 1959. The King County Board of Commissioners authorized the creation of the District by Resolution No. 20121 on August 17, 1959.

By 1961, the District had completed several source of supply connections to the City of Seattle's Tolt River Pipeline. In 1963, the initial distribution system was completed and the District began providing water to customers.

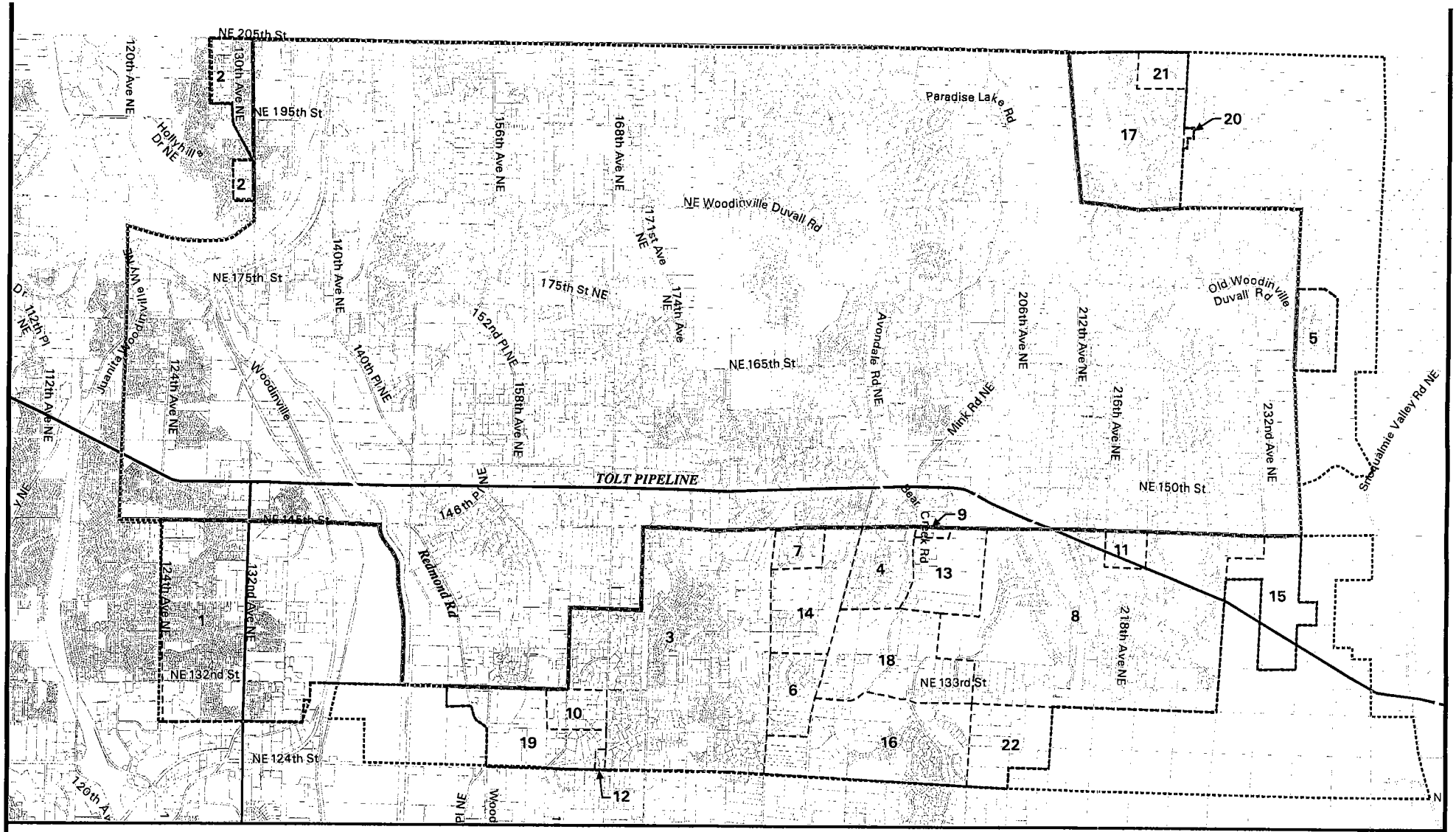
Early system expansions were constructed through Utility Local Improvements Districts (ULIDs). More recently, system expansions have been through developer extensions.

Historically, the District's boundaries have expanded through annexation proceedings. A list of the District annexations is provided as Table 1-1 *Annexations.* The locations of the annexations are shown in Figure 1-1 *Annexations.*

In addition to water service, the District also provides sanitary sewer service within the Corporate Boundaries of the City of Woodinville, and within the Designated Urban Growth Boundaries of Unincorporated King County.

TABLE 1-1
ANNEXATIONS
WOODINVILLE WATER DISTRICT

Annexation Number	Name	District Resolution	Year
0	Original District	--	1959
1	Kingsgate	86	1963
2	Bloomberg	162	1967
3	Hollywood-Sunrise	634	1976
4	Avondale	810	1979
5	Morrison	865	1978
6	Goldsmith-Bell	865	1978
7	Brookside	899	1979
8	Holiday Lake	1062	1980
9	Bear Creek Road	1590	1983
10	Ellsworth-Anderson	1634	1983
11	Bondo	1858	1985
12	Strelinger	2143	1986
13	Kinkenberg	2144	1986
14	Ross	2232	1987
15	Hjelte	2277	1987
16	Shadowbrook	2278	1987
17	Aspenwood	2264	1987
18	Himmelspach	2294	1987
19	Scheumann	2365	1988
20	Curry	2592	1989
21	East Aspenglen	2883	1991
22	Anstalt	3058	1994



LEGEND

- Woodinville Water District
- Stream
- Tolt Pipeline
- Parcel Line
- Current Water District Boundary
- Future Water District Boundary
- Original Water District Boundary
- Annexations
- 14 Annexation Number

Source: King County GIS -1998, EDAW -1998, HDR -1998 File: /reavis/wash/woodinville/mapc.aml Plotted: 25 May 00

0 1000 2000 3000 4000 5000 6000 Feet

Figure 1-1

Annexations

Woodinville Water District
Comprehensive Water Plan
May 2000

HDR

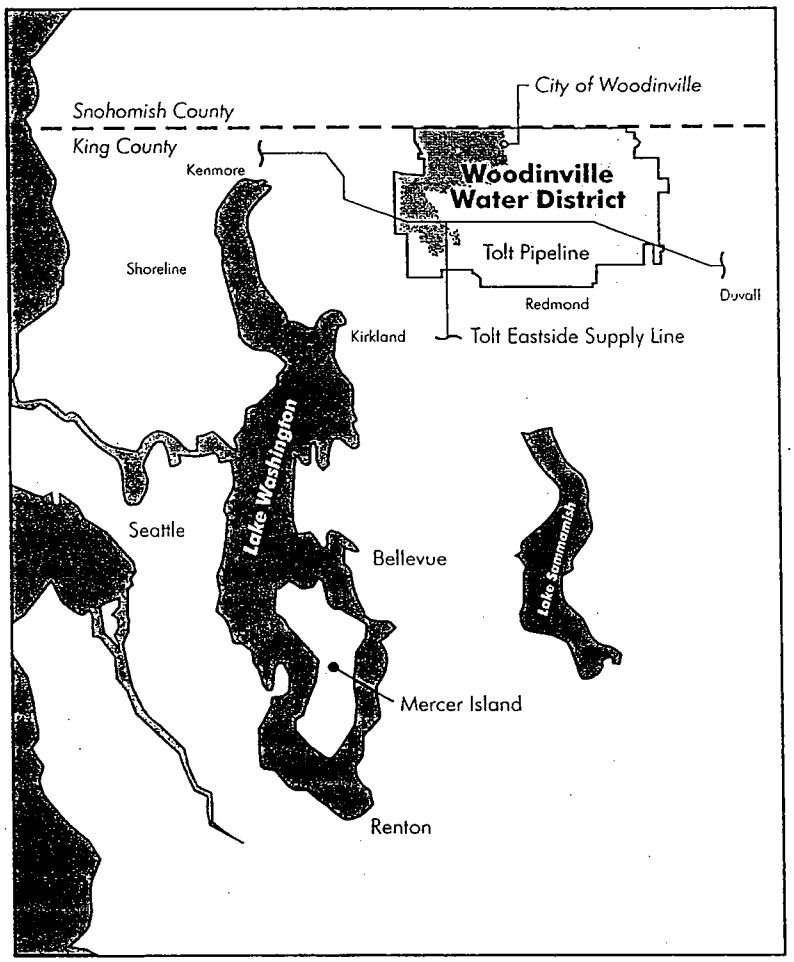
District Management

The District is governed by a five member Board of Commissioners elected by the residents of the District for overlapping six-year terms. The Board of Commissioners oversees the management of the District. The General Manager is responsible for overall management and operation of the District.

EXISTING SERVICE AREA CHARACTERISTICS

The District is located in northeast King County (see Figure 1-2 *Service Area Location Map*) and covers approximately 18,660 acres (29.2 square miles). The District serves the City of Woodinville and portions of unincorporated King County (See Figure 1-3 *Land Use Map*). In 1998, the District population was approximately 43,100 with approximately 12,400 connections. Average annual water use in 1998 was approximately 4.4 million gallons per day (mgd).

FIGURE 1-2
SERVICE AREA LOCATION MAP
WOODINVILLE WATER DISTRICT



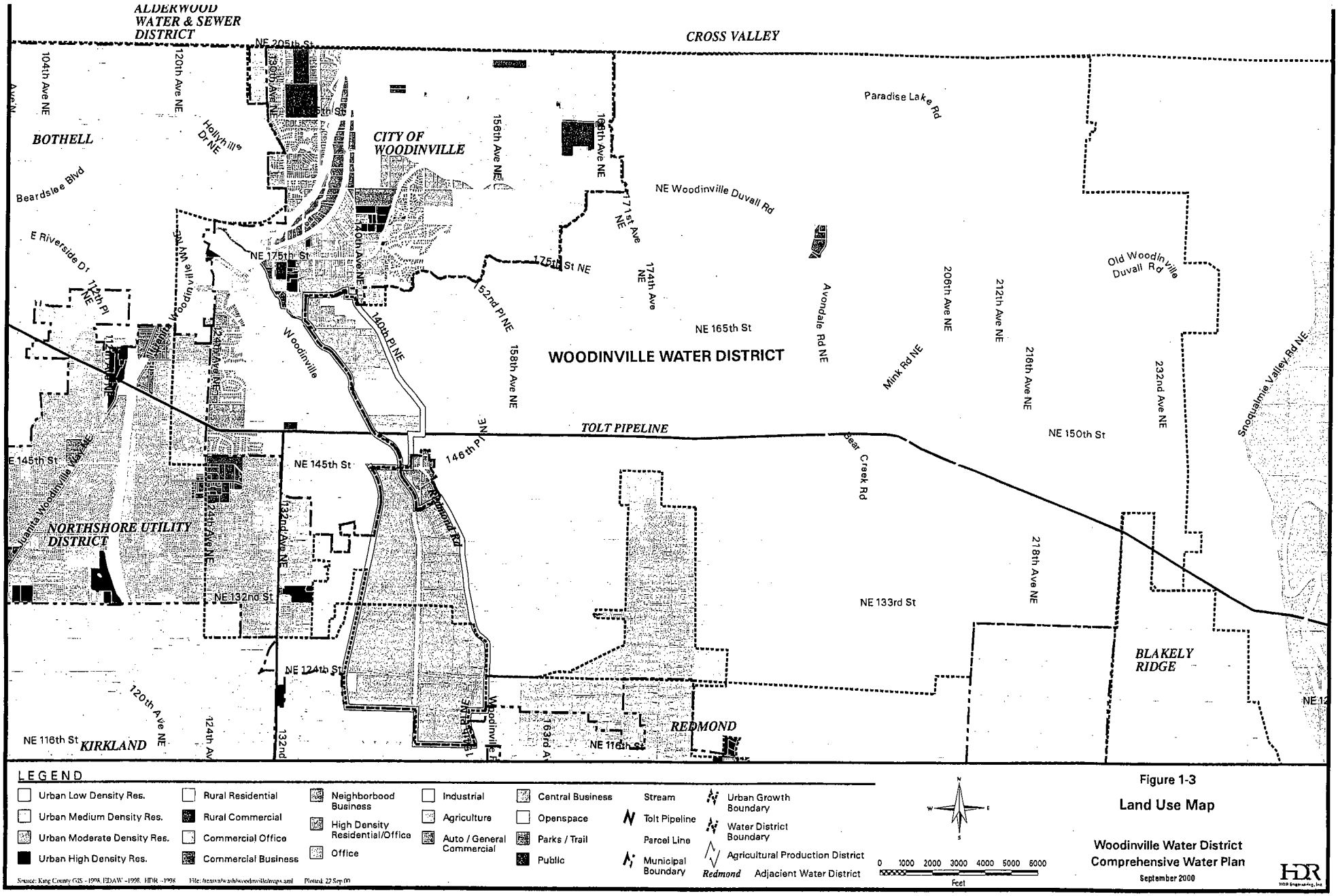


Figure 1-3

Land Use Map

Woodinville Water District
Comprehensive Water Plan

September 2000

Geography

Topography within the District ranges from flat terrain to undulating hills, with elevations varying from 25 feet to over 600 feet. Elevations at the western District boundary are over 400 feet. Moving east, elevations drop to 25 feet in the Sammamish Valley, then rise to 500 feet at the east ridge of the Sammamish Valley. The elevations drop to below 200 feet across the Cottage Lake Creek and Bear Creek drainage basins. Elevations then rise to over 600 feet at the east boundary of the District (the westerly ridge of the Snoqualmie Valley).

Adjacent Purveyors

Adjacent purveyors are shown on Figure 1-3 *Land Use Map*. In King County, the City of Bothell and the Northshore Utility District border the District on the west; the City of Kirkland borders on the southwest, and the City of Redmond borders on the south. Water District 119 is located to the east of the District. There is an unclaimed area between the District and the Duvall Water District. To the north in Snohomish County, the adjacent purveyors are the Alderwood Water District and the Cross Valley Water District.

Land Use

Land use policies identify where growth will occur. The District provides service consistent with the adopted land use policies of King County and the City of Woodinville. One of the biggest impacts of land use planning on the District is the Growth Management Act (GMA). The GMA defines where growth can occur through the delineation of the Urban Growth Boundary (UGB). Outside of the UGB, the land use is rural, and is restricted to rural densities. Approximately one third of the District is within the UGB, most of which is within the City of Woodinville. There is also an unincorporated urban area located south of NE 145th St., in the vicinity of English Hill. The majority of the District service area is located outside of the UGB.

Land use in the District is shown on Figure 1-3 *Land Use Map*. The majority of the District is rural residential land use. The adopted zoning is shown in Figure 1-4 *Zoning Map*. The zoning legend types are further defined in Table 1-2 *Zoning Designations and Zoning Map Symbols*. Approximately 70 percent of the District's current service area is zoned either RA-2.5 or RA-5, both of which have base densities of one dwelling unit in five acres.

Insert Figure 1-4

there is no Figure 1-4 (per Bob Bandura)

TABLE 1-2
ZONING DESIGNATIONS AND ZONING MAP SYMBOLS

Map Symbol	Zoning Designations
A	Agricultural (10 –or 35 acre minimum lot size)
RA	Rural Area (2.5-acre, 5-acre, 10-acre or 20-acre minimum lot size)
UR	Urban Reserve
R	Urban Residential (base density in dwellings per acre)
NB	Neighborhood Business
CB	Community Business
RB	Regional Business
O	Office
I	Industrial
- P	Property-specific development standards (suffix to zone's map symbol)
- SO	Special District Overlay (suffix to zone's map symbol)
P/I	Public Institutional

EXISTING FACILITIES INVENTORY

This section provides a basic description of District facilities including sources of supply, storage and transmission and distribution.

Sources of Supply

Seattle Water

The District purchases its water from Seattle Public Utilities (SPU), from the Tolt River source of supply through the Tolt Pipeline. The Tolt Pipeline enters the District from the southeast, and traverses the District along approximately NE 150th St. The Tolt Eastside Supply Line junction which diverts a portion of the Tolt River supply to the south, is located on the west side of the District. SPU also has the capability to supply water from the Cedar River system northward into the District through the Tolt Eastside Supply Line. The District has nine active connections or taps to the Tolt River supply, eight to the Tolt Pipeline and one tap to the Tolt Eastside Supply Line. Details on the taps are presented on Table 1-3, *District Source Meters on Tolt Supply*. Flow control valves on each tap are manually controlled remotely from District headquarters.

SPU guarantees a set minimum hydraulic gradient at each tap. With implementation of the Tolt Filtration Plant, the minimum hydraulic gradient that SPU will supply to some taps will be reduced. The District has planned for this reduction in the pressure gradient, and is prepared to continue to supply water without changing the pressure zones.

TABLE 1-3
DISTRICT SOURCE METERS ON TOLT SUPPLY
WOODINVILLE WATER DISTRICT

Tolt Tap Number	Name & Location	Meter Size And Type	Pressure Zones Served		Minimum HGL[1]		Water Available (gpm)[3]
			Primary	Secondary	Current	Future[2]	
53	WellingtonTransmission Main 159th Ave. NE &Tolt River Pipeline	10" Prop.	570	-	580	580	2,400
57	S. Hollywood 14400 174th Ave. NE	8" Prop.	570	-	600	585	1,800
76	Flow Station No. 1 124th Ave. NE & Tolt River Pipeline	6" Prop.	510	420/305/260	560	560	600
77	Flow Station No. 16 132nd Ave. NE & NE 140th St.	6" Prop.	510	420/305/260	560	560	1,350
78	Ringhill Pump Station 232nd Ave. NE & Tolt River Pipeline	2-8" Dan Foss Mag [5]	670	575/420/340770/480	635	605	2,100
79	Avondale Transmission Main 15100 Blk. Avondale Rd. @ Tolt River Pipeline	12" Prop.	570	420	615	590	3,375
80	Hollywood Pump Station 15700 168th Ave. NE	2-8" Dan Foss Mag [6]	650	570	595	580	1,800
123	Sammamish 15004 132nd Ave. NE	8" Prop.	260	-	560	560	1,350
125	Brookside 15000 181st Pl. NE	6" Dan Foss Mag	420	-	600	585	2,500

(1) Minimum Hydraulic Grade Line Guaranteed by SPU.
(2) Modified minimum hydraulic gradient effective December 13, 2000.
(3) Indicates AWWA Maximum Rated Flow
(4) Tolt Tap T77 is off of the Tolt Eastside Supply Line, all other taps are from the Tolt River Pipeline
(5) One meter on the gravity side and one on the pump discharge
(6) One meter on station influent and one on pump discharge
Prop. = Propeller

Ground Water

The District currently owns and maintains an emergency standby well (and site) located in close proximity to the District's Woodinville office properties. The specific purpose of the well is to provide the District and its customers with an alternate source of water in the event a natural disaster (e.g., seismic event) or other unforeseen event disrupts the District's ability to receive a safe and reliable water supply from Seattle Public Utilities (or potentially the Cascade Water Alliance or Snohomish River Regional Water Authority). The well, which does not have a water right, possesses a reliable, sustained pumping capacity of 1,000 gpm. Analysis of the well's water quality indicates that the quality is good and acceptable for use as a public water supply without treatment.

As an emergency standby source, the District would utilize this well only when necessary to address public health and safety emergencies arising within District boundaries. Should such emergencies arise, including those caused by natural disasters, it is the District's understanding and belief that the use of emergency standby wells will be authorized by the Department of Ecology (DOE) by public notice and/or policy for the duration of such events. For this reason, and pursuant to consultations regarding the well with DOE Northwest Regional Office Water Resources staff, the District has no immediate intention to secure an emergency standby water right for this well. The District performs periodic water quality tests on the emergency standby well to assure that the water quality will meet acceptable standards in the case of an emergency.

Surface Water

As a member of the Snohomish River Regional Water Authority (SRRWA), the District has an 11 mgd legal interest in former Weyerhaeuser Company surface water right S1 – 10617C. An application to change the place and purpose of use of this right is pending with DOE, with a decision expected by May 1, 2001. The SRWWA is a joint administrative entity formed in 1996 comprised of the City of Everett, Northshore Utility District, and the Woodinville Water District. The District joined the SRRWA pursuant to receipt of a notice of intent from SPU that it would not renew the District's existing supply contract.

Interties

The District does not have any formal interties with surrounding jurisdictions. However, the District does have informal emergency interties with both the Northshore Utility District and the City of Bothell.

Northshore Utility District Intertie

This intertie is located at approximately NE 132nd St. and 125th Ave. NE in the Kingsgate area (Zone 1). The intertie consists of a meter, which feeds the District through Pressure Reducing Valve (PRV) 19. The PRV setting allows flow only under an extreme demand, such as would occur during a fire.

City of Bothell

This intertie is located at approximately 131st Ave. NE and NE 182nd Pl. in the Bloomberg area (Zone 4). The City of Bothell has three water mains in this general vicinity, which are tied into the District's system running along 131st Ave. NE. Two of Bothell's mains are 8-inches in diameter and the third is 12-inches in diameter. The 12-inch water main ties into a District 12-inch main, which immediately reduces to an 8-inch main, where the other two Bothell mains are connected. Valves at the intertie location are normally closed. On occasion, Bothell has provided water to the service zone on a temporary/emergency basis.

Future Interties

A potential future intertie may be constructed with the City of Redmond along the southern boundary of the District. The District currently provides water service to several properties just south of the District's

boundaries through an interlocal agreement with the City of Redmond. Once Redmond extends its water system northward, and can provide service, the District will transfer service of the customers back to Redmond. At that point, the District anticipates having interties with Redmond at those locations.

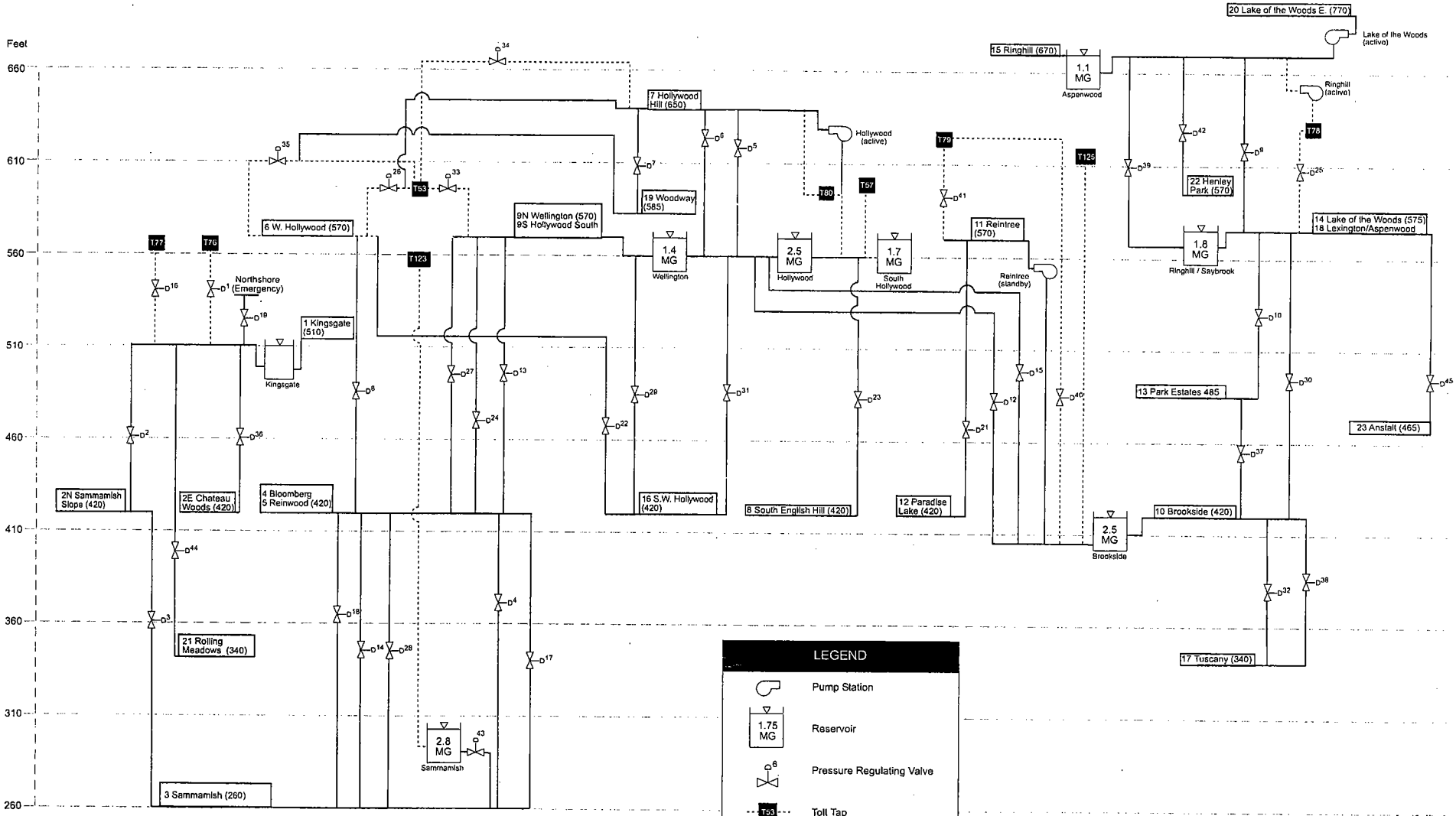
There is potential for both formal and informal interties with the Cross Valley Water District. Cross Valley will be taking over several District customers along the Woodinville-Snohomish Road, just north of the King/Snohomish County line, in the year 2000. The system will be separated by closing an 8-inch zone valve at the county line. This valve may serve as an emergency intertie after Cross Valley assumes service to this area.

Storage and Transmission Distribution

General Operation

The District's system includes approximately 253 miles of transmission and distribution piping, eight storage facilities, five pump stations (three of which are active and two standby), and 44 pressure reducing valve stations. Figure 1-5 *Water Distribution System* (located at the back of the document) is a map showing the location of storage facilities, Tolt taps, pump stations, and transmissions/distribution piping. A schematic of the system is presented on Figure 1-6 *System Schematic.*

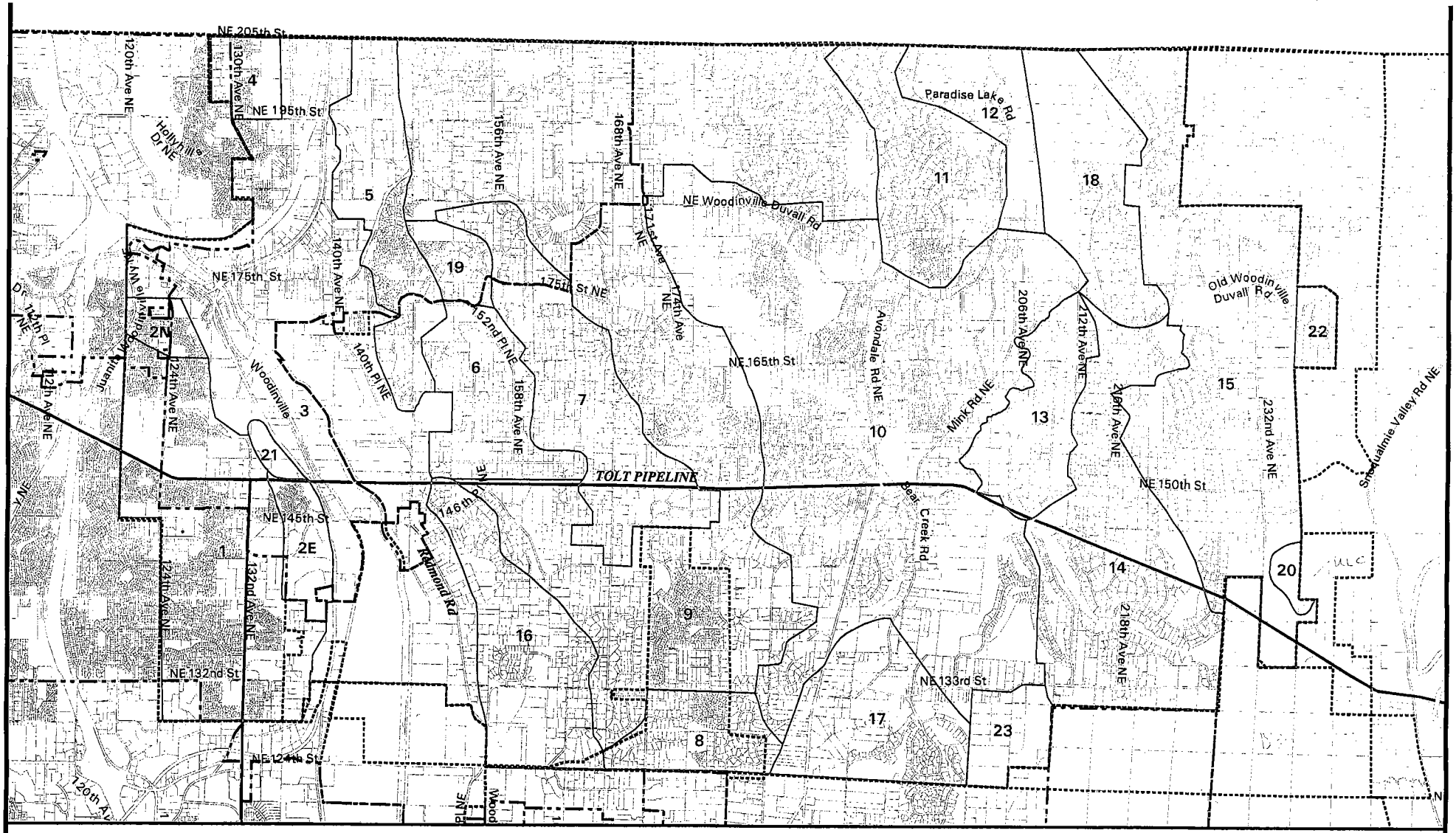
With its varying topography, the District operates several service zones (see Figure 1-7 *Service Zone Map*). In some zones, water from the Tolt discharges directly into the system through a PRV. Since the minimum head from the Tolt Pipeline varies from 560 to 635 feet across the District, some of the higher elevation zones require booster pumping to reach service pressures. Storage facilities provide water to meet peak demands allowing the District to maintain a fairly constant flow from the Tolt Pipeline taps. The lower pressures zones are fed directly though PRVs.



Notes: **1.** South Hollywood Reservoir is the primary source for PRV stations 22, 29 and 31. The secondary sources are PRV stations 5, 26 and 35.

2. Cottage Lake Pump Station (which is inactive) is not shown. The district intends to remove the pump station.

Figure 1-6
System Schematic
Woodinville Water District



LEGEND

- Woodinville Water District
- Stream
- Tolt Pipeline
- Parcel Line
- Municipal Boundary
- Urban Growth Boundary
- Water District Boundary
- Service Zone
- Woodinville Water District Future Service Boundary
- 2E Service Zone Designation

Source: King County GIS - 1998, EDAW - 1998, HDR - 1998 File: /ea/wa/wash/woodinville/maps.aml Plotted: 25 May 00

0 1000 2000 3000 4000 5000 6000 Feet

Figure 1-7

Service Zones Map

Woodinville Water District
Comprehensive Water Plan
May 2000

HDR Engineering, Inc.

Storage Facilities

The District has eight steel storage reservoirs. Storage facility data is summarized in Table 1-4 *Storage Facilities*. Each reservoir is associated with a particular service zone. The overflow elevations of six of the reservoirs are set to "float" on the pressure elevation of the highest zone that the reservoir serves. Two reservoirs do not float on the elevations of the service zones. The Sammamish Reservoir is located at a higher elevation (300 feet) than the zone that it serves (Zone 3 Sammamish at 260 feet). To reduce pressure, supply to these zones is provided through PRV 43. The Hollywood Reservoir has an associated pump station which pumps from the reservoir (with an overflow elevation of 570 feet) to Zone 7 Hollywood Hill (pressure elevation 650 feet).

Plans for future storage facility projects include a booster pump station for the S. Hollywood Reservoir serving Zone 9S South Hollywood. The reservoir currently has difficulty maintaining zone pressures when the head provided by the Tolt Pipeline is low.

TABLE 1-4
STORAGE FACILITIES
WOODINVILLE WATER DISTRICT

Storage Facility And Location	Year Constructed/ Recent Coating	Capacity (MG)	Maximum Water Depth (ft)	Overflow Elevation (ft)	Diameter (ft)	Primary Pressure Zone Served
Hollywood 15700 168th Ave. NE	1978 Recoat 1991	2.5	27	570	125	650
Brookside 1500 180th Pl. NE	1981 Recoat 1993	2.5	18	420	154	420
Sammamish 15106 132nd Ave. NE	1992 No Recoat-	2.8	36	300	115	260
Ringhill/Saybrook 22636 NE 169th St.	1996 No Recoat	1.8	20	575	125	575
Kingsgate 14422 130th Ave. NE	1972 Recoat 1993	1.1	100	510	56	510
South Hollywood 14400 174th Ave. NE	1986 Touchup 1993	1.7	88	579	58	570
Wellington 15600 NE 204th St.	1979 Recoat 1993	1.4	78	570	56	570
Aspenwood 20433 223rd Ave. NE	1998 No Recoat	1.1	116	670	40	670

Transmission/Distribution Piping

The District maintains over approximately 253 miles of transmission/distribution pipe ranging in size from 4- to 18-inches in diameter. The majority of the pipe (approximately 74 percent) is ductile iron. The District also has approximately 65 miles (26 percent) of asbestos cement pipe, which the District intends to eventually replace. A summary of piping material is presented in Table 1-5 *Inventory of Piping Material.*

There are two 16-inch transmission mains connecting to the Tolt Pipeline. The Wellington Transmission Main runs from Tolt Tap T53 to the Wellington Reservoir. The transmission main feeds PRVs 26, 33, and 35. The Avondale-Reintree Transmission Main runs from Tolt Tap T79 to Zone 11 Reintree. The transmission main feeds PRVs 40 and 41. There is no reservoir directly connected to the Avondale-Reintree Transmission Main.

TABLE 1-5
INVENTORY OF PIPING MATERIAL (lengths in feet)
WOODINVILLE WATER DISTRICT

Size (in)	Asbestos Cement	Ductile Iron	PVC	Totals
4	10,526	59,476	869	70,871
6	173,233	24,952	0	198,185
8	134,560	723,733	486	858,779
10	17,894	54,683	0	72,577
12	6,945	89,258	0	96,203
16	0	36,629	0	36,629
18	0	2,166	0	2,166
Totals (ft)	343,158	990,897	1,355	1,335,410
Totals (miles)	65	188	0.3	253

Pressure Reducing Valves

The District has 44 PRV stations, which control flow from the Tolt supply and between pressure zones. The PRVs are summarized on Table 1-6 *Pressure Reducing Valve Stations.*

TABLE 1-6
PRESSURE REDUCING VALVE STATIONS
WOODINVILLE WATER DISTRICT

	Location	Zone Number From	Zone Number To	Zone Pressure From	Zone Pressure To	Valve Size (inch)	Valve Elevation (ft)	Field Setting (psi)	Field Setting+ Valve Elev. (ft)
1	124th NE & NE 151st	T76[1]	1	560	510	6	318.3	89	524
						3	315.6	89	521
2	124th NE & NE 165th	1	2N	510	420	6	310.7	45	415
						3	308.0	51	426
3	124th NE & NE 171st	2N	3	420	260	6	183.9	28	249
						3	181.2	34	260
4	NE 171st & 146th Pl. NE	5	3	420	260	6	185.0	28	250
						3	182.2	34	261
5	168th NE & NE 143rd	7	9S	650	570	6	451.0	43	550
						3	451.0	47	559
6	164th NE & NE 175th	7	9N	650	570	6	482.5	21	531
						3	479.5	26	539
7	155th Pl. NE & NE 175th	7	19	650	585	6	465.0	50	580
						3	462.3	55	589
8	NE 173rd & 151st NE	6	5	570	420	6	320.9	39	411
						3	318.1	44	420
9	NE 150th & 220th NE	15	14	670	575	6	447.7	50	563
						3	441.9	55	569
10	NE 165th & 212th NE	14	10A	575	485	6	337.8	59	474
						3	335.0	65	485
12	171st NE & NE 185th	9N	10	570	420	6	313.7	35	394
						3	310.9	41	406
13	148th NE & NE 190th	9N	5	570	420	8	298.5	46	405
						4	298.8	51	416
14	NE 195th & 142nd NE	5	3	420	260	6	179.2	30	248
						4	179.4	35	260
15	NE 156th & 183rd NE	9S	10	570	420	8	296.0	47	405
						4	293.0	53	415
16	NE 140th & 132nd NE	T77	1	560	510	6	381.6	53	504
						3	378.8	59	515
17	148th NE & NE 159th	5	3	420	260	6	144.6	46	251
						3	141.7	51	259
18	130th NE & NE 195th	4	3	420	260	4	204.7	20	251
						2	204.6	24	260
19	NE 132nd & 125th NE[2]	-	1	-	510	8	285.9	53	408

TABLE 1-6 (Continued)
PRESSURE REDUCING VALVE STATIONS
WOODINVILLE WATER DISTRICT

	Location	Zone Number From	Zone Number To	Zone Pressure From	Zone Pressure To	Valve Size (inch)	Valve Elevation (ft)	Field Setting (psi)	Field Setting+ Valve Elev. (ft)
20	135th NE & Tolt[3]	T*[4]	3	--	260	6	216.6	21	265
						1.5	213.1	offline	
21	200th NE & NE 197th	11	12	570	420	6	345.0	50	460
						3	345.0	55	472
						1	342.3	60	481
22	153rd NE & Tolt	6	16	570	420	6	342.6	31	414
						3	339.9	37	425
23	NE 132nd & 172nd NE	9S	8	570	420	6	328.8	31	400
						3	326.3	37	412
24	NE 184th Pl. & 147th Ct.	9N	5	570	420	6	303.5	46	410
						3	301.4	51	419
25	140th Way NE & 226th NE	T78	14	T78	575	8	449.6	55	577
						4	449.6	61	590
26	NE 160th & 160th NE	T53	6	580	570	6	474.3	39	564
		7	6	650	570	4	474.3	35	555
		T53	6	580	570	3	471.8	45	576
27	NE 200th & 146th NE	9N	5	570	420	6	342.3	29	409
						3	339.7	35	420
28	NE 200th & 142nd NE	5	3	420	260	6	168.8	35	250
						3	168.5	40	261
29	162nd NE & NE 141st	9S	16	570	420	6	324.9	37	410
						3	325.0	41	420
30	NE 142nd & 209th NE	14	10	575	420	6	325.3	35	406
						3	325.5	39	415
31	165th NE & NE 135th	9S	16	570	420	6	361.5	21	410
						3	361.4	25	419
32	NE 132nd Pl. & 187th Pl. NE	10	17	420	340	6	168.0	72	334
						3	168.0	76	343
33	156th NE & NE 186th	T53	9N	580	570	6	438.5	53	561
						3	436.4	58	570
34	NE 182nd & 156th NE[5]	T53	7	595	650	6	503.2	68	660
						3	503.2	72	669
35	154th NE & NE 173rd	T53	6	580	570	6	379.7	78	560
		19	6	585	570	4	379.7	74	550
		T53	6	580	570	3	377.7	83	569

TABLE 1-6 (Continued)
PRESSURE REDUCING VALVE STATIONS
WOODINVILLE WATER DISTRICT

	Location	Zone Number From	Zone Number To	Zone Pressure From	Zone Pressure To	Valve Size (inch)	Valve Elevation (ft)	Field Setting (psi)	Field Setting+ Valve Elev. (ft)
36	NE 147th Pl. & 134th NE	1	2E	510	420	6	267.9	62	411
						2	267.4	67	422
37	NE 150th & 205th NE	13	10	485	420	8	222.0	82	411
						4	222.4	86	421
38	NE 133rd & 202nd NE	10	17	420	340	6	135.6	85	332
						3	135.4	89	341
39	222 Way NE &	15	18	670	575	6	448.6	50	564
	NE 222 Ave.					3	449.0	54	574
40	Woodinville-Duvall &	T79	10	615	420	6	277.6	56	407
	194th NE					3	277.4	59	415
41	194th NE & NE 188th	T79	11	615	570	12	494.3	35	575
						3	494.8	38	582
42	NE 168th & 226th NE	15	14	670	575	6	436.0	42	533
	Henley Park					3	436.0	45	540
43	133rd NE & Tolt Pipeline	T123	3	560	260	10	256.0	9	291
						4	256.0	9	256
44	Rolling Mdws Plat	1	21	510	340	6	215.0	45	319
						3	210.9	60	349
45	212th Ave. NE & NE	14	23	575	420	6	338	50	453
	133rd St.					4	338	55	465

(1) T_=Tap # (e.g., T 76 is Tolt Tap No. 76)

(2) PRV 19 is at an intertie with the Northshore Utility District. The PRV is set to flow only for an extreme demand, such as for a fire. The PRV has only one valve.

(3) Small valve does not operate at Station 20. Station 20 is off-line.

(4) Abandoned tap.

(5) Valve only works when Tolt Hydraulic Grade Line is greater than 670 feet.

Pump Stations

The District has five pump stations. Table 1-7 *Pumping Stations* summarizes the pump station data.

The pump stations boost water to upper zones and maintain system pressures. The Ringhill Pump Station is equipped with a remote sensor at a high point in the system near 232nd Ave. NE and NE 168th St. When system pressures are low, pumps operate; otherwise flow bypasses the pump station. Variable frequency drives adjust the speed of the pumps to match the pressure and flow demand in the system. The pump station is also equipped with a local pressure transmitter located on the pump discharge header to enable backup or alternative automatic operation if there is a failure with the remote sensor. The District is planning to install control modifications to give more flexibility to the various operating modes.

Lake of the Woods East was constructed recently to serve Zone 20, a small residential area. Reintree and Cottage Lake pump stations are inactive.

TABLE 1-7
PUMPING STATIONS
WOODINVILLE WATER DISTRICT

Location	Function	Pump No.	Manufacturer/ Model	Design Flow (gpm)	Design Head (ft)	Shut-Off Head (ft)	Speed (rpm)	Horse-Power (HP)
Hollywood	Pumps from Tolt Tap T80 to Zone 7 Hollywood Hill (650 feet)	1 (Jockey)	Berkley B-2	400	84	94	3,500	15
		2	Aurora/361A	800	130	137	1,750	50
		3	Aurora/361A	800	130	137	1,750	50
Ringhill	Pumps from Tolt Tap T78 to Zone 15 Ringhill (670 feet)	1	Peerless/10 MA	695	178	263	1,760	40
		2	Peerless/10	695	178	263	1,760	40
		3	MAPeerless/10 MA	695	178	263	1,760	40
Reintree (Standby)[1]	Inactive	1 (Jockey)	PACO/2595-1	240	185	225	3,500	20
		2	Floway/8JKM	500	236	320	3,500	40
		3	Floway/8JKM	500	236	320	3,500	40
Cottage Lake(Standby)[2]	Inactive	1	Peerless/10 M10 – 1825-1801	500	133	--	1,760	25
Lake of the Woods East	Pumps from Zone 15 Ringhill (670 feet) to Zone 20 (770 feet)	1	Carver/L&H Horizontal	53	148	170	3,450	5
		2	Carver/L&H Horizontal	53	148	170	3,450	5
		3 (Fire)	Carver/L&H Horizontal	1,000	55	67	1,760	20

[1] Whether to remove or rebuild the Reintree Pump Station will be determined as part of the System Analysis.

[2] The District plans to remove the Cottage Lake Pump Station.

Service Zones

The District service area is organized into 24 service zones. The service zone locations are shown on Figure 1-7 *Service Zones Map.* Supply and withdrawal for each service zone is summarized on Table 1-8 *Service Zone Connections.*

TABLE 1 –8
SERVICE ZONE CONNECTIONS
WOODINVILLE WATER DISTRICT

Pressure (feet)	Feed To	Withdrawal From	Comments
Service Zone 1 Kingsgate			
510	PRV 1 from Tolt River Tap T76 PRV 16 from Tolt Eastside Supply Tap T77 PRV 19 (Northshore Utility District) Kingsgate Standpipe	PRV 2 to Zone 2N PRV 36 to Zone 2E PRV 44 to Zone 21 Sammamish Emergency Bypass through Tolt Tap 123	PRV 16 is the District's only tap off of the Tolt Eastside Supply Line, and may be subject to peak demand charges. A flow control valve at PRV 16 controls the flow, and peaks are provided for by Tolt Tap T76 (PRV 1) and the Kingsgate Standpipe. PRV 19, which is an intertie with Northshore Utility District, is set to allow for flow only during an emergency.
Service Zone 2N Sammamish Slope			
420	PRV 2 from Zone 1	PRV 3 to Zone 3	Service zone slopes down from the north end of the Kingsgate area northward toward the Sammamish River. Elevations drops from 340 to 210 feet in less than one mile. The demand from Service Zone 3N draws water through the zone, creating operational challenges to hold water in Zone 2N since there is no reservoir in the zone to control flow. Careful control of PRV 2 and 3 is necessary to maintain pressure. PRV 3 is hydraulically closed to keep water in Zone 2N.
Service Zone 2E Chateau Woods			
420	PRV 36 from Zone 1	None	Service zone slopes easterly from Zone 1 (Kingsgate) to Zone 3S (Sammamish) and is limited in size and service due to steep slopes. There is no connection to Zone 3S, so no water flows through the zone.

TABLE 1 –8 (Continued)
SERVICE ZONE CONNECTIONS
WOODINVILLE WATER DISTRICT

Pressure (feet)	Feed To	Withdrawal From	Comments
Service Zone 3 Sammamish			
260	PRV 43 from Samm. Res. from Tolt Tap 123 (west) PRV 14 and PRV 28 from Zone 5 (east) PRV 18 from Zone 4 PRV 3 from Zone 2N (west) PRV 4 from Zone 5 PRV 17 from Zone 5	None	Zone is primarily fed by PRV 43 from the Sammamish Reservoir, which is fed by Tolt Tap 123. PRV 14 and PRV 28 provide secondary feed; all other PRVs are normally hydraulically closed.
Service Zone 4 Bloomberg			
420	Zone 5 Emergency Intertie with City of Bothell	PRV 18 to Zone 3	Availability of water to Zone 4 may be restricted when there is a high demand in Zone 3; line to Zone 4 also supplies water downstream to Zone 3 through PRV 18. Connected with Zone 5. Emergency intertie with City of Bothell is used in isolated incidences such as when the District supply is shut down for construction.
Service Zone 5 Reinwood			
420	PRV 13 from Zone 9N PRV 8 from Zone 6 PRV 24 from Zone 9N PRV 27 from Zone 9N	PRV 14 to Zone 3 PRV 28 to Zone 3 PRV 4 to Zone 3 PRV 17 TO Zone 3	The primary source for Zone 5 is from the Wellington Reservoir through PRV 13, 24, and 27. Backup is provided through PRV 8. Connected with Zone 4 by 10" main.
Service Zone 6 West Hollywood			
570	PRV 26 PRV 35	PRV 8 to Zone 5 PRV 22 to Zone 16	Zone 6 connects directly with Zone 9S, although 6-inch lines limit the exchange of flow between the two zones. The connection to the Wellington Transmission Main at PRV 35 is used primarily as a backup, with the major source being from the Hollywood Hill area at PRV 26.

TABLE 1 –8 (Continued)
SERVICE ZONE CONNECTIONS
WOODINVILLE WATER DISTRICT

Pressure (feet)	Feed To	Withdrawal From	Comments
Service Zone 7 Hollywood Hill			
650	Hollywood Pump Station and Reservoir Tolt Tap T80 PRV 34 from Tolt Tap T53 (not in service)	PRV 5 to Zone 9S PRV 6 to Zone 9N PRV 7 to Zone 19 PRV 26 to Zone 9	The Hollywood Hill area is served directly from a connection to the Tolt Supply Line (Tap T80), via a small bypass line in the Hollywood Pump Station. If that line is insufficient to supply the needs of the zone, the pumps draw from the Hollywood Hill Reservoir, pumping directly into the Hollywood Hill grid. A permanently mounted diesel generator supplies emergency power in case of a power outage in the system. The key to keeping the pressure up in the Hollywood Hill grid is proper settings and maintenance of the four PRVs which provide water to lower zones from this area. If the PRVs are set too low, the amount of water drawn from the Hollywood Hill grid requires non-stop operation of the large pumps in the Hollywood Pump Station, and makes maintaining the pressure in the zone difficult. If the PRVs are set too high, maintaining the pressure in the lower grids is difficult due to a limited supply. The District has worked extensively with these settings in the past, and has the operation of the various grids well defined. PRV 26 (which supplies water to a lower zone) has three pressure valves, rather than the normal two valves. By coordinating the settings of the 3-inch, 4-inch, and 6-inch valves, most demand situations are handled easily. The 3-inch and 6-inch valves are fed from Wellington Transmission Main. If the pressure is not sufficient in the main, the 4-inch valve will draw water from the Hollywood Hill grid.
Service Zone 8 South English Hill			
420	PRV 23 from Zone 9S	None	Only feed to zone is PRV 23.

TABLE 1 –8 (Continued)
SERVICE ZONE CONNECTIONS
WOODINVILLE WATER DISTRICT

Pressure (feet)	Feed To	Withdrawal From	Comments
Service Zone 9N Wellington			
570	PRV 6 from Zone 7 (Emergency/Fire only) PRV 33 from Tolt Tap T53 through Wellington Trans. Main Wellington Standpipe (from Tolt Tap T53; controlled by altitude valve)	PRV 12 to Zone 10 (hyd. shut) PRV 13 to Zone 5 (secondary source) PRV 24 to Zone 5 (tertiary source) PRV 27 to Zone 5 (primary source)	Connection with Zone 9S. High draw to lower zones requires careful operation of PRVs.
Service Zone 9S Hollywood South			
570	Tolt Tap T57 via South Hollywood Standpipe PRV 5 from Zone 7	PRV 15 to Zone 10 PRV 23 to Zone 8 PRV 29 to Zone 16 PRV 31 to Zone 16	The District intends to install a pump station to maintain pressure in grid and to utilize existing storage during demand season. Zone 9S connects directly with Zone 6, although 6-inch lines limit the exchange of flow between the two zones.
Service Zone 10 Brookside			
420	Tolt Tap T125 via Brookside Reservoir PRV 40 from Tolt Tap T79 via Avondale-Reintree Trans. Main (primary source) PRV 12 from Zone 9N (secondary source to zone) PRV 15 from Zone 9S PRV 30 from Zone 14 PRV 37 from Zone 13 (hyd. closed to keep water in Zone 13)	PRV 32 to Zone 17 PRV 38 to Zone 17	The primary source of water to Zone 10 is PRV 40 from north end of Avondale-Reintree Trans. Main. With accurate settings on PRV 40, the Brookside Reservoir floats on the zone. Because the Brookside reservoir is not equipped with a swing check, careful adjustment of the PRV stations which feed the zone are required. A setting which is too high could result in overflow of the reservoir.
Service Zone 11 Reintree			
570	PRV 41 from Tolt Tap T79 via Avondale-Reintree Trans. Main	PRV 21 to Zone 12	Connected to 9N. A reservoir to control flow in the zone is under consideration.
Service Zone 12 Paradise Lake			Due to the small size of this zone, PRV 21 has three valves: 6-inch, 3-inch, and 1-inch direct acting PRV for low flows.
420	PRV 21 from Zone 11	None	
Service Zone 13 Park Estates			
485	PRV 10 from Zone 14	PRV 37 to Zone 10	

TABLE 1 –8 (Continued)
SERVICE ZONE CONNECTIONS
WOODINVILLE WATER DISTRICT

Pressure (feet)	Feed To	Withdrawal From	Comments
Service Zone 14 Lake of the Woods			
575	PRV 9	PRV 10 to Zone 13	Connected with Zone 18.
	PRV 25 from Tolt Tap T78	PRV 30 to Zone 10 PRV 45 to Zone 23	In Zones 14 and 18, a high pressure is maintained in the grid, and the Ringhill Reservoir is full most of the time. The reservoir provides fire storage only and little equalization storage. To maintain water quality, PRV stations feeding Zones 14 and 18 have winter and summer settings. Periodically, the PRV stations are manually shut down to turn the water in the reservoir.
Service Zone 15 Ringhill			
670	Tolt Tap T78	PRV 9 to Zone 14	If the energy grade line on Tolt is high enough, water will bypass the Ringhill P. S.
	Ringhill P.S.	PRV 39 to Zone 18	
	Aspenwood Reservoir fed by Ringhill P.S.	PRV 42 to Zone 22	PRV 25 is used as a back-up to zone.
Service Zone 16 Southwest Hollywood			
420	PRV 31 from Zone 9S	None	
	PRV 22 from Zone 6		
	PRV 29 from Zone 9S		
Service Zone 17 Tuscany			
340	PRV 32 from Zone 10	None	
	PRV 38 from Zone 10		
Service Zone 18 Aspenwood/Lexington			
575	PRV 39 from Zone 15	PRV 45 to Zone 23	Connected with Zone 14.
	Ringhill/Saybrook Reservoir		See additional comments under Zone 14.
Service Zone 19 Woodway			
585	PRV 7 from Zone 7	PRV 35 to Zone 6 when Tolt pressure is low	PRV 35 has three valves. The 3-inch and 6-inch valves are supplied by the Wellington Transmission main. The 4-inch valve is supplied by Zone 7.
Service Zone 20 Lake of the Woods East			
770	Lake of the Woods E. Pump Station from Zone 15	None	
Service Zone 21 Rolling Meadows			
340	PRV 44 from Zone 1	None	

TABLE 1 –8 (Continued)
SERVICE ZONE CONNECTIONS
WOODINVILLE WATER DISTRICT

Pressure (feet)	Feed To	Withdrawal From	Comments
Service Zone 22 Henley Park			
570	PRV 42 from Zone 15	None	
Service Zone 23 Anstalt			
420	PRV 45 from Zone 14 and 18	None	

AGREEMENTS AND POLICIES

Service Area Agreements

The District has water service area agreements and/or policies with the City of Seattle (SPU), the City of Redmond, the Cross Valley Water District, the Northshore Utility District, and King County. The agreements are listed on Table 1-9 *Summary of District Service Area Policies and Agreements.* Copies of agreements are included in the Appendix.

The District purchases its water from the City of Seattle. Conditions for the supply of water are defined in the *Water Purveyor Contract - Version B* (November 1981, Amended February 3, 1982 and February 26, 1982) and the *First Amendment to the Water Purveyor Contract* (June 6, 1994). The contract expires on January 1, 2012. Copies of both contracts are included in the Appendix.

An interlocal agreement with the City of Redmond designates the service area boundary between the two purveyors to be the easterly extension of NE 124th St. An addendum to the agreement establishes service to the Shadowbrook Phase II development that straddles both service areas. Several additional addenda to the agreement establish service to several individual properties and smaller developments.

The District has a policy regarding the extension of water service into the Cross Valley Water District which borders the District to the north in Snohomish County. The District will only consider requests for water service into Snohomish County made by Cross Valley Water District pursuant to the terms and conditions of an approved interlocal agreement. A service area agreement with the Cross Valley Water District defines the manner in which service can be provided for circumstances where a customer lies within the service area of one purveyor, but water service can be more feasibly provided by the other purveyor. Service requires the written consent of the other purveyor, and SPU.

Service area boundaries are designated in the East King County Coordinated Water System Plan (*CWSP*). The *CWSP* was most recently updated November 14, 1996.

The District has no formal agreements for water service with the City of Bothell, which borders the District on the northwest, or with Kirkland, which borders the District on the southwest. Bothell supplies water west of 124th Ave. NE. On occasion, Bothell provides water for Zone 4 (Bloomberg), on an emergency/temporary basis. The District is in the process of entering into a formal agreement with the City of Bothell.

The District is one of three utilities (i.e., Woodinville Water District, Northshore Utility District, City of Everett) that executed the interlocal agreement which formed the SRRWA in 1996. The purpose of the SRRWA is to plan, develop, manage, and finance a regional water supply system in coordination with current and future members. Once the SRRWA was formed, the District executed an Agreement to Develop Water Supply Resources with the other SRRWA members. The latter agreement establishes the rights and obligations of SRRWA members relative to acquisition of the Weyerhaeuser Company surface water right, including costs for development of the SRRWA source, including permitting and construction. The Agreement assigns 11 mgd of the SRRWA total 36 mgd (Qi), to the District for municipal supply purposes. Copies of the SRRWA agreements are attached.

TABLE 1-9
SUMMARY OF DISTRICT SERVICE AREA POLICIES AND AGREEMENTS

Purveyor/Jurisdiction	Date	Description
Cross Valley Water District and Alderwood Water District	5/17/88	Policy statement regarding extension of water service into Snohomish County (Cross Valley Water District and Alderwood Water District) (Resolution 2388)
Cross Valley Water District	9/30/91	Letter from SPU to District - Response to the request to provide temporary water service to the Cross Valley Water District
Cross Valley Water District	3/4/85	Water service agreement between District and Cross Valley Water District (Resolution 1863)
City of Redmond	7/13/88	Interlocal Agreement designates the service area boundary between the District and Redmond to be an easterly extension of NE 124th St. Resolution 2407 (dated 6/27/98) approves the Interlocal Agreement
City of Redmond	See Description	Addenda to the interlocal agreement between the District and Redmond establishing water service to the following areas: Shadowbrook (1/22/90); between 177th Ave. NE and 184th Ave. NE (10/1/92); 167th Ave. NE and 172nd Ave. NE (9/14/93); east of 184th Ave. NE (12/29/93); east of 176th Ave. NE extended (1/27/94); and 177th Ave. NE and 184th Ave. NE (9/19/94).
King County	10/6/92	Acknowledges the water service area boundaries and responsibilities for the water purveyor as outlined in the East King County Coordinated Water System Plan.
City of Seattle	11/81 (Initial)	Conditions for the supply of water. *Water Purveyor Contract – Version B* (11/81, Amended 2/3/82 and 2/26/82) and the *First Amendment to the Water Purveyor Contract* (2/6/94).

Service Area Policies

Cascade Water Alliance

The District has been a participant in the formation of the Cascade Water Alliance (CWA). The CWA is a regional group forming to address the future water supply of suburban water districts which currently purchase most of their water from the City of Seattle. The agreement and contract for the CWA are under development.

Design and Performance Standards

Minimum design and performance standards for new development are listed in the *Standard Water Specifications of the Woodinville Water District for Developer Extensions* (July 11, 1997). A copy of the standards is included in the Appendix. The District also meets the minimum design and performance standards of the *CWSP* for the East King County Critical Water Supply Service Area.

Emergency Service

Resolution No. 2333, adopted January 18, 1988, defines the conditions under which an emergency service connection can be provided for an applicant located within District boundaries. This connection is intended only for a single family residence served by an individual well in which the groundwater supply is contaminated and presents an adverse health condition. Emergency service will only be provided following demonstration of a health hazard from the contaminated groundwater supply. The emergency service connection is a temporary connection to the District's water system until permanent water facilities are extended to the property requesting service.

Annexations

The District's policy is to only serve properties within the District boundaries. Annexation is a condition for providing service to areas outside of the District's boundary, except upon a contractual basis such as exists under the interlocal agreement with the City of Redmond. Territory adjacent to the District that is within the District's future service area, and not already part of another water purveyor or service area within the *CWSP* service area boundary, may be annexed.

System Extensions

Anyone seeking to connect to the existing water system is required to install improvements to assure orderly development of the utility system. These improvements must comply with the requirements for water quantity and pressure established by the District and with fire protection requirements contained in the District standards and/or King County Ordinance No. 5828 (or latest edition). Water main extensions must extend through and to the extremes of the property being developed, unless specifically waived by the District due to physical constraints, or other site limitations. Each building lot must have frontage on a permanent water main.

An extension to the District water system is required under the following conditions:

- Where the subject property, under existing conditions, is unable to comply with fire protection requirements established by the District or other applicable fire protection requirements.
- When an existing water main is unable to adequately serve the property being developed and meet the District flow and pressure standards.
- When the property to be served will connect to a water main that is scheduled for upgrading as specified in the adopted Water Comprehensive Plan.
- When a water main extension is needed to complete the existing system of water mains or to further the orderly development, gridding, or looping of the water system.
- Mains are required to be extended as a condition of service.

Three methods are available for extending the District's water system, including developer extension, ULID, and fire hydrant extension. Developer extensions are the primary method used by property owners to extend water service.

Developer Extensions. Developer extensions are constructed and financed by a property owner or developer wishing to serve an area with water. Annexation is required for developer extensions in areas outside District boundaries (but within the District's designated future service area). The process for extending the system through the Developer Extension method consists of:

- Developer obtains water availability certificate from District.
- Developer and District enter into signed agreement per District standards.
- Developer pays administrative and other applicable fees.

- Project is designed and permits obtained (may be by District or developer at developer's option). All costs are to be paid by the developer.
- Project constructed (District inspection). All costs are to be paid by the developer.
- Developer to furnish recorded or recordable easements, title insurance and fees.
- Project accepted by District.

The written Developer Extension agreement with the District sets forth the terms and conditions under which the system will be extended. The developer extension agreement addresses fees, plan reviews, insurance and indemnity, warranties, ongoing bonds, conditions of acceptance, technical specifications, standards and other applicable issues.

Under certain circumstances, the District may participate financially in the construction of the project when it is determined that "oversizing" of the line or Extended Service Agreement removal is in the best interests of the District as a whole.

If a water main extension is planned in the vicinity of properties with extended or temporary service agreements, the District may require those properties to hook up to the new permanent water main upon completion of the extension in accordance with District Resolution. The District gives additional notice to the owners of property subject to an extended or temporary service agreement. This notice reminds those owners that their water service from the District is temporary and that their properties and they may be subject to certain obligations. The District will hold a Public Hearing prior to determining whether a temporary service will be terminated. A temporary water service connection will be terminated upon advance notice to the owner of the property that is temporarily connected, whenever:

(a) A permanent water main has been installed and made operative, and

(b) That permanent main satisfies the standards of the District for permanent service to the property that is temporarily connected.

(c) The Board of Commissioners determines that it is in the District's interest to terminate such service.

Before the property subject to an extended or temporary service agreement may be connected to the permanent main, the owner(s) of that property must first:

(a) Satisfy all prerequisites of the District for water service, and

(b) Pay the District the actual cost of the new connection, other connection charges as allowed, and any applicable fees for reimbursing property owners who contributed to the construction of the permanent water main, as required by District resolutions.

ULID. The District Board of Commissioners is empowered to determine whether or not to form ULIDs. This determination is made on the basis of the facts and circumstances pertinent to each particular ULID proposed for formation. The two methods available for initiating a ULID are the petition method and by resolution of the Board of Commissioners. The petition method requires signatures of property owners representing at least 51 percent of the land area within the boundary of the proposed ULID. The Board of Commissioners initiates the resolution method by passing a resolution of formation.

Following the receipt of a petition for the formation of a ULID, a public meeting is held by the District. This meeting is held for the purpose of generally explaining the procedures that the District follows in forming a ULID. Notice of the meeting is sent to the occupants and/or owners of property included within the boundaries of the proposed ULID. The District also provides notice to these occupants and/or property owners of the meeting at which the Board of Commissioners plans to determine the sufficiency of a petition for the formation of a ULID. (The Board of Commissioners then determines the sufficiency of the petition or adopts a resolution of its intent to form the ULID.)

A property owner desiring to initiate a petition for the formation of a ULID has the option of preparing the form and contents of the petition himself or herself or of contracting with the District to prepare the form and contents of the petition. There is an administrative charge for this service. This charge is not refundable, and is not credited against the assessment or any other fees or charges imposed by the District.

Emergency Service Agreement. During the early years of the District, another mechanism for system extension was used and termed an Extended Service Agreement (also called an Emergency Service Agreement or a Temporary Service Agreement). This method is no longer available and it is the District's policy to eliminate those existing agreements where it is possible to do so in an orderly, consistent fashion. One of the conditions under which an Extended Service Agreement was granted for a particular property was an agreement not to oppose or protest formation of a future ULID when the use of this method became appropriate, and temporary service would be disconnected once permanent service was available.

It is the District's policy to cease service to properties currently served under Extended Service Agreement within 60 days of the date permanent service becomes available. The property owner is given an opportunity to connect to the new permanent service with the attendant connection, latecomer, or other charges and fees as established by District Resolution.

Fire Hydrant Service/Extension. A fire hydrant service/extension is the installation of a water main and/or fire hydrant for the purpose of providing additional fire protection to an area. This situation usually occurs in commercial or industrial areas where additional buildings are added to a site in which the Fire Marshall requires a fire hydrant or sprinkler system in order to meet the fire codes. This is a special extension which is in lieu of a complete developer extension at the discretion of the District. A need or desire for this special extension must be expressed to the District.

The criteria for considering a fire hydrant service/extension are as follows:

1. Length of water main between fire hydrants:
   - 300 feet maximum in commercial areas.
   - 600 feet maximum in residential areas.
2. Maximum distance from hydrant to structure is 150 feet in commercial and industrial areas.
3. Number of fire hydrants required – limited to one fire hydrant for every 300 feet.
4. The property has previously extended the water system in accordance with District standards and service polices.

If determined by the District that the extension does not meet one of these requirements, then another method of water system extension must be used.

The developer or property owner is responsible for all costs associated with Fire Hydrant Service/Extension is accordance with District Resolution.

Residential Sprinkler Systems. Residential sprinkler systems are permitted. Separate meters with approved backflow devices are required for these services.

Satellite System Management Program

In accordance with the *CWSP*, the District may be called upon to provide some level of response to adjacent areas beyond District boundaries that require a public water supply. The *CWSP* outlines a Satellite System Management Program (SSMP), under which an existing, viable water provider may provide operation and management services to areas outside of its boundaries on a contractual basis.

The District supports the concept of satellite management and may provide satellite management services after evaluating requests or applications on a case-by-case basis. The District reviews requests for satellite management of separate and self-contained water systems based on the following considerations:

1. The economic feasibility of connecting to the District's system. Economic feasibility is gauged by the distance between the project site and the District's system, engineering variables that might affect cost, the size of project to be served by the water system, possible participation by other interested parties, and other factors the District considers relevant. Whenever connection to the District's system is economically feasible, the District will not provide satellite management services. Instead, those properties would be required to extend the District's permanent water main system to obtain water service.
2. Existing systems. The condition of the existing system and its compatibility with the District's system. The ability of property served by the system to fund necessary upgrades, either privately or through municipal funding mechanisms. Supply adequate in quantity and quality must be available. Water rights must be transferred to the District.
3. New systems. The applicant must possess water rights adequate to supply the project and be willing to transfer those rights to the District. This would apply only to those systems with seven or more connections, since public water systems with fewer connections are not required to have water rights. The system must be constructed according to District standards and specifications.
4. Except when otherwise approved by the Board of Commissioners, the District will own all systems which it agrees to manage, and rates and charges will be established by the Board of Commissioners according to law. Satellite systems will be subject to all rules and regulations of the District. Satellite systems will be connected to the District's system when public service is available to the property served by the system.

Because satellite management will not benefit the District's customers, the District will consider various financing options to provide satellite management services. Satellite System Management will have no rate impacts to current customers. The August 12, 1993 Addendum to the *CWSP* suggests the following potential financing options for satellite management services:

- District to advance cost of satellite system improvements which would be paid back by remote system customers through rates, or acting as an intermediary to help the system secure state or federal grant money.
- Low interest loans from such programs as the State Public Works Trust Fund.
- Conventional loans.
- Community development Block Grant funds for qualified low income residents.
- The formation of ULIDs.

Related Planning Documents

District plans that are related to the Water Comprehensive Plan include:

- *Woodinville Water District Water Shortage Contingency Plan for Drought and Emergency Reduction*, 1994.
- *Woodinville Water District Emergency Response Plan* (under production).

The District plans and provides service consistent with the land use policies of King County and the City of Woodinville. Related land use plans include:

- *1998 King County Annual Growth Report. Land Development and Demographic Information for King County, Its Cities, and Unincorporated Areas* (King County Office of Budget and Strategic Planning, August 1998).
- *City of Woodinville Comprehensive Plan*, June 1996.
- *The 1994 King County Comprehensive Plan Complete with 1997 Updates,* (King County Office of Budget and Strategic Planning, November 1994 revised December 1994).

Future water demand projections will be based on both the land use policies of the King County and the City of Woodinville as well as demographic projections from the following:

- *Forecast of Demographics by Purveyor* (Seattle Public Utilities, 1998).
- *1995 Population and Employment Forecasts for the Central Puget Sound Region* (Puget Sound Regional Council of Governments (PSRC), 1995).
- *East King County Coordinated Water System Plan Update* (November 14, 1996).

A portion of the Trilogy at Redmond Ridge Urban Planned Development (UPD) (formerly Blakely Ridge) is located within the District's service area. At this time, Redmond will supply all water to the development. However, the District could provide service to the Trilogy UPD in the future directly (not through Redmond). Information on Trilogy UPD is provided in:

- *Blakely Ridge Water System Master Plan* (January 23, 1992).

The District is part of the Water Utility Coordinating Committee which published the East King County CWSP (November 14, 1996). Some issues addressed by the CWSP include water demand forecasts, boundaries between purveyors, regional water supply options, a conservation program, and minimum design and performance standards.

There are several related conservation planning documents. Some of these documents include:

- *Conservation Planning Requirements Guidelines and Requirements for Public Water Systems Regarding Water Use Reporting, Demand Forecasting, Methodology, and Conservation Programs,* DOH, DOE, March 1994.
- *Municipal Water Conservation Analysis and Recommendations Draft,* DOH, August 12, 1998.
- *1996 Long Range Regional Conservation Plan* (Seattle Water and Its Wholesale Customers).
- *Water Conservation Potential Assessment Draft Project Report, Seattle Public Utilities,* March 2, 1998.
- *A Peek at the Peak Case Study: Reducing Seattle's Peak Water Demand,* Allan Dietemann Resource Conservation Section, Seattle Public Utilities, February 9, 1998.

Complaint Response

The District receives approximately 10 customer "complaints" or inquiries per week. The subject of customer complaints generally pertains to high water bills, water pressure, or water quality. The District often resolves the concern by telephone. If needed, the District's customer service department prepares a work order and a staff member is sent to the site to investigate. The District retains records of all work orders in accordance with State archiving rules and regulations.

CHAPTER 2 - PLANNING DATA AND DEMAND FORECASTS

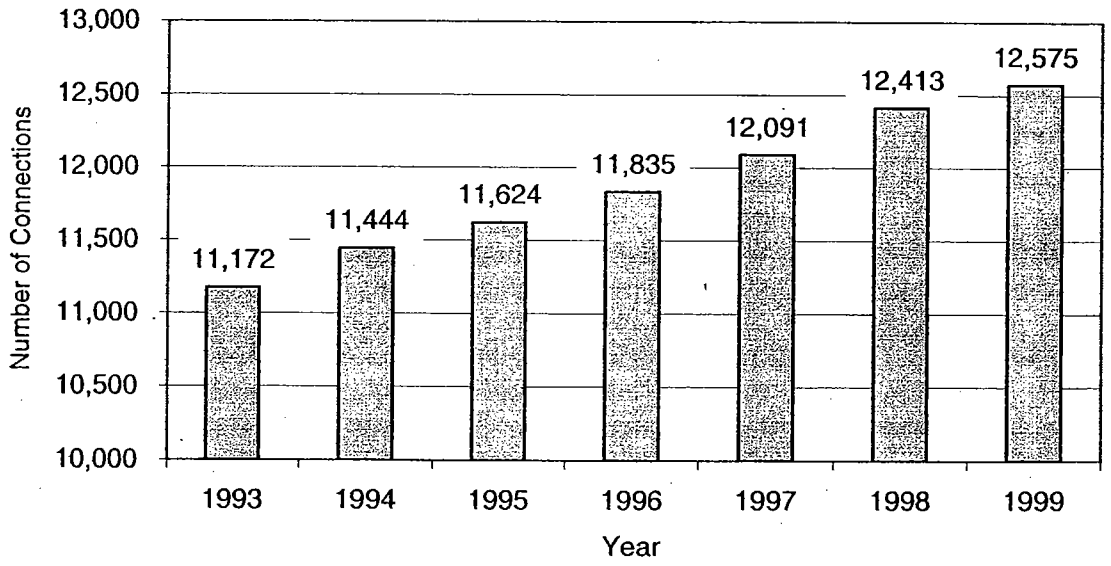
This chapter presents the planning data and water demand forecasts. It includes a look at the historical water consumption and water usage patterns. Water demand for the District is projected through 2020 based on historical water usage, adopted zoning, land use policies, and demographic projections.

EXISTING WATER USE

Current Population and Service Connections

The District has a population of approximately 43,800 (1999 estimate). From 1993 to 1999 the District population, as well as the number of service connections, grew at an annual rate of about two percent. The total number of connections from 1993 to 1999 is shown on Figure 2-1 *Approximate Total Service Connections (1993 to 1999).*

FIGURE 2-1
APPROXIMATE TOTAL SERVICE CONNECTIONS 1993 to 1999
WOODINVILLE WATER DISTRICT



The District classifies service connections into six categories: single-family, multi-family, commercial, industrial, municipal, and irrigation. The number of service connections in each category in 1997 through 1999 is summarized in Table 2-1 *Service Connections.*

TABLE 2-1
SERVICE CONNECTIONS
WOODINVILLE WATER DISTRICT

	1997	1998	1999
Single-family	11,172	11,382	11,593
Multi-family[1]	236	262	263
Commercial	474	546	493
Industrial	7	4	5
Municipal	39	40	39
Irrigation	163	179	182
Total	12,091	12,413	12,575

Source: Woodinville Water District 1997, 1998, and 1999 Water Consumption by Rate Schedule & Zone

(1) The number of multi-family dwelling units for this number of connections was 2,974 in 1997, 2,995 in 1998, 3,000 in 1999.

Water Demands

The District keeps an extensive data base to track water usage. This section presents a summary of existing water usage based on supply meter, service zone, and connection type.

Annual Demand

From 1990 to 1999, the District's annual water usage remained fairly constant at approximately 4.0 mgd, with the exception of 1998, where annual usage was 4.4 mgd. Annual water usage from 1993 to 1999 is summarized in Table 2-2 *Annual Consumption* and shown graphically in Figure 2-2 *Historical Water Usage*. The annual usage is expressed both in terms of annual consumption (in MG) and Average Daily Demand (ADD) which is equal to the annual demand divided by 365 days. The demand data are based on Seattle Public Utilities (SPU) billing records for the source meters and the District's billing records for connections. Consumption data from the District's source meters were not available. Because of inaccuracies in the SPU meters on the Tolt supply line, the source meter data shows a lower usage than the connection meter data, for 1990 to 1997, preventing calculation of the percentage of unaccounted-for water. SPU began replacing the source meters in 1998, which resulted for the first time, in the District purchasing more water than it sold (in 1998). Unaccounted-for water in 1999 was four percent.

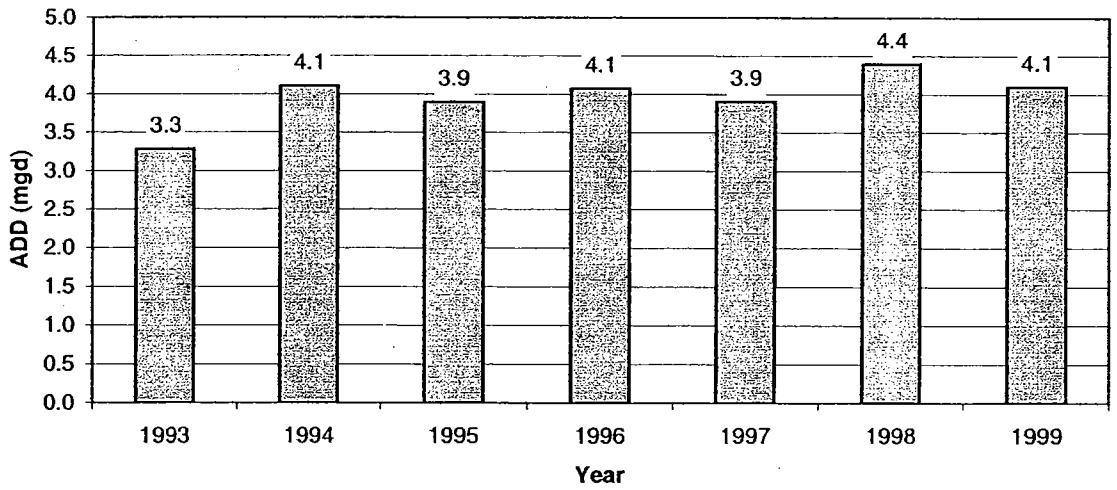
TABLE 2-2
ANNUAL CONSUMPTION
WOODINVILLE WATER DISTRICT

Year	Annual Consumption (MG)		Average Day Demand (mgd)	
	Based on Connection Demand[1]	Based on Source Meter[2]	Based on Connection Demand	Based on Source Meter
1993	1,199	1,117	3.3	3.1
1994	1,499	1,428	4.1	3.9
1995	1,422	1,379	3.9	3.8
1996	1,487	1,459	4.1	4.0
1997	1,425	1,391	3.9	3.8
1998	1,605	1,638	4.4	4.5
1999	1,496	1,554	4.1	4.3

(1) Source: *Monthly Consumption (CCF) and Meter Count (for 1993 through 1999)*

(2) Source: *Water Consumption (100 CU. FT.) based on SPU Billings (for 1993 through 1999)*

FIGURE 2-2
HISTORICAL WATER USAGE
WOODINVILLE WATER DISTRICT



Source: Monthly Consumption (CCF) and Meter Count (for 1993 through 1999).

The Maximum Day Demand (MDD) is equal to the highest quantity of water consumed in a 24-hour period. The MDD in 1996, 1997, 1998, and 1999 was 10.8 mgd, 11.85 mgd, 11.8 mgd, and 9.3 mgd respectively, resulting in a maximum ratio of MDD to ADD of 3.0.

Demand by Source

The water demand for each Tolt tap is summarized in Table 2-3 *Annual Demand by Source Meter.*

TABLE 2-3
ANNUAL DEMAND BY SOURCE METER
WOODINVILLE WATER DISTRICT

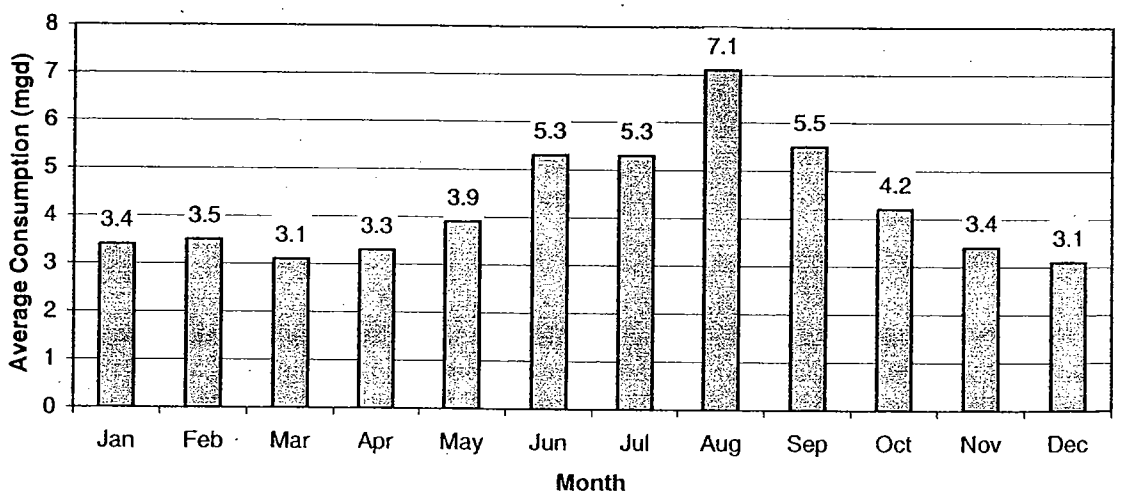
Tap	Location	Demand (MG) 1997	1998	1999
53	158th Ave NE (Wellington)	146	200	206
57	176th Ave NE (S. Hollywood)	286	335	321
76	124th Ave NE	152	179	128
77	132nd Ave NE & NE 140th St	139	131	166
78	232nd Ave NE	212	175	186
79	Avondale Road	74	14	18
80	168th Ave NE	81	103	100
123	Sammamish Reservoir	205	300	272
125	180th PL NE	96	200	1 57
	Total	1,391	1,638	1,554

Source: *1997, 1998, and 1999 Water Consumption (100 CU. FT.) based on Seattle Water Dept. Billings*

Seasonal Variation

Seasonal variation in water demand is graphically illustrated in Figure 2-3 *1999 Monthly Water Consumption.* The monthly consumption, expressed in average daily demand, ranged from 3.1 mgd to 7.1 mgd in 1999.

FIGURE 2-3
1999 MONTHLY WATER CONSUMPTION
WOODINVILLE WATER DISTRICT



Demand by Service Zone

The water demand for each of the District's 23 service zones is summarized in Table 2-4 *Consumption by Service Zone.*

TABLE 2-4
CONSUMPTION BY SERVICE ZONE
WOODINVILLE WATER DISTRICT

	Annual Consumption (MG)		
Zone	**1997**	**1998**	**1999**
1	269.6	286.3	269.2
2	11.6	12.7	11.9
3	210.4	246.7	243.6
4 and 5	111.8	113.7	101.3
6	28.3	31.9	28.0
7	45.5	54.0	50.2
8	34.5	39.5	36.7
9	249.1	273.4	253.9
10 and 13	191.3	213.7	193.1
11	62.4	69.2	63.4
12	1.3	1.5	1.4
14	73.3	89.4	80.5
15	45.4	61.1	58.0
16	26.2	30.7	26.5
17	34.6	41.6	37.4
18	20.5	25.1	21.8
19	5.7	6.2	6.2
20	0.4	1.7	2.0
21	0.3	3.0	6.6
22	2.1	3.7	3.9
23	0.0	0.0	0.1
Total	1,424	1,605	1,496

Source: *Woodinville Water District 1997, 1998, and 1999 Water Consumption by Rate Schedule & Zone*

Note: District data were allocated to revised service zone boundaries. (This impacted annual consumption shown for Zones 4, 5, 10, 13, and 16.)

Demand by Connection Type

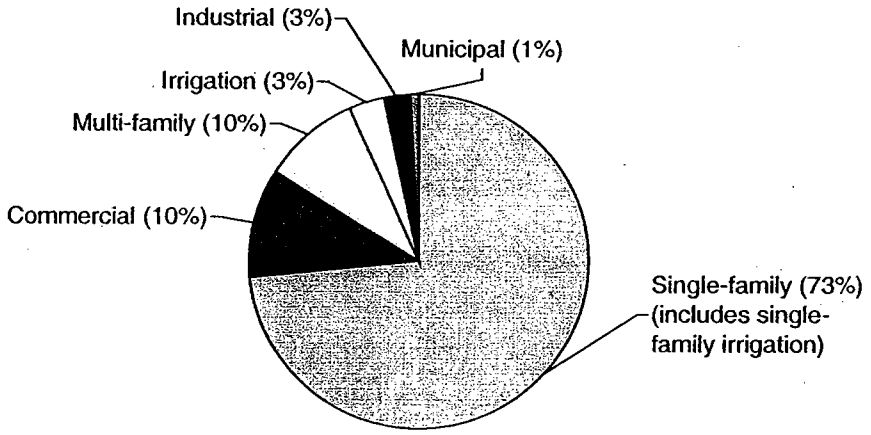
Water demand by service connection type is listed in Table 2-5 *Water Demand by Connection Type.* The percentage of annual demand by connection type is illustrated graphically in Figure 2-4 *Percentage of Annual Water Demand by Connection Type (1999).* Residential demand accounts for 83 percent of the total water demand. Single family residential demand accounts for 73 percent of the total water demand.

TABLE 2-5
WATER DEMAND BY CONNECTION TYPE
WOODINVILLE WATER DISTRICT

	Demand (MG/year)		
Connection Type	**1997**	**1998**	**1999**
Single-family	1,048	1,189	1,098
Multi-family	135	145	144
Commercial	155	162	156
Industrial	36	40	38
Municipal	12	12	11
Irrigation	39	57	50
Total	1,424	1,605	1,496

Source: *Woodinville Water District 1997, 1998, and 1999 Water Consumption by Rate Schedule & Zone*

FIGURE 2-4
PERCENTAGE OF ANNUAL WATER DEMAND BY CONNECTION TYPE (1999)
WOODINVILLE WATER DISTRICT



Equivalent Residential Units

An Equivalent Residential Unit (ERU) represents the amount of water consumed by a typical single-family residence. The average usage in 1997, 1998, and 1999 for a single-family residence was calculated to be 257 gpd, 286 gpd, and 259 gpd respectively. The average demand for each service connection type expressed in terms of ERU is summarized in Table 2-6 *Calculated ERU.*

Per Capita Demand

The per capita demand (based on single family water usage data) is approximately 90 mgd.

FIGU[illegible] 2-5
METHODOLOGY FOR PROJECTION OF RESIDENTIAL DWELLING UNITS AT BUILDOUT

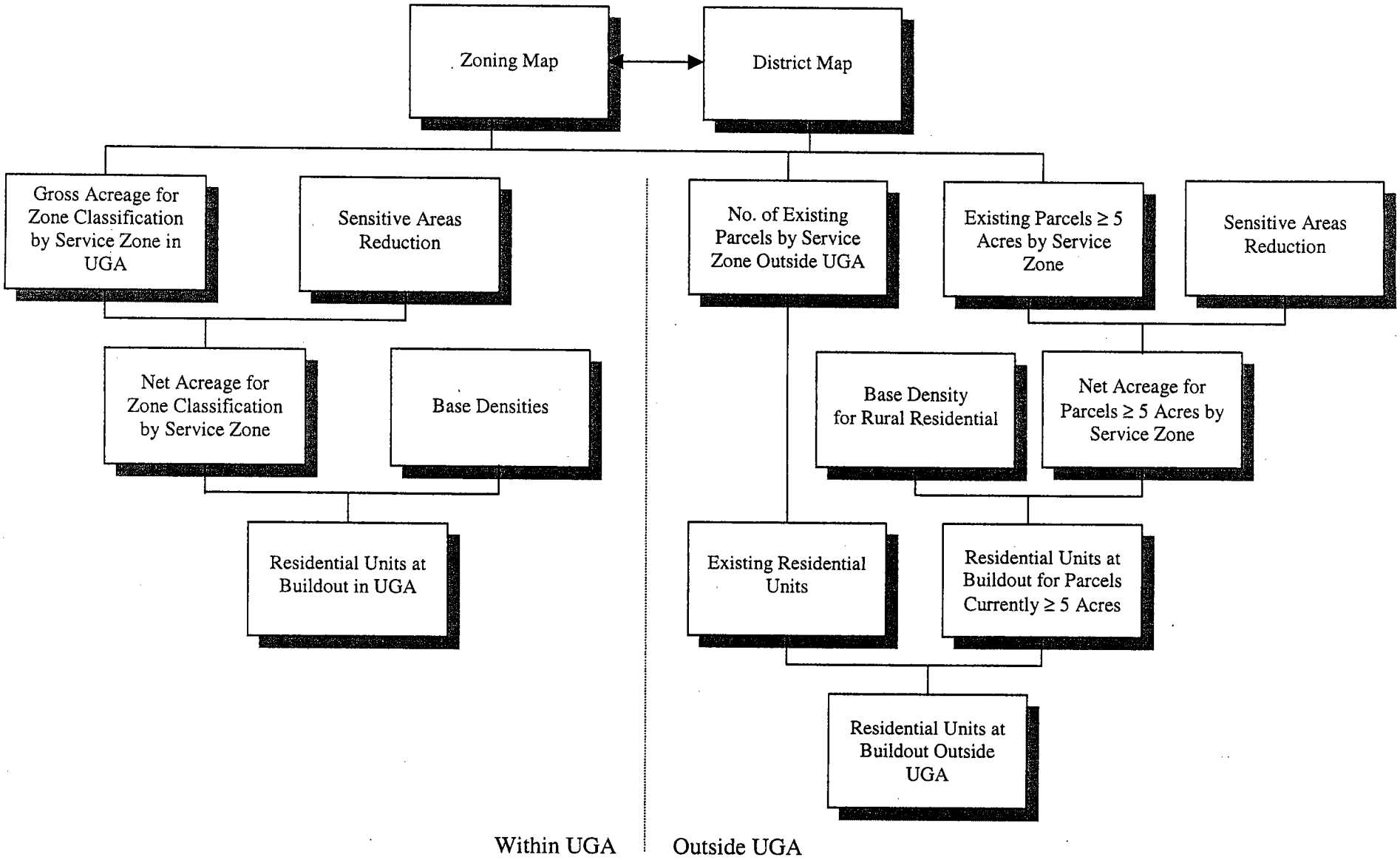


TABLE 2-6
CALCULATED ERU
WOODINVILLE WATER DISTRICT

Connection Type	ERU 1997	ERU 1998	ERU 1999
Single Family	1.0	1.0	1.0
Multi-family	0.5	0.5	0.5
Commercial	3.5	2.8	3.3
Industrial[1]	54.8	95.3	79.7
Municipal	3.3	2.9	2.9
Irrigation	2.6	3.1	2.9

Source: Woodinville Water District 1997, 1998, and 1999 Water Consumption by Rate Schedule & Zone

(1) The increase from 1997 to 1998 in the calculated industrial demand ERU was due to a consolidation of the number of connections, and not due to a significant increase in demand.

PROJECTED WATER DEMANDS

Demand Projection Methodology

Future water demands for the District were estimated by analyzing land use and population. Water demands were calculated by estimating the number of future connections then multiplying that number by the water demand per connection. (Water demand by connection type is listed on Table 2-6 in terms of ERUs.) Water demands were calculated for each service zone and for each connection type (i.e. single-family, multi-family, commercial, industrial, municipal, and irrigation). The demand projection methodology used the integration of GIS zoning and service area mapping, existing demand and connection data, King County and City of Woodinville land use policies, and demographic data from SPU, which are based on Puget Sound Regional Council (PSRC) projections.

Future Connections

Residential Connections. The first step in projecting residential connections was the calculation of the number of buildout dwelling units by service zone. Buildout dwelling units were based on adopted zoning and land use policies. From the buildout dwelling units, the number of residential dwelling units during interim years were calculated based on household projections by SPU.

Dwelling Units at Buildout. A graphical representation of the methodology used to calculate buildout dwelling units is presented in Figure 2-5 *Methodology for Projection of Residential Dwelling Units at Buildout.* Buildout represents maximum development based on the Growth Management Act (GMA).

Buildout dwelling units were calculated differently for urban and rural areas. Inside the Urban Growth Area (UGA), buildout dwelling units were calculated based on adopted zoning. Buildout represents development to the allowable base densities. First, the gross acreage of each land use zone type in each service area was determined by overlaying the GIS land use zoning map and service zone map. Next, the net acreage for each land use zone type was calculated by reducing gross acreage by 25 percent to allow

TABLE 2-7
BASE DENSITIES FOR ZONING CLASSIFICATIONS

Zone Designation	Name	Base Density (Dwelling Units/Acre)[(1)]
CB	Community Business	18
I	Industrial	--
NB	Neighborhood Business	8
RB	Regional Business	36
O	Office	36
R-1	Residential	1
R-4	Residential	4
R-6	Residential	6
R-8	Residential	8
R-12	Residential	12
R-18	Residential	18
UR-SO	Urban Reserve	0.2
RA-2.5	Rural	0.2
RA-5	Rural	0.2
RA-10	Rural	0.1
A-10	Agriculture	0.1

Source: King County Municipal Code Title 21A Chapter 21A.12; City of Woodinville.

(1) Community Business, Neighborhood Business, Regional Business, and Office are mixed use zones.

for sensitive areas, right-of-way and setbacks.[1] Base densities were then applied to the net acreage to determine the urban dwelling units at buildout within each service zone. Base densities for each zoning classification are summarized in Table 2-7 *King County Base Densities*.

Mixed-use areas were assumed to be 30 percent residential. Residential development in mixed-use areas and residential areas zoned R-12 and denser, were assumed to be multi-family dwelling units.

Outside of the UGA, residential areas are zoned rural residential, which has a base density of one dwelling unit per five acres. Much of the rural areas have "grandfathered" areas of development at higher densities than that which is allowed under the current adopted zoning. To account for this denser development, dwelling unit projections for developed and platted areas outside of the UGA assume existing densities. It was assumed that vacant land would be developed at the adopted zoning of one dwelling unit per five acres. The existing and platted dwelling units were approximated by overlaying the existing parcel map and service zone map. Parcels that were greater than 10 acres were subdivided into minimum five acre parcels. The gross acreage of each parcel was first reduced by 25 percent to allow for sensitive areas, right-of-way and setbacks.

Dwelling Units for Interim Years. To estimate the number of dwelling units during interim years, the buildout single-family dwelling unit projection was compared to the SPU 2020 single-family dwelling unit projection. SPU projections are based on PSRC projections. In the PSRC projections, demographic data are allocated to Traffic Analysis Zones (TAZs), which are not coincident with water purveyor boundaries. SPU distributed the TAZ projections to individual purveyor boundaries, assuming fixed percentages of TAZs populations within each purveyor boundary, and calibrating results with actual 1994 single-family

[1] A value of 25 percent was based on discussions with Bruce Bennett, King County Planning Department.

TABLE 2-8
SEATTLE PUBLIC UTILITIES DEMOGRAPHIC PROJECTIONS
WOODINVILLE WATER DISTRICT

Category	1990	2000	2010	2020
Single-family	9,837	12,099	14,568	16,447
Multi-family	1,671	2,041	2,416	3,977
Total Households	11,508	14,140	17,014	20,424
Average Household Size	3.05	2.97	2.79	2.76
Total Population	35,129	42,024	47,446	56,270
Total Employment	9,802	11,973	13,228	13,662
Commercial/Industrial Employment	8,678	10,095	10,991	11,288

Source: Bruce Flory, Seattle Public Utilities.

connections.[2] The SPU projections for the District are summarized in Table 2-8 *Seattle Public Utilities Demographic Projections for Woodinville Water District.*

By assuming a linear growth for the District and setting the single-family dwelling units for 2020 to be equal to 16,447 (2020 SPU projection) the year corresponding to buildout was calculated to be approximately 2031. A linear growth rate for single-family and multi-family dwelling units was calculated for each individual service zone by assuming that each service zone reached buildout in 2031.

The calculated growth rates for each service zone were applied to the existing single family and multi-family dwelling units to determine the number of dwelling units during interim years. The only exception was Blakely Ridge, which was assumed to begin development in 2003 and reach buildout over a period of five years. Currently, Blakely Ridge is not included in any of the existing service areas.

Non-residential Connections. Future commercial and municipal connections were calculated by applying growth trends to the existing District connections. Growth trends were developed based on SPU employment projections for commercial/industrial employment. Future connections were distributed by service zone based on the percentage of commercially zoned land in each service zone.

Projected industrial connections were based on projections by the District. Future connections were allocated to the service zones based on the percentage of industrially zoned land in each service zone.

Projected Connections

The number of projected District dwelling units are shown in Figure 2-6 *Projected Dwelling Units.* Note that because Blakely Ridge is assumed to be built out within a five year time frame, the total number of projected single family connections in Figure 2-6 does not agree exactly with the projected SPU single family connections for 2020. Projected nonresidential connections are summarized in Table 2-9 *Projected Nonresidential Connections.* Projected ERUs are presented in Table 2-10. Projected connections by service zone and type are presented in the Appendix.

[2] Discussions with Bruce Flory, Seattle Public Utilities

FIGURE 2-6
PROJECTED DWELLING UNITS
WOODINVILLE WATER DISTRICT

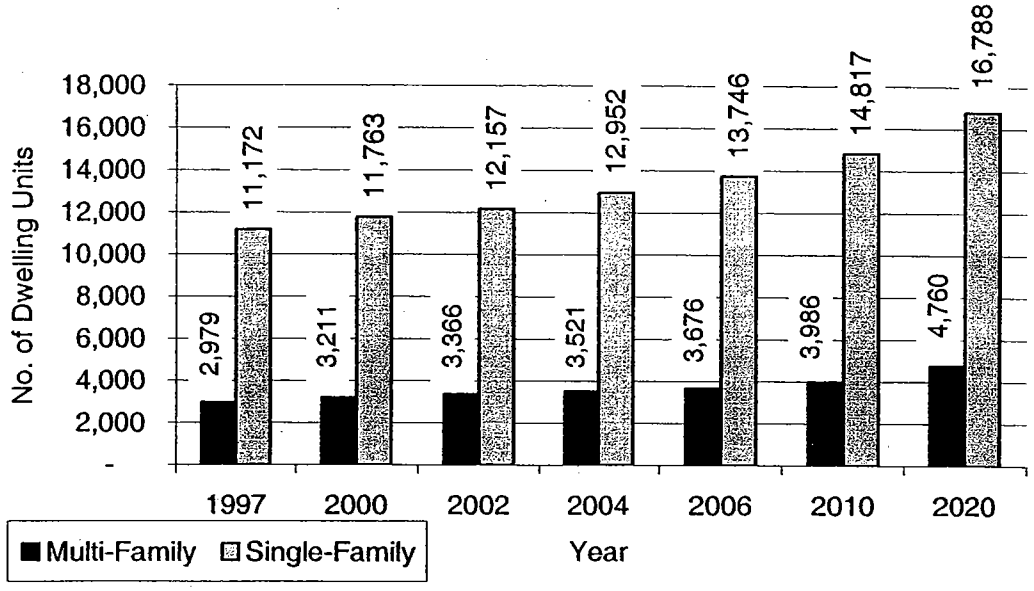


TABLE 2-9
PROJECTED NON-RESIDENTIAL CONNECTIONS
WOODINVILLE WATER DISTRICT

	1997	2000	2002	2004	2006	2010	2020
Commercial	474	496	505	513	522	540	555
Industrial	7	8	8	9	10	11	14
Municipal	39	41	42	42	43	44	46
Irrigation	163	171	173	176	179	186	191

Projected irrigation connections do not include Blakely Ridge

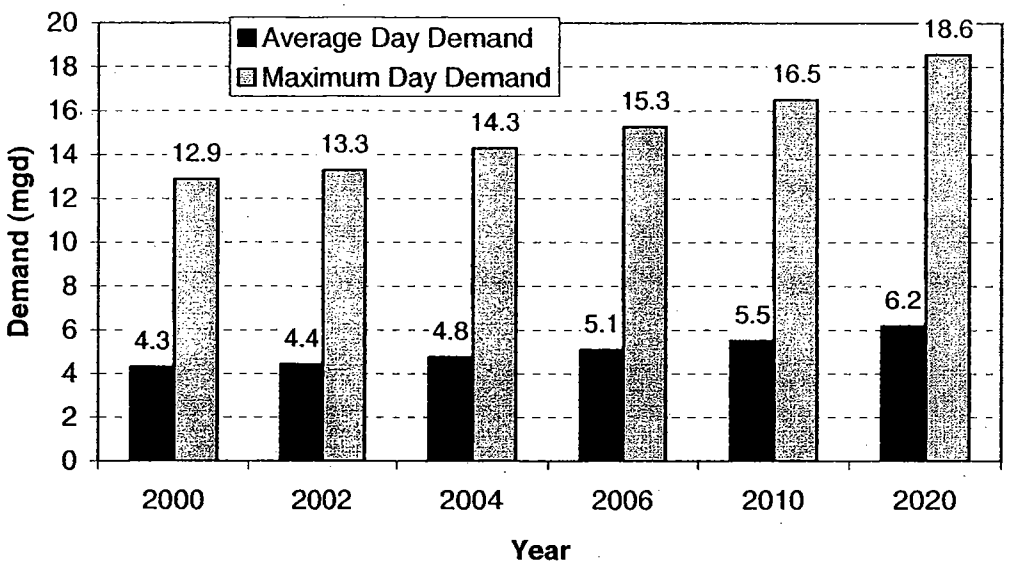
TABLE 2-10
PROJECTED ERUs
WOODINVILLE WATER DISTRICT

2000	2002	2004	2006	2010	2020
16,000	16,600	17,800	19,000	20,500	23,100

Future Demand

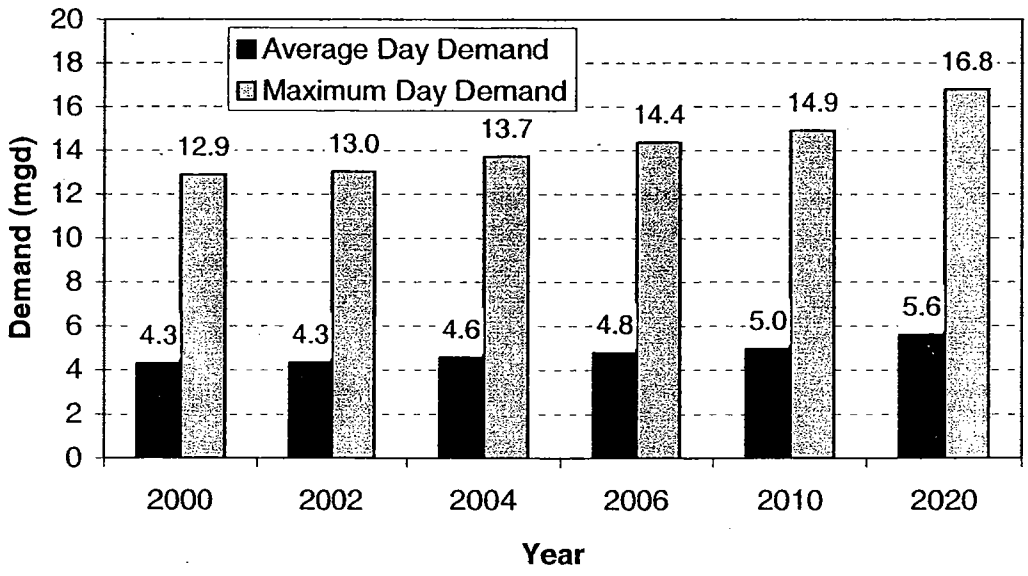
Future ADD was calculated by multiplying the projected number of connections times the existing demand per connection type. The only exception to this was Blakely Ridge, for which future demand was based on the projections presented in the *Blakely Ridge Water System Master Plan*. Projected water demands include four percent for unaccounted-for water. MDD was calculated based on the existing MDD:ADD ratio of 3.0. Projected total ADD and MDD for the District are shown in Figure 2-7 *Projected Water Demands.*

FIGURE 2-7
PROJECTED WATER DEMANDS (MGD)
WOODINVILLE WATER DISTRICT



Projected future ADD and MDD with the anticipated impact of the 1% Conservation Program are presented in Figure 2-8 *Projected Water Demands - With Conservation.* The 1% Conservation Program is discussed in Chapter 4.2 *Conservation Program.*

FIGURE 2-8
PROJECTED WATER DEMANDS - WITH CONSERVATION (MGD)
WOODINVILLE WATER DISTRICT



Water Conservation Demand Impacts

The District has undertaken an aggressive water conservation program. In recent years, annual water demand has remained constant even though the District population and number of service connections has risen steadily.

Potential additional conservation reduction will be examined at as part of the Water Conservation Program. The water conservation program is presented in Chapter 4 *Source of Supply and Water Conservation Program.*

Fire Flow Demands

Fire flow demand refers to the amount of water that is necessary to control major fires. Fire flow demand is specified by the rate of water flow for a specified duration.

Fire Flow Standards

Minimum design standards for fire flows for the District are specified by the East King County Coordinated Water System Plan (CWSP), King County, the DOH, and the local fire districts.

CWSP. The CWSP specifies a minimum fire flow of 1,000 gpm for urban areas and 500 gpm for rural areas. The actual fire flow to be provided for a proposed developed and the duration required for fire protection is to be determined by the Fire Marshall.

King County. King County Code Chapter 17.08 establishes minimum fire flow requirements. The County adopts fire flow rules and regulations based upon the *Guide for Determination of Required Fireflow*, 1974, published by the Insurance Service Office.

Washington Department of Health. The DOH establishes minimum fire flow standards in WAC 246-293-640. In general, these requirements are less stringent than those required by King County.

Fire Districts

There are two fire districts within the Woodinville Water District. The Woodinville Fire and Life Safety District covers the majority of the District including the City of Woodinville and all rural areas. The area within the UGB which is south of NE 132nd in the vicinity of Kingsgate is under the jurisdiction of Kirkland Fire District No. 41. The fire districts base their fire flow requirements on the *1994 Uniform Fire Code.*

Fire Flow Recommendations

Planning level fire flows by land use classification are summarized in Table 2-11, *Planning Level Fire Flow Recommendations.* Actual fire flow requirements for specified projects are dependent upon several items:

- Size of the Structure(s).
- Location of the Structure/Project.
- Type of Construction Materials (Wood vs. Concrete/Brick, etc.).
- Number of Stories.
- Building Fire Protection Systems (Sprinklers, Automatic Fire Doors, etc.).
- Proximity of Adjacent Structures.
- Type of Occupancy/Building Use (Any flammable chemicals being stored, etc.).

The planning level fire flow recommendations in Table 2-11 will be used in the hydraulic analysis of the distribution systems. Results of the computer modeling will identify those areas which require improvements in order to meet the recommended fire flow demands.

TABLE 2-11
PLANNING LEVEL FIRE FLOW RECOMMENDATIONS
WOODINVILLE WATER DISTRICT

Class	Fire Flow[1] (gpm)	Duration[2] (Hours)
Residential Single-Family and Duplex	1,000[3]	2
Residential Multi-Family	4,000[4]	4
Commercial	4,750[5]	4
Schools	5,000[6]	4
Industrial	4,250[7]	4

Notes:
(1) No consideration is given towards sprinkler systems in any of the above calculations. Sprinkler systems can reduce the required fireflow by 50 percent or more in some cases. The Woodinville Fire Life and Safety District requires sprinkler systems for buildings with areas greater than 10,000 sf.
(2) Recommended fire flows and duration of fireflows are based on *1994 Uniform Fire Code, Appendix III-A.*
(3) Based on wood-frame house with approximately 3,600 square feet or less.
(4) Based on wood-frame construction (Type V-N) of an apartment complex with approximately 23,000 square feet.
(5) Based on ordinary construction materials (Type III-N) and an approximate gross area of 50,000 square feet.
(6) Based on non-combustible materials (Type II) with a gross area of approximately 125,000 square feet.
(7) Based on ordinary construction materials (Type III-N) with a gross area of approximately 40,000 square feet.

WATER QUALITY SUMMARY

Drinking water quality is regulated in the United States by the Environmental Protection Agency (EPA). Under provisions of the Safe Drinking Water Act (SDWA), the EPA may delegate primary enforcement responsibility for water quality control to the State. The State of Washington has primacy under the SDWA. The basic regulatory requirements for drinking water quality in the State of Washington are published in the Drinking Water Regulations (Chapter 246-290 WAC) and are administered and enforced by the Washington Department of Health (DOH). In most cases, the regulations adopted by DOH are the minimum requirements from the federal SDWA. However, the DOH has the option to adopt and enforce standards that are more stringent than the federal regulations.

An overview of the SDWA regulations and the water quality monitoring requirements are provided in Chapter 6. This section summarizes the District's water quality and SDWA compliance status.

Water Quality Data

The District's primary water source is the South Fork Tolt River Watershed. Occasionally, the water is supplemented by the Cedar River Watershed. The treated water quality of the two sources is summarized on Table 3-1 (primary standards), Table 3-2 (secondary standards) and Table 3-3 (unregulated compounds).

TABLE 3-1
TOLT AND CEDAR 1998 WATER QUALITY MONITORING RESULTS
PRIMARY STANDARDS

Parameter	Current MCL	Cedar Range	Tolt Range
Clarity (Raw Water)			
Turbidity, NTU	5	0.2 - 3.5	0.1 - 1.7
Microbiological (Distribution System)			
Total Coliform, % presence of positive samples	5%	0%	
Inorganic and Organic Chemicals (Following Treatment)			
Fluoride, mg/L	4	0.9 - 1.1	0.8 - 1.2
Nitrate-Nitrogen, mg/L	10	0.1	0.1
Hexachlorocyclopentadiene, µg/L	50	ND	ND - 0.3
Disinfection By-Products (Distribution System)			
TTHM, µg/L	100	63.3 - 75.6	
Lead and Copper	**Action Level**	**90th Percentile (Distribution System)**	
Lead, µg/L	15	19.3	
Copper, mg/L	1.3	0.6	

Source: Woodinville Water District 1999 Water Quality Report; SPU Drinking Water Quality Annual Report, June 1999.
µg/L = micrograms per liter
MCL = Maximum Contaminant Level
mg/L = milligrams per liter
TTHM = Total trihalomethane
NTU = Nephelometric turbidity unit
ND = Not Detected

TABLE 3-2
TOLT AND CEDAR 1998 WATER QUALITY MONITORING RESULTS FOR SECONDARY STANDARDS
(in mg/L unless noted)

Parameter	SMCLS	Cedar	Tolt
Chloride	250	4.4	3.7
Color, std. units	15	ND	ND
Fluoride	2	0.9 - 1.1	0.8 - 1.2
Iron	0.3	0.01 - 0.04	0.03 - 0.20
Manganese	50	ND - 4	ND - 24
Total Dissolved Solids	500	42	31
Conductivity, µmhos/cm	700	67.8	50.9
Sulfate	250	1.9	1.8
Zinc	5	ND	ND

Source: Woodinville Water District 1999 Water Quality Report and SPU Access Network - Water Quality Analysis: 1998 Annual Analyses of Cedar and Tolt (Sample Date May 19, 1998) (last updated 6/16/99)
µg/L = micrograms per liter
ND = Not Detected
SMCLs = Secondary MCLs
µmhos/cm = micro mhos per centimeter

TABLE 3-3
1998 WATER QUALITY MONITORING RESULTS FOR UNREGULATED WATER QUALITY PARAMETERS (mg/L unless noted)

Parameter	Cedar	Tolt
Alkalinity (mg/L as $CaCO_3$)	16 - 21	13
Aluminum, µg/L	16 - 48	62
Calcium (mg/L as $CaCO_3$)	21.4	10.4
Hardness (mg/L as $CaCO_3$)	26.1	11.7
Magnesium	1.16	0.34
Oxygen	10.20	11.5
Phosphorus, Soluble Reactive	<2	<2
Potassium	0.3	0.1
Silica, Reactive	8.1	5.5
Sodium	2.9	5.5
Temperature, annual range, °C	4 to 20	4 to 20
Total Organic Carbon	0.9	1.3

Source: Woodinville Water District 1999 Water Quality Report and SPU Access Network - Water Quality Analysis: 1998 Annual Analyses of Cedar and Tolt (Sample Date May 19, 1998) (last updated 6/16/99)

Current treatment for the Tolt and Cedar supplies includes fluoridation, chlorination, and pH adjustment through the addition of soda ash and lime for corrosion control. A new Tolt Filtration Plant is under construction and will be on-line by late 2000. An ozonation facility for the Cedar River Supply is scheduled to be on-line in 2004.

Current Compliance

As described in Chapter 6, the District participates in a regional distribution system monitoring program with SPU and other purveyors supplied by the Tolt and Cedar River supplies. The District source waters do not contain lead or copper. However, lead and copper can leach into residential water from building plumbing systems containing copper plumbing, lead-based solder, brass fixtures or some types of zinc coatings used on galvanized pipes and fittings. Homes built or plumbed with copper pipe prior to the 1985 King County lead solder bans would likely have used lead-based solder, and are considered "high risk" by EPA's criteria. Brass fixtures, regardless of age, generally also contain some lead. Metals leach into building plumbing systems when water has not been used and sits stagnant in the pipes for six hours or longer. The 90th-percentile lead concentration in the regional system currently exceeds the lead action level established under the Lead and Copper Rule (LCR). Consequently, each year, the District is required to send out public education materials concerning the lead concentrations. Under a bilateral compliance agreement with DOH, SPU will complete a Corrosion Control Optimization Study once the Tolt Filtration Plant is on-line. In the interim, all LCR monitoring and corrosion studies are on-hold. The Tolt Filtration Plant will continue with the current method of corrosion control, which is the addition of lime and soda ash. The reduction of organics with the Tolt Filtration Plant might be slightly beneficial in reducing corrosion rates. The District is in compliance with all other regulations.

Consumer Confidence Report

In accordance with federal regulations requiring annual Consumer Confidence Reports, the District publishes an annual Water Quality Report for distribution to its entire customer base. A copy of the 1999 report is included in Appendix J.

Future Compliance

The District plans to meet the new Stage 1 Disinfection By-products Rule (DBPR) which large surface water systems (i.e., serving 10,000 or more) must comply with by December 2001. The DBPR will apply to all water systems that add a disinfectant during any part of the treatment process. Major features of the Stage 1 DBPR include: limits and monitoring requirements for DBPs and Maximum Residual Disinfectant Levels (MRDLs), and Total Organic Carbon (TOC) removal requirements. MCLs and MRDLs for the Stage 1 DBPR are listed on Table 3-4 along with the current range for areas served by the Tolt supply (within the District for TTHM and within the SPU distribution system for Haloacetic Acid 5 (HAA5)). The current HAA5 range on the Tolt exceeds the Stage 1 MCL. DBPs are expected to decrease by approximately 50 percent (well below the Stage 1 MCLs) once the Tolt Filtration Plant is put in service in late 2000.

The ozonation process (which will be part of the Tolt Filtration Plant) can stimulate bacterial regrowth in the distribution system. Ozonation increases the biodegradable portion of the TOC, which is then more readily available for bacterial growth in the distribution system. Because of low TOC levels in the Tolt water, bacterial growth should be minimal, and should have no noticeable effect on the distribution system water quality. Any increase in bacterial growth should not impact compliance with other SDWA regulations.

TABLE 3-4
STAGE 1 DISINFECTANTS/DISINFECTION BYPRODUCTS RULE MCLs AND MRDLs

Disinfectant/ Disinfection Byproducts	Stage 1	Current Tolt Range[1]
Disinfectant By-Products (MCL):		
Total trihalomethanes (TTHMs)	80 µg/L	63 – 76 µg/L
Haloacetic Acids 5 (HAA5)	60 µg/L	33 – 92 µg/L
Bromate[2]	10 µg/L	N/A
Chlorite[3]	1 mg/L	N/A
Disinfectants (MRDL):		
Chlorine	4 mg/L	1.3 – 1.9 mg/L[4]
Chloramines	4 mg/L	--
Chlorine dioxide[3]	0.8 mg/L	--

(1) Range shown for TTHMs is measured with the District. Range shown for HAA5 is measured within the SPU distribution system.
(2) Required only for systems using ozone.
(3) Required only for systems using chlorine dioxide.
(4) Normal dosage range at Tolt Regulating Basin.

MCL = Maximum Contaminant Level
MRDL = Maximum Residual Disinfectant Levels
TTHM = Total Trihalomethane
HAA5 = Haloacetic Acid 5
N/A = Not Applicable
µg/L = micrograms per liter
mg/L = milligrams per liter

WATER TRANSMISSION AND DISTRIBUTION

Hydraulic Analysis

Criteria

The hydraulic evaluation criteria are based on maintaining ranges of system pressures and velocities, as defined in the DOH WAC 246-290-230 and in *Water System Design Manual*, (DOH, June 1999). The following criteria were used to evaluate the distribution system:

- Maintain a minimum pressure of 30 psi in any point in the distribution system during Peak Hour Demand (PHD) conditions.
- Maintain a minimum pressure of 20 psi in any point in the distribution system during fire flows under Maximum Day Demand (MDD) conditions.
- Limit pipe velocities to approximately 8 fps.
- Limit main pressures in the distribution system to 100 psi.

Model Description

System Model. The system was analyzed using the KYPIPE Version 3 computer model.

The District provided the basic system computer model. The model contained data for the Tolt taps, all pipelines, pumps, reservoirs, and PRVs. Modifications were made to the model based on a comparison of the basic system model with record drawings. Fire flow data were used to calibrate the existing model.

Demand Data. The system model was run for existing and 2020 average day demand (ADD), MDD, and PHD conditions. Existing and 2020 system demands were assigned to the model as part of this WSP effort. Existing (1998) ADD for each service zone were available from the District. Within each service zone, the

ADDs were assigned to individual nodes based on existing land use and parcel data. The 1998 demand by service zone is provided in Table 2-4 of Chapter 2.

The 2020 ADDs were prepared for each service zone and were assigned to individual nodes based on zoning and land use policies. The demand projection methodology is presented in Chapter 2.

Both existing and 2020 MDDs were calculated based on the existing MDD:ADD ratio of 3.0. PHD were calculated for individual pressure zones based on equation 5-3 of the *Water System Design Manual.*

Conditions Evaluated

Using the KYPIPE Model, the distribution system was evaluated under the following conditions:

- Existing and 2020 PHD within each individual pressure zone, with all Tolt taps operating at the minimum hydraulic grade line guaranteed by SPU (effective in 2000) under the condition where all equalizing storage is depleted. The evaluation criteria were based on maintaining a minimum pressure of 30 psi in any point in the distribution system during PHD conditions.
- Fire flows during existing and 2020 MDD, with all Tolt taps operating at the minimum hydraulic grade line guaranteed by SPU (effective in 2000) under the condition where the designed volume of fire suppression and equalizing storage is depleted. Fire flow locations were selected based on land use, major facilities (schools), pressure zones, and possible problem areas. The fire flow evaluation criteria were based on maintaining minimum pressures while delivering the required fire flow. The DOH WAC 246-290-230 requires that new distribution systems be designed to provide the MDD plus the required fire flow with a minimum pressure of 20 psi throughout the rest of the system.

Model Results

Several model runs were performed. Copies of data input and sample model runs are provided in the appendix.

ADD. Under normal operating conditions, with reservoirs full, there are several nodes throughout the District with pressures greater than 100 psi. The District recommends that individual property owners install PRVs on service lines to individual homes in these areas.

PHD. At PHD, with equalizing storage depleted, the minimum pressure of the distribution system exceeds 30 psi.

Fire Flow During MDD. Locations in which the maximum available fire flow was less than the design fire flow under the criteria of MDD, with equalizing storage and fire storage depleted, while maintaining 20 psi in the distribution system, are listed in Table 3-5. In addition, with equalizing storage and fire storage depleted, Zone 1 (Kingsgate) was unable to maintain 20 psi under MDD, even without providing a fire flow.

TABLE 3-5
MAXIMUM AVAILABLE FIRE FLOW
EXISTING AND YEAR 2020

Service Zone	Node	Location	Existing Maximum Available Fire Flow @ 20 psi	2020 Maximum Available Fire Flow @ 20 psi	Zoning
4	402	132 Ave. NE near NE 198th St.	1,400	1,100	School
4	403	NE 195th St. and 132nd Ave. NE	1,500	1,300	School
5	420	Wdnvlle Duvall Rd. and 144th Ave. NE	3,300	2,600	R-24/Comm.
5	450	144th and NE 203rd St.	2,800	2,200	Industrial
5	508	148th Ave. NE near 147th Pl. NE	550	500	SF
7	700	151 Ave. NE, near Wdnvlle Duvall Rd.	800	600	SF

SF = Single-family residential
R-24 = Residential with base density of 24 dwelling units per acre.

With the proposed improvements which are listed in the CIP (Chapter 8) model results indicate that the system will be able to fulfill the fire flow requirements.

Note that the Fire District recognizes and considers fire flow delivery capabilities when approving building type and occupancy in all areas of the District. Building ordinances are in place that require commercial and high occupancy development to utilize fire resistant construction, and fire sprinkler systems to reduce fire flow requirements to that which is available from the system. The District conducts hydrant fire flow tests to determine actual fire delivery capability prior to approving water availability certificates.

Piping

Based on the hydraulic analysis, the existing distribution system is capable of meeting PHD through 2020. Isolated improvements are required to improve flows and pressures under fire flow conditions. Additional improvements are needed to continue the District's aggressive AC pipe replacement program.

Storage

Storage Requirement Criteria

The criteria for storage requirements used in this analysis are outlined in *Water System Design Manual*. A storage reservoir is composed of five component volumes:

- Operational storage.
- Equalizing storage.
- Emergency standby.
- Fire storage.
- Dead storage.

Operational Storage. Operational storage is the volume of distribution storage associated with source or booster pump normal cycling timer under normal operating conditions. The operational storage requirement is additive to the equalizing and emergency standby/fire storage requirement.

Equalizing Storage. Equalizing storage capacity is utilized to meet the daily variations in demand. Over the course of a day, there are significant variations in the water demand. The PHD can be as much as 75 percent to 80 percent higher than the average 24-hour flow. Typically, high demand occurs during the morning and evening, especially during the breakfast and dinner hours. Low demands occur during the late evening and early morning. Water is withdrawn from storage during high demand periods and replenished during the low demand periods.

Equalizing storage within a water system allows the components of a water supply and transmission grid to be sized for the average rate of demand on the maximum day. Stored water is utilized to make up the difference between the ADD and the PHD.

The DOH specifies guidelines to estimate the required quantity of equalizing storage volume. Equalizing storage for each pressure zone was calculated using the following equation:

Equalizing Storage (gallons) = (PHD – Q_S)(150 minutes), where:

PHD = Peak Hour Demand (gpm)
Q_S = Sum of all sources (gpm)

Emergency Standby Storage. Emergency standby storage provides water supply during equipment failures, power failures, or during natural disasters such as earthquakes or floods. Although hopefully it is seldom used, emergency standby storage is an important part of the safety and reliability of the water system.

Emergency standby requirements are calculated based on the number of sources of supply. The required storage is based on the ADD and the number of sources of supply, in accordance with the following equations:

Water systems with a single source:

Standby Storage (gallons) = (2 days)(ADD)

Water systems with multiple sources:

Standby Storage (gallons) = (2 days)(ADD) – $t_m(Q_S - Q_L)$

ADD = Average Day Demand (in gpm)
t_m = Time that remaining sources are pumped on the day that the largest source is not available (1,440 minutes)
Q_S = Sum of all sources (gpm)
Q_L = Largest capacity source available, gpm

The minimum allowable emergency standby storage for zones with multiple sources is 200 gallons per ERU.

Fire Storage. Fire flow storage is the product of the required fire flow multiplied by the duration. For example, for multi-family residential area, required fire storage is 1,500 gpm for three hours, or 270,000 gallons.

Dead Storage. The dead storage is the volume of stored water that is not available to all consumers at the minimum design pressure. The total storage of a reservoir minus the dead storage is equal to the effective storage.

Required Storage Volume. The total required effective storage volume for each pressure zone is equal to the sum of the operational storage, equalizing storage and the larger of either emergency standby or fire storage.

Storage Evaluation Description

Storage requirements for the system and individual service zones were calculated for existing, 2000, 2010, and 2020 demands. The service zones were grouped together by the storage facilities which serve the zones. In most cases, a storage facility serves more than one pressure zone through PRVs or a pump station. Several of the pressure zones are served by more than one storage facility. Table 3-6 summarizes the storage analysis areas.

TABLE 3-6
STORAGE ANALYSIS AREAS

Zone	Primary Storage Facility	Secondary Storage Facility (through PRV)
1 (510); 2 (420); 21 (340)	Kingsgate	None
3 (260)	Sammamish	Kingsgate, Wellington; S. Hollywood, Hollywood
7 (650); 19 (585)	Hollywood via Hollywood PS	None
9 & 6 (570); 4, 5, 8, 16 (420)	Wellington; S. Hollywood, Hollywood	None
11 (570); 12 (420)	Wellington; S. Hollywood, Hollywood, or Brookside via Reintree PS (depending on how zone is operated)	None
20 (770)	Aspenwood via Lake of the Woods PS	None
15 (670); 22 (570)	Aspenwood	None
14 & 18 (575); 13 (485); 23 (465)	Ringhill/Saybrook	Aspenwood
10 (420) and 17 (340)	Brookside	Aspenwood, Ringhill/Saybrook

Results

Table 3-7 summarizes required additional storage volumes to meet the storage criteria for existing and projected 2010 and 2020 demands. The detailed storage calculations are presented in the appendix.

TABLE 3-7
REQUIRED ADDITIONAL STORAGE VOLUMES (MG)

Service Zones	Required Additional Storage (MG)		
	Existing	2010	2020
1 (510); 2 (420) and 21 (340)	0.7	1.1	1.6
3 (260)	-	-	-
7 (650); 19 (585)	-	-	-
9 & 6 (570); 4, 5, 8, 16 (420)	-	-	-
11 (570) and 12 (420)	0.4	0.4	0.4
20 (770)	-	-	-
15 (670) and 22 (570)	-	-	0.1
14 & 18 (575); 13 (485); and 23 (465)	-	-	-
10 (420) and 17 (340)	-	-	-

Zone 1 (Kingsgate). Zone 1 (Kingsgate), along with two lower Zones 2 (Sammamish Slope/Chateau Woods) and 21 (Rolling Meadows) which are fed through PRV stations, has an existing storage deficiency of 0.7 MG because of the considerable dead storage (about 60 feet) in the Kingsgate Standpipe. By 2020, Zone 1 requires an additional 1.6 MG of storage. The existing deficiency could be eliminated, and future required storage volumes reduced, if the District were to utilize the dead storage of approximately 0.7 MG in the existing Kingsgate Standpipe. A pre-design study to evaluate options for utilizing the dead storage from the Kingsgate standpipe and additional storage capacity is included in the CIP.

Zone 11 (Reintree). Zone 11 (Reintree) along with Zone 12 (Paradise Valley), which is fed through PRV 21, has an existing storage deficiency of approximately 0.4 MG. The required storage volume does not increase significantly by 2020 because the area is outside of the UGB and is already built to the allowable zoning density.

This required storage volume could be eliminated if the District were to successfully operate Zone 11 with Zone 9N (Wellington), as one zone, which the District initially intended for the two zones. If the zones were to operate one zone, existing storage in Zone 9N would be sufficient for Zones 11 and 12. Zone valves which connect the two zones, are generally closed because of difficulties in synchronizing PRV 41 with the storage facilities in Zone 9N. A pre-design study to investigate operating options for Zone 9N is included in the CIP.

Zone 15 (Ringhill). Zone 15 (Ringhill) shows a storage deficiency of 0.1 MG by 2020. It is recommended that the storage for this area be reevaluated with the next Comprehensive Water Plan. No storage improvement is included in the CIP.

SUMMARY OF DEFICIENCIES

System deficiencies are summarized in Table 3-8. The deficiencies incorporate the hydraulic model and storage analysis results, as well as consultation with District operation staff. The table includes the reference numbers for the CIP projects which are presented in Chapter 8.

TABLE 3-8
DEFICIENCIES

Zone	Deficiency	CIP Ref.
Transmission and Distribution		
4 (420)	System has difficulty providing fire flow to school near NE 195th St. and 132nd Ave. NE while maintaining pressures in northwest portion of service zone during MDD due to restricting 10-inch DI pipe which feeds the zone from Zone 5, restricting 6-inch AC pipe which feeds the northwest portion of the service area, and higher elevations in the northwest corner of Zone 4.	D-1 D-2
5 (420)	During MDD, the system has difficulty drawing water from Zone 9 to provide fire flow to high density residential, commercial and industrial areas in Zone 5 because of restricting 6-inch AC pipe and 6-inch DI pipe which feed PRV 27.	D-3 D-4
5 (420)	System has difficulty meeting fire flow criteria in SF, residential area in Zone 5 on 148th Ave. NE near 147th Pl. NE because of restricting 6-inch AC pipe along 148th Ave. NE, between NE 166th St. and NE 172nd St.	D-9
7 (650)	System has difficulty meeting fire flow criteria in SF residential area in Zone 7, near 151 Ave. NE and Woodinville Duvall Rd. because of restricting 6-inch, dead-end AC and CI pipe.	D-7 D-8
6 (570), 3 (260), 10 (420), 15 (670), 9 (570)	AC pipe replacement and need to strengthen distribution grid with enlarged pipe diameter.	D-11 D-13
Source		
8	Service zone needs source redundancy. Currently, zone is served solely by PRV 23 from Zone 9.	D-5
17	Service zone needs source redundancy; currently PRV 32 and PRV 38 serve the zone from Zone 10.	D-6
Storage		
6	If needed, Zone 6 may have difficulty utilizing the storage from Zone 9S (South Hollywood Reservoir) because of restricting 6-inch AC pipe and circuitous pipeline route.	D-10 D-12
11	As it is currently operated, Zone 11 is in need of storage. Storage options include: upgrading the Reintree Pump Station to utilize storage from the Brookside Reservoir operating Zone 11 and Zone 9 as one zone in order to utilize the Wellington Standpipe, or constructing a new storage facility in Zone 11.	S-1
1	Additional storage required in Zone 1.	S-2
Pumping		
1	A pump station is needed to utilize dead storage from existing Kingsgate Standpipe.	P-1
15	Need modifications to optimize operation of Ringhill Pump Station.	P-2
9	Project is underway to construct pump station to utilize dead storage from South Hollywood Reservoir.	P-3

INTRODUCTION

The District's current water supply contract with the Seattle Public Utilities (SPU) will expire on January 1, 2012. To secure its future water supply, the District has been exploring future supply alternatives. This chapter summarizes the various supply alternatives under consideration.

INSTITUTIONS

There are two organizations under formation to address the development, operation, and management of regional municipal water supplies:

- Cascade Water Alliance (CWA).
- Snohomish River Regional Water Authority (SRRWA).

Cascade Water Alliance

The CWA is a regional group that would serve as a single wholesale customer to SPU. The CWA is composed of several cities and water districts that currently purchase most of their water from SPU. With the CWA, these purveyors would continue to obtain their water from SPU. Instead of the current individual contracts between SPU and each purveyor, the CWA would consolidate the individual water contracts of the wholesale purveyors into one contract. The CWA would allow the purveyors to work as a unified group to address issues such as water supply planning, conservation, transmission, and operations.

The CWA began as the Interim Water Group in 1995. Formal meetings began in March 1996 to establish an organizational structure and plan operations, to negotiate an agreement with SPU, and to recruit membership. Currently, the CWA constitutes 51 percent of SPU's purveyors (by water volume) and nearly 60 percent of total retail water sales within King County (outside of Seattle). As of early 2000, the CWA has not formed into the governance structure anticipated by its members.

Snohomish River Regional Water Authority (SRRWA)

Description

The Snohomish Regional Water Authority (SRRWA) is a joint administrative entity comprised of the Northshore Utility District, the City of Everett, and the Woodinville Water District. The SRRWA was formed by interlocal agreement in the fall of 1996. The agreement provides that the SRRWA will work to promote regional cooperation in the planning and development of new water sources.

Pursuant to the purpose of its formation and SPU's notice of intent not to renew the existing purveyor supply contract, in November, 1996, the SRRWA acquired the Weyerhaeuser Timber Company (WEYCO) Surface Water Right S1-10617C. This certificated water right authorizes an instantaneous withdrawal of 36 mgd/56 cfs from the Snohomish River for manufacturing purposes. The SRRWA inter-local agreement allocates to the District approximately 11 mgd of the total 36 mgd.

On December 23, 1996, the SRRWA submitted to the DOE, a Plan of Use and application to change the purpose and place of use of the Weyerhaeuser Company water right to "municipal purposes" and the "Area served by the SRRWA." The application for change and the supporting documentation are currently under evaluation by DOE. In February, 2000, DOE Director Fitzsimmons committed the DOE to render a final decision on the application by May 1, 2001, if not sooner.

DOE's response to this application is expected to have a significant impact on the long-term water supply strategy of the District. Under any circumstance, it is the District's intent to continue to be active in regional water resources planning and to coordinate development of SRRWA supply sources with SPU and other regional purveyors.

FUTURE SOURCE OF SUPPLY ALTERNATIVES

A description of potential future water supply alternatives is provided below. Each description includes:

- Capacity: Annual Withdrawal (Qa) and Instantaneous Withdrawal (Qi), if available.
- Status: What work has been completed thus far.
- Costs: capital and operating and maintenance costs, if available.
- Likelihood that the project will occur.
- Time frame for the project to be on-line.

A comparison table of the alternatives is included as Table 4.1- 1.

TOLT AND CEDAR RIVERS (EXISTING SUPPLY)

The District's current primary water source is the South Fork Tolt River Watershed, which is occasionally supplemented by the Cedar River Watershed. The water is purchased directly from SPU, and is supplied via the Tolt Pipeline.

Capacity

The District's current usage is not limited by SPU.

Status

This is the District's current source. The District's water supply contract with SPU expires on January 1, 2012. Although SPU will not renew the contract under the current terms and agreements, the SPU water supply contract will likely be renewed in some form prior to 2012 to assure continuity of water supply to existing District customers.

The District has had ongoing discussions with SPU regarding the potential form of a renewed supply agreement. At this time, a revised contract with SPU could be through the District's participation in the CWA or a new individual contract. The term of this six-year Water System Plan update is through 2006. The status of the continuing SPU contract discussions will be further refined and updated in the 2006/2007 Water System Plan as the District has a valid contract in excess of the time frame of this plan update.

Costs

The wholesale water rates (effective December 31, 1999) paid to SPU are as follows:

Old Water:	
Winter	$0.73/ccf
Summer	$1.12/ccf
New Water:	
Growth Surcharge	$0.46/ccf

The District's current water usage comprises about 48 percent old water.

TABLE 4.1-1
COMPARISON OF SOURCE OF SUPPLY ALTERNATIVES - DRAFT
WOODINVILLE WATER DISTRICT

Source	Institution/ How Acquired	Budgetary Costs[1]	Capacity	Major Required Facilities	Likelihood to Occur and Time Frame for Source to be On-line	Water Rights	Right-of-Way Acquired	SEPA/EIS Complete	Major Permitting Complete	Other Issues[2]
Tolt and Cedar Rivers	Direct Purchase from SPU	Water Rate (Jan. 2000): Winter: $0.73/ccf Summer: $1.12/ccf Growth Surcharge: $0.46/ccf	Current District use is not limited. Currently: ADD: ~ 3.9–4.4 mgd MDD: ~ 11.8 mgd	None (SPU's Tolt Filtration Plant is under construction; Cedar Treatment Plant is in the planning stage)	Current source and most likely future sources.	Water rights are in place.	NA	NA	NA	--
Green River	Direct Purchase from TW. Wheel through SPU or CWA (via TSI)	Capital: $7 M/mgd Water Rate: ?/ccf	Average Annual: 13 mgd[3] TSI Capacity: 40 mgd The District's share would be part of SPU/CWA agreement.	Howard Hanson Dam Additional Water Storage Project; SSP (Headworks, PL5, North Branch (TSI)) Potential Future Filtration	Most likely of alternative future sources – most progressed. Time Frame: 2004 – 2005 (TSI) Time Frame: 2002 (upper reach PL5) Time frame dependent on the financial viability of the middle reach of PL5 and North Branch (TSI).	In 1986, Tacoma was granted a water right for an additional 65 mgd, which is subject to in-stream flow requirements. The place of use is "the City of Tacoma and its environs."	Yes - PL 5 No - TSI	Yes - PL 5 No - TSI (Programmatic and Project)	Yes - PL 5 No - TSI	Adoption of Tacoma Water's HCP. Corp's advancement of HHD AWSP. CWA formation Future filtration.
Sultan River (Lake Chaplain)	Direct Purchase from Everett	Capital: $2.2 M for new pipeline capacity: SnoPUD Surcharge; Wheeling Cost ?/ccf; Transmission Costs from Clearview Reservoir Water Rate: ?/ccf [4]	District's capacity of Clearview Project: 12 mgd	Clearview Project; Additional Transmission Piping from Clearview Reservoir to District	Less likely than SRRWA options.	Option would require that the place of use for Everett's existing water rights be expanded to include Woodinville.	No	No	No	Crossing Snohomish/King County Line. Challenging permit process.
Sultan River (Lake Chaplain)	Develop Source as Partner in SRRWA – Flow Swap	Capital: $5.9 M/mgd[5] plus: SnoPUD Surcharge[6] O&M: $1.6 M/year plus: SnoPUD Surcharge ?/ccf	Qa: 8.8 mgd Qi: 11 mgd	Industrial WTP; Clearview Project; WWD Transmission Piping	Undetermined - Subject to issues affecting SRRWA Plan of Use Implementation. . Time frame: Undetermined(?)	No application submitted and/or regulatory efforts have been initiated to facilitate swap.	No	No	No	Crossing Snohomish/King County Line.
Snohomish River	Develop Source as Partner in SRRWA – Direct Transfer	Capital: $7.3 M/mgd[7] O&M: $2.0 M/year	Qa: 8.8 mgd Qi: 11 mgd	Potable WTP; WWD Transmission Piping	Reasonable likelihood. Time frame: ~ 2014 – 2016	SRRWA submitted an application in 1996 to change type and place of use for current SRRWA water right.[8] Decision on change application by May 1, 2000. WWD entitled to 11 mgd share of 36 mgd (Qi) total.	Partially (Clearview Project)	Partially (Clearview Project) SEPA completed on SRRWA Plan of Use and Water Right Change	Partially (Clearview Project)	Crossing Snohomish/King County Line. Challenging permit process.
Cross Valley Ground Water	Transfer CVWD Water Rights	Capital: $4 to 5 M/mgd	Qa and Qi: 2 mgd	Ground Water Pumping; Treatment; Transmission Facilities	At one time a viable project to serve east side of District. However because of GMA, growth will occur on west side.	Woodinville may submit an application to expand the place of use of CVWD water right to include Woodinville.	No	No	No	Crossing Snohomish/King County Line.
Snoqualmie Aquifer and River	CWA and EKCRWA	Capital: $3 to $4 M/mgd	Qa and Qi: 40 mgd total capacity. (District share not determined)	Groundwater Pumping Facilities, Potable WTP; Transmission Piping	This is a potential long-term alternative. Time frame: ~ 2014 to 2020	EKCRWA and SPU have applied for two water right permits. (Snoqualmie aquifer and Snoqualmie River).	No	No (Programmatic and Project)	No	Possible In-stream benefits.
Lake Tapps	SPU or CWA	Capital: $3.7 M/mgd[9]	Qa and Qi: 65 mgd	WTP; Transmission Piping; Distribution Piping	High likelihood. Time frame: 2015	Puget Sound Energy applied for permit on June 20, 2000.	No	No	No	In-stream flow benefits.
Wastewater Reuse	King County	Capital: Not Determined	Qa and Qi: 20 mgd Irrigation	Water Reuse WTP; Transmission Piping; Distribution Piping	Undetermined.	King County theoretically holds water rights for treated wastewater.	No	No	No	--

(1) Budgetary costs reflect available costs to date; additional cost components are noted. Budgetary costs between alternatives can not be compared directly.
(2) The impacts of the ESA would need to be addressed under all options.
(3) With the TSI on-line, the average annual incremental increase in SPU system yield is estimated to be 13 mgd based on a 98 percent system reliability. SPU's portion of the annual withdrawal from the Green River will be 3,300 acre-feet plus an additional 6,700 acre-ft during the drier three out of every 10 years. The amount available will vary seasonally as a function of in-stream flow requirements and storage at HHD. The maximum available will be 40 mgd.
(4) Cost for direct purchase from Everett would include wholesale rate from Everett (currently $0.65/CCF), water wheeling costs from CVWD, and potential Snohomish PUD surcharge.
(5) From SRRWA Technical Memorandum (June 1999), based on District's share of capital costs: $51.7 m for 8.8 mgd.
(6) Potential Snohomish PUD surcharge for Jackson Hydroelectric Plant, since District is outside of Snohomish PUD service area.
(7) From SRRWA Technical Memorandum (June 1999), based on District's share of capital costs: $64.6 m for 8.8 mgd.
(8) DOE has stated that water right transfers will be approved prior to new applications, unless the project is environmentally damaging.
(9) Based on a capital cost of $240 million and a capacity of 65 mgd.

ADD = Average Day Demand
ccf = 100 cubic feet
CWA = Cascade Water Alliance
CVWD = Cross Valley Water District
DOE = Department of Ecology
EKCRWA = East King County Regional Water Association
ESA = Endangered Species Act
GMA = Growth Management Act
HCP = Habitat Conservation Plan
HHD AWSP = Howard Hanson Dam Additional Water Storage Project
MDD = Maximum Day Demand
M = Million
mgd = million gallons per day
N/A = Not Applicable
O&M = Operation and Maintenance
PL5 = Pipeline No. 5
Qa = Annual Withdrawal
Qi = Instantaneous Withdrawal
SRRWA = Snohomish River Regional Water Authority
SnoPUD = Snohomish PUD
SPU = Seattle Public Utilities
SSP = Second Supply Pipeline
TSI = Tacoma Seattle Intertie
TW = Tacoma Water
WTP = Water Treatment Plant
?/ccf = undetermined cost

Likelihood

The current source is also the most likely future source, although it is expected to be supplanted and/or conjunctively used with the SRRWA source of supply once this source comes on line.

Time Frame

This source is on-line.

Green River

The proposed TSI would connect Tacoma Water's Green River supply to SPU's Cedar River supply system. Water from the TSI would be made available through SPU or the CWA.

The TSI, also referred to as the North Branch of the SSP, is a joint project between Tacoma Water, SPU, CWA, and purveyors. The TSI will connect Tacoma's Pipeline No. 5 (PL5) to SPU's Lake Youngs Reservoir. Construction of the TSI is contingent on completion of Howard Hanson Dam Additional Water Storage Project and other SSP components which include headworks improvements, and the upper 13-mile reach of PL5 from Tacoma control works to the TSI.

Capacity

The District's portion of the TSI capacity will depend on the SPU/CWA agreement. SPU will be eligible for an annual withdrawal from the Green River of 3,300 acre-feet (1,100 MG). An additional 6,700 acre-ft (2,200 MG) will be available three out of every 10 years, during years with less precipitation.

The amount available to SPU at a given time will vary seasonally, and will be a function of in-stream flow requirements and storage at Howard Hanson Dam. Tacoma's second diversion water right is for 100 cfs. Provided instream flow requirements are met, SPU will be eligible to withdrawal one-third of 100 cfs, or approximately 21 mgd. From approximately February to June, SPU will rely on the Cedar and Tolt Rivers supply, and will store the Green River water at Howard Hanson Dam. Beginning in June of each year, SPU will use the stored Green River supply, which will provide up to 40 mgd (the design capacity of the TSI).

SPU conducted a computer simulation model to estimate the average annual incremental increase in SPU's system yield that would result from the Green River supply. Model results indicated that the Green River supply would provide an average annual incremental increase of 13 to 14 mgd, based on a 98 percent system reliability over 50-years.

Status

Several milestones of PL5 have been completed. The EIS has been accepted, water rights have been secured, and major permitting is in place. PL5 is being constructed in three sections. The status of each section is:

- Upper reach from the control structure to Covington (including connection to the TSI): final design is scheduled to begin in early 2000.
- Middle reach from First Avenue at Federal Way to Covington: final design is on-hold until the section is deemed financially viable.
- Lower reach from approximately First Avenue at Federal Way through Tacoma to the Portland Avenue Reservoir: construction complete.

The North Branch (TSI) of the SSP is still in the early stages. Preliminary design, permitting and acquisition of right-of-way have not been completed.

An agreement has been reached between the SSP participants regarding the construction and operation of the project. Tacoma will own and operate the entire SSP (including the TSI). SPU (and its purveyors)

will have capacity rights in the project for the life of the project. The capacity rights will be equal to SPU's share of the project water and project costs (one third).

Costs

The entire cost of the SSP, including financing and reserve is estimated to be $279 million (June 1996 dollars). SPU's share of this cost would be approximately $93 million. Project costs to the District are undetermined. Based on SPU's share of project costs (of $93 million), and the incremental increase in SPU's regional supply yield (of 13 mgd), the capital cost of the TSI is estimated to be approximately $7 million per mgd. A wholesale water rate to the District would apply.

Likelihood

This is the most likely future alternative source for the District.

Time Frame

The time frame for completion of the TSI is dependent on the financial viability of the project. The earliest estimate for the TSI to be on-line is 2004 to 2005.

Sultan River Through Direct Purchase From Everett

Under this alternative, the District would purchase Everett WTP water from the City of Everett. The water would be conveyed through the Clearview Project (described below) to the Clearview Reservoir. A new transmission main would then need to convey the water from the Clearview Reservoir site to the District. This purchase would require that the water rights place of use be expanded to include the Woodinville Water District service area.

Capacity

The District's share of the Clearview Project capacity is 12 mgd.

Status

This project is speculative. Although the Clearview Project is under construction, no work specific to this option has been undertaken.

Costs

The District's cost for the Clearview Project is estimated to be $2.2 million. Additional transmission would be required from the Clearview Reservoir to the District. The District would purchase the water from Everett, based on a wholesale rate established by Everett (current rate is about $0.65/100 cubic feet). Other cost components would include water wheeling cost from the Cross Valley Water District and a surcharge from Snohomish PUD for the Jackson Hydroelectric Plant, which may be required since the District is outside of the Snohomish PUD service area.

Likelihood

The Sultan River source is less likely to occur through direct purchase from Everett than under the SRRWA because of anticipated permitting and regulation obstacles.

Time Frame

The time frame is unknown, because of permitting obstacles.

Sultan River or Snohomish River Through SRRWA

The District currently presumes the SRRWA water right will be conveyed consistent with the Plan of Use submitted to DOE in 1996. The Plan of Use approach is characterized as Direct Transfer. A second approach, characterized as Flow Swap, was also prepared for primarily comparative purposes. These

approaches were investigated as part of the *Sno..omish River Regional Water Authority Water Rights Transfer Project Technical Memorandum (SRRWA Technical Memorandum)* (HDR Engineering, June 1999). A copy of the technical memorandum is included in the appendix.

Direct Transfer. The District has committed itself to this approach pursuant to the SRRWA Plan of Use and the SRRWA SEPA process. Under this approach, the SRRWA would treat water from the Snohomish River to potable water standards and directly transfer the water to the SRRWA. The transfer would include up to 36 mgd instantaneous flow and an annual average flow of 28.7 mgd. The Woodinville Water District would be eligible for 11 mgd peak instantaneous and 8.8 mgd average annual flow. Under current and future demand projections, the District has a demonstrated need for its entire SRRWA allocation and is committed to its use once permitted.

This approach would include:

- The construction of a new 36 mgd potable WTP.
- Retrofit of the existing Weyco Ebey Slough Intake Facility.
- Installation of a new transmission main and finished water pump station to convey the water from Everett to the District.

Capacity

The District would be eligible for 11 mgd peak instantaneous and 8.8 mgd average annual flow.

Status

In December 1996, the SRRWA submitted a draft plan of use and an application to the DOE to change the purpose of use of the Weyerhaeuser surface water right (S1-10617C), from "manufacturing" to "municipal purpose" and the place of use from Weyerhaeuser's north Everett mill site to the "area serviced by the Snohomish River Regional Water Authority." (City of Everett et al., January 1998). DOE Director Fitzsimmons has committed DOE to render a final decision on the pending change application no later than May 1, 2001. With the exception of the SEPA processes for the Clearview Project and SRRWA Plan of Use and Water Right Change being completed, preliminary design, major permitting and acquisition of right-of-way have yet to occur. The District, however, intends to address future use of this supply source in pending contract negotiations with SPU.

Likelihood

This option has a reasonable likelihood to occur.

Flow Swap. This approach involves a water swap with the City of Everett. The SRRWA would provide the City of Everett with up to 36 mgd instantaneous and 28.7 mgd average annual flow of treated industrial grade process water (non-potable water). The City of Everett would, in turn, provide the same volumes of potable water to the SRRWA. The District would be eligible for 11 mgd instantaneous and 8.8 mgd average annual flow. At this time, the flow swap approach is not the presumed development path for the SRRWA project. It is, however, an option that may be pursued if the Direct Transfer/Plan of Use approach, once permitted, encounters substantial cost and/or regulatory obstacles. Pursuing this approach would, at a minimum, require the City of Everett and Snohomish PUD agree to amend the place of use of Sultan Water, development of a new Plan of Use by the SRRWA, and approval by DOE of a change application by Everett and the PUD.

The approach would include:

- The construction of a new 36 mgd industrial water treatment plant (industrial WTP) adjacent to the Snohomish River in the City of Everett.
- Retrofit of the existing Weyerhaeuser Company (Weyco) Ebey Slough Intake Facility.

- Minor repairs to a portion of the existing Weyco pipe, which would convey raw water from the Ebey Slough Intake to a new pipe connecting to the industrial WTP. Approximately 1,700 feet of new raw water transmission pipe would connect the existing Weyco pipe to the headworks of the industrial WTP.
- Slip lining of a portion to the existing Weyco pipeline to convey treated water from the treatment plant to the redeveloped Weyco site.
- Installation of a new finished transmission main from the industrial WTP clearwell to the existing Weyco pipeline.
- The potable water from the City Everett would be transferred to the Clearview Reservoir through the Clearview Project (described below). A new transmission main would convey the water from the Clearview Reservoir site to the District.

The Clearview Project. The Clearview Project is a conveyance system to transfer water from the City of Everett's water supply system to the Clearview Reservoir located north of the District in Snohomish County. Original participants in the Clearview Project include: Alderwood Water District, Silver Lake Water District, and Cross Valley Water District. The Woodinville Water District purchased 12 mgd of Cross Valley's capacity in the Clearview Project through a September 30, 1999 agreement.

The Clearview Project facilities include pumping facilities, a transmission line and a reservoir. The transmission line will run from the City's of Everett's pipeline No. 5 to the Clearview Reservoir. Woodinville paid an incremental cost to oversize the transmission line from 36-inches to 42-inches and to expand pumping facilities. The Clearview Project facilities are under construction and are projected to be complete in 2000. The cost for the pipeline and pumping facilities is estimated to be $2.2 million.

The Clearview Project would serve to transfer the Everett WTP supply either through the SRRWA or through direct purchase from Everett, as described below. Because the Clearview Project terminates at the Clearview Reservoir, a transmission main would be required from the Clearview Reservoir to the Woodinville Water District.

Costs

The District's share of the costs for the two SRRWA alternatives is estimated to be:

	Capital Cost		Annual O&M Cost	
	Million	M/mgd	million	M/year
Approach 1 – Direct Transfer	$64.8	$7.3	$2.0	$2.0
Approach 2 – Flow Swap	$51.7	$5.9	$1.6	$1.6

Time Frame

The projected time frames for the two *SRRWA* development approaches are:

Alternative 1 – Direct Transfer 2014 - 2016

Alternative 2 – Flow Swap Undetermined

Cross Valley Water District Ground Water

Under this alternative, the Cross Valley Water District would transfer its ground water rights to the District. This option would require ground water pumping, treatment, and transmission facilities.

Capacity

A volume of 2 mgd is available to be transferred.

Status

The District may submit an application to the DOE to expand the place of use for the CVWD ground water rights permit to include the Woodinville Water District service area. No work associated with this alternative has been completed.

Costs

The estimated capital cost is $4 to $5 million per mgd delivered.

Likelihood

At one time this was a viable project to serve the east side of the District. However, District growth on the east side has leveled off because of GMA restrictions. Since the supply cannot be efficiently conveyed to the west side of the District, where demand is projected to increase, this project is not deemed to be viable.

Time Frame

The time frame is undetermined.

Snoqualmie Aquifer and Snoqualmie River

Under this alternative, water would be pumped from the Snoqualmie aquifer and discharged to the Snoqualmie River near North Bend. The river would serve as the conveyance system to a new potable WTP near Carnation. The treated water would be discharged into the Tolt Pipeline in the Redmond area.

Status

A Snoqualmie Aquifer water right has been applied for jointly by the East King County Regional Water Association (EKCRWA) and SPU. The preliminary design has been conducted on the project. Upcoming activities include:

- Scoping notice for EIS.
- An engineers estimate of project components.
- An update of ground water modeling.

Costs

The cost is estimated at $3 to $4 million per mgd (delivered water with treatment). Costs do not include water wheeling, which would require a separate contract.

Capacity

The total capacity of the project is 40 mgd.

Likelihood

This is a potential long-term alternative.

Time Frame

The time frame for this source to be on-line is 2014 to 2020.

Lake Tapps

Lake Tapps is under consideration as a regional water supply. The lake is supplied primarily through a Puget Sound Energy (PSE) diversion system on the White River. The project is being developed and pursued in connection with the efforts of the Lake Tapps Task Force to arrive at a collaborative settlement of issues surrounding the 1997 Federal Energy Regulatory Commission (FERC) operating license for

PSE's White River Hydroelectric Project. The water supply would be purchased by a combination of the CWA, SPU and/or Tacoma Water.

In addition to the infrastructure in place and required for the continuation of the Power Project, additional infrastructure is necessary to provide municipal water use:

- Pipeline to connect a water supply project to the existing Power Project
- Treatment Plant to treat Lake Tapps water
- Transmission to regional interconnection points. Options for interconnection points to the supply systems include:
  - McMillin Reservoir (Tacoma system)
  - North Branch of the Second Supply Project (Tacoma and Seattle system)
  - Lake Youngs (Seattle system)
  - Eastside Reservoir (Seattle system)

Status

PSE applied for a 100 cfs water right from the White River on June 20, 2000.

Costs

The total cost of the project is estimated to be $240 million, the District's share of the cost would be about $24 million.

Capacity

The total capacity of the project is 100 cfs (65 mgd).

Likelihood

This option has a high likelihood to occur.

Time Frame

The time frame for this source to be on-line is 2015.

Wastewater Reuse

The District is very receptive to the possibility of a King County Water Reuse plant located near the Sammamish River. During the summer, the effluent could be used for irrigation. During the winter, the plant would either be shut down or the effluent would discharge to the Sammamish River. This option would include the construction of a 20 mgd water reuse plant and the installation of a transmission and distribution system.

Capacity

The treatment plant would have a 20 mgd capacity.

Status

This project is in the conceptual stage.

Costs

No costs have been specified.

Likelihood

The likelihood has not been determined.

Timeframe

No time frame has been specified.

Ground Water

The District currently owns and maintains an emergency standby well (and site) located in close proximity to the District's Woodinville office properties. The District has no intention at this time of operating the well as a full-time source. Further description of the well is provided in Chapter 1.

CHAPTER 4.2 - WATER CONSERVATION PROGRAM

This chapter summarizes the District's water conservation program including:

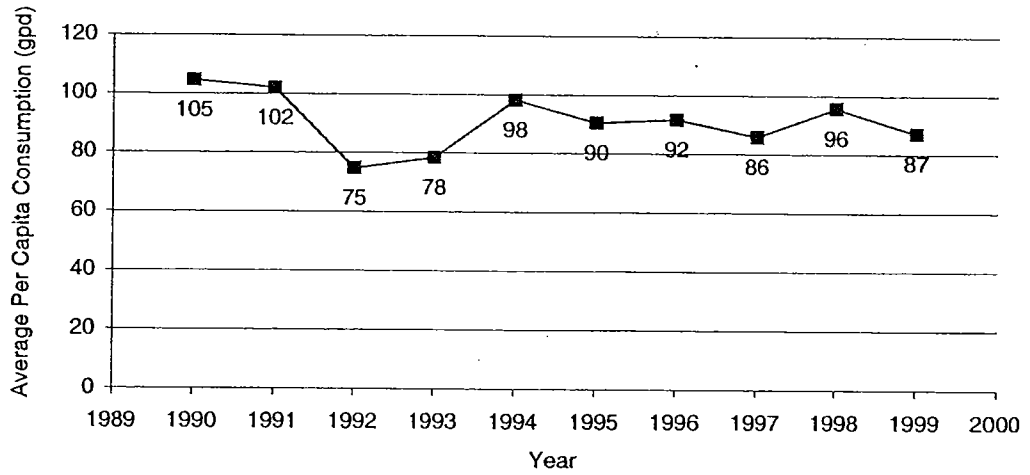
- The effectiveness of the overall conservation efforts, in terms of the reduction of per capita water consumption.
- Goals and objectives of the conservation program.
- The conservation measures since 1991.
- The direction of the continued conservation program.

The District has a full-time Public Information Coordinator who manages the conservation program for the District. The District participates in and promotes all of Seattle Public Utilities' (SPU) conservation programs to its customers, including the 1% Conservation Initiative. In addition, the District implements its own programs locally and partners with other area water utilities. Some of those partnerships have included other SPU purveyors, Snohomish PUD, Puget Sound Energy, King County and the University of Washington. In addition, the District's conservation program meets the guidelines of the 1996 East King County Coordinated Water System Plan Update Conservation Program.

THE EFFECTIVENESS OF OVERALL CONSERVATION EFFORT

In 1991, the District implemented an aggressive water conservation program. The goal was to reduce per capita consumption by eight percent by the year 2000. Per capita consumption from 1990 to 1999 is shown in Figure 4.2-1. The per capita consumption is based on single-family residential water usage data.

FIGURE 4.2-1
PER CAPITA WATER CONSUMPTION



Note: 1992 and 1993 were anomalous years. In 1992, there were mandatory water restrictions because of a drought; 1993 was unusually rainy.

Since implementation of the conservation program in 1991, the average demand has steadily decreased. Average per capita consumption decreased approximately seventeen percent from 1990 to 1999, far exceeding the eight percent goal. Average per capita consumption increased during 1998. Rainfall and solar radiation data collected at the District's Evapotranspiration Weather Station suggests that unusually low rainfall and high solar radiation in 1998 resulted in this increased usage.

Other factors impact water usage besides conservation measures, as indicated by the 1998 per capita demand increase. Temperature and rainfall have a large impact. The large decline in 1992 and 1993 water consumption was due to anomalous conditions. In 1992, a regional drought mandated a restriction on lawn watering all summer. Water demand was low in 1993 because of unusually high rainfall.

CONSERVATION GOALS AND OBJECTIVES

The emphasis of the District's continuing water conservation program is to lower peak demand, primarily by targeting landscape irrigation. Many residential customers in the District have large irrigated lots, resulting in high peak water usage. The District's ratio of Maximum Day Demand (MDD) to Average Day Demand (ADD) is approximately 3.0, compared with 2.1 for the Seattle regional system. The higher ratio is due to the District's service area being largely rural, with much larger lots compared with Seattle's service area.

CURRENT CONSERVATION PROGRAM

Public Education

School Outreach

The District's school outreach education program is intended to increase awareness of local water resources and encourage water conservation practices at school and at home.

Elementary School. The District offers several elementary school programs. School districts served by the Woodinville Water District teach water cycles in the second grade curriculum and water and the environment in the fourth grade. The Woodinville Water District offers teachers hands-on classroom presentations at these grade levels, upon request. These presentations include information on the water cycle and on how choices made in the environment affect water conservation and water quality. In addition to these presentations, the District partners with Snohomish PUD to provide additional water-related classroom presentations to grades K-6, upon teachers' requests. A youth education newsletter was developed in January 1999, outlining programs and materials available. This newsletter is sent through inter-school district mail to each teacher.

In 1998, the District implemented a program called the "Northshore Community Partnership in Environmental Education." The project constructed a research conservation garden at Woodmoor Elementary School. Woodmoor Elementary School and the adjacent Northshore Junior High School house a combined population of approximately 2,000 students. The research garden is being used as a learning tool for students at Woodmoor Elementary and Northshore Junior High; to provide research data which will be available on school web sites; and to develop an environmental curriculum that can be used by other teachers in the school district. The project will continue through 1999, but it was designed so it could provide on-going education. The District worked with biology teachers to develop a curriculum so other teachers and schools could teach the program. The project was implemented through a partnership with Northshore Utility District and Northshore School District. The project was funded through a King County Block Grant, with additional funding provided through an EPA research grant and local businesses.

Junior/Senior High School. The District and Puget Sound Energy sponsor a program designated "In Concert with the Environment" for junior and senior high school students. Students complete a household natural resources survey. Survey data are input into a computer program which provides a detailed report showing how their households are currently using the resources and how they can be more efficient.

Students at Northshore Junior High participate in the "Northshore Community Partnership in Environmental Education", described above.

The "Timbercrest Landscape Soils Study Project" helps students at Timbercrest Junior High in the Northshore School District understand the impact of landscape practices on water quality and quantity. The project includes three experimental plots with different soil amendments in each plot. Pipes from each plot carry collected surface and subsurface water to containers where students can measure the quantity of water and sample the water quality. The project was funded through a King County Watershed Action Grant, which ended in 1998, although the students continue to use the garden.

Teachers Continuing Education Program and Curriculum Materials. The District is a member of the Seattle/Purveyor Youth Education Committee. The committee's priority projects include development of a regional water education web page, an updated water system poster (both of these are underway), water conservation curriculum materials, and better field trip access to the Cedar River Watershed.

The District works with the Water Conservation Coalition of Puget Sound (WCCPS) and/or local area water utilities to sponsor continuing education workshops for teachers. The workshops focus on how to incorporate water conservation and water quality learning activities into their curriculum.

Teachers Newsletter. The District produces a teacher's newsletter that is outlined above under Elementary School. The intent of the newsletter is to encourage teachers to incorporate water conservation and water quality education into their curriculum.

General Public Outreach

The general public outreach program is designed to raise customer consciousness about water stewardship. Staff works to provide the public with educational tools that will help them make wise choices regarding water conservation and water quality.

Natural Lawn Program. The Natural Lawn Program began in 1997 as a multi-agency regional campaign. Partners include SPU and its wholesale purveyors, as well as King County Department of Natural Resources, and its local Hazardous Waste Management Program. The long-term campaign goal is to move toward environmentally best practices for lawn care. One of the objectives of the program is to promote less water usage under the premise that a healthy lawn needs less water to stay green. The program relies on a comprehensive public educational package utilizing paid radio and television advertising, bill inserts, newsletters, workshops/seminars, trade shows, demonstration gardens, and educational materials.

Water Efficient Demonstration Garden. Installed in the fall of 1993, the Water Efficient Demonstration Garden provides visitors with information and techniques to make their landscapes more water efficient. The garden is located at the District office, and will be modified and re-constructed as part of the new administration building construction project.

Evapotranspiration Hotline. The District's Evapotranspiration Hotline provides detailed information to customers about plant watering needs. Callers receive a message that instructs them on the amount of water their lawn needs that day based on the information from the District's Evapotranspiration (ET) Weather Station. The ET Water Station was installed in 1995 to provide a daily ET index.

Customer Newsletter. The District mails a bimonthly newsletter to customers with each water bill. Each newsletter has a section on water conservation. The newsletter announces rebate programs, workshops, gives tips on conserving water and water efficient gardening, and lists available resources for more information. The newsletter includes "Kid's Corner," a section targeted to children.

Speakers Bureau. The District seeks speaking opportunities and has speakers available to a wide cross section of service and community groups. Speakers are available to discuss District programs, rates, water supply, water conservation and water quality. The District has also developed a video resource library for public use.

Program and Project Promotion. The District works regionally with SPU and its wholesale purveyors and other agencies to publicize the need for water conservation. Regional promotion is done through television and radio public service announcements, through major newspaper publications and with bus signs and billboards. District staff works with SPU and its wholesale purveyors to develop summer campaign messages for regional consistency. Locally, the District uses utility bill inserts and articles in its bimonthly newsletter. In addition, the District promotes programs and provides information through its two local newspapers, the Woodinville Weekly and the Northshore Citizen.

Theme Shows, Fairs, and Community Events. The District has held an annual Spring Garden Open House for the last six years and provides professional speakers on the topic of Water Conservation in the Landscape. The District works cooperatively with other utilities to develop speaker programs regionally as well. District staff has also participated in local science fairs and the City of Woodinville's annual parade event, "Celebrate Woodinville," promoting water conservation. As a regional partner, the District has participated in the Northwest Flower and Garden Show event promoting water efficiency in landscaping.

New Customer Packet. Each new District customer receives a customer information brochure along with a list of the brochures the District has available. Customers are mailed brochures upon their request.

Technical Assistance

The District has participated in SPU's Regional Conservation Program, the details of which are listed below. This program targets mainly commercial customers, with the exception of the WashWise program which targets residential customers. In addition to regionally administered programs, the District implemented an indoor/outdoor water audit program for residential customers to assist them in their effort to use water more efficiently.

Regional Incentive Programs

WashWise Rebate Program. The WashWise Rebate Program is implemented through SPU and Northwest Energy Efficiency Alliance (NEEA), which includes the region's electric utilities; participating gas, wastewater and water utilities. WashWise was created to encourage individuals to purchase resource efficient washing machines. The program offers rebates on qualifying models of water efficient washing machines, those that use 40 percent less water per load. This program is promoted through radio ads, in-store displays, and utility bill inserts, newsletters, and web pages.

Water Smart Technology Program. The District along with SPU and other SPU wholesale purveyors implemented the Water Smart Technology Program in 1993. The program offers technical assistance and financial incentives to commercial, industrial, and institutional customers to install water conservation technologies. An evaluation of the program is provided in a report entitled *At the Vanguard of Commercial Water Conservation* (SPU, 1998).

Commercial Toilet Rebate Program. The District along with SPU and SPU wholesale purveyors implemented the full-scale Commercial Toilet Rebate Program in April 1995. The program offered cash

rebates to businesses and public institutions with frequently used toilets and urinals, that replace existing fixtures with low flush toilets (1.6 gallons per flush (gpf)) and urinals (1.0 gpf). The existing fixtures must use 3.5 gpf or more to qualify. An evaluation of the program is provided in *At the Vanguard of Commercial Water Conservation* (SPU, 1998).

Commercial Water Efficient Irrigation Program. The District along with SPU and SPU wholesale purveyors implemented the Commercial Water Efficient Irrigation Program in 1995. The program provided technical assistance and financial incentives for irrigation improvements to commercial, industrial and institutional customers. The program includes: 1) a site visit to review irrigation practices and provide recommendations, 2) a free irrigation audit, and 3) a financial incentive program. The irrigation system audit evaluates irrigation efficiency including system pressure, site coverage, irrigation schedules and water budgets. Financial incentives are offered for capital upgrades of existing or planned irrigation systems, or other projects that result in dependable, consistent water savings. An evaluation of the program so far, as well as recommendations for 1999 and beyond are provided in a report entitled *Water Efficient Irrigation Program Evaluation 1995 - 1998* (SPU, 1998).

Regional Water and Energy Efficiency Program. In 1992, the District participated in a regional retrofit program for faucets and showerheads. Program participants included SPU, Puget Power, Bonneville Power Administration, King County (Metro), Washington Natural Gas, and Snohomish PUD. Conservation kits were delivered to all residential customers.

Multi-family residential conservation kits included a toilet tank displacement device, a 2.75 gpm showerhead, a 2.5 gpm faucet aerator, and informational conservation materials. Single-family residential conservation kits included low-flow showerheads, faucet aerators, dye tablets to check for toilet leaks, flow restrictors for toilets and informational conservation materials.

Local Incentive Programs

Residential Water Audits. The Residential Water Audit Program assists customers to assess their water usage and shows them ways to reduce their water consumption. The program targets the highest use residential customers. Technicians perform on-site indoor and out-door analyses. Indoors, the technician evaluates the efficiencies of toilets, showerheads, faucets, and meters. Outdoors, the technician evaluates soil conditions and the efficiency of irrigation systems. Based on the results, the technician generates a report with specific recommendations for the customer.

The District partnered with the City of Redmond to implement its first pilot indoor/outdoor audit program during the peak season in 1996. The program was continued through 1997. This program was called "Water Cents"; the District's consultant was EcoGroup from Phoenix, Arizona. SPU's review of the program showed sustained water savings. The program appeared to be cost effective. In 1998, the District partnered with Northshore Utility District to do a new "field study" audit program with a local consultant, Cascadia Consulting. The current Residential Water Audit Program has been continued through the year 2000. SPU is financing the 2-year long pilot program. A region-wide program is planned for 2001.

Technical Studies

The District has participated in several regional research studies. The District partnered with SPU in the Residential Water Audit Program (described above). The Northshore Community Partnership in Environmental Education and the Timbercrest Landscape Soils Study Project provided data for University of Washington research projects on the effects of soil amendments on water quality and water quantity. The Northshore Community Partnership in Environmental Education also provided data to develop environmental curricula.

System Measures and Policy

Leak Detection

In 1993, the District conducted a leak detection program on approximately 80 percent of the asbestos cement water distribution pipe. Three leaks were identified – one at a fire hydrant and the other two at water service connections. Asbestos pipe is more prone to leakage than ductile iron or cast iron water pipes. The District has an aggressive asbestos-cement pipe replacement program. In addition, the District's operation staff is watchful for leaks throughout the distribution system. Leaks are repaired as soon as identified.

With replacement and upgrading of source water meters, the District will have a better idea of the percentage of unaccounted-for water. Unaccounted water results from more than leakage; it also results from meter inaccuracies, flushing, and hydrant testing. It is recommended that the District conduct additional leak testing if the unaccounted-for water is excessive (greater than eight percent).

Bill Showing Consumptive History

Customer bills show consumption data for the previous year.

Source Meters

Both the District and SPU have master source meters on all Tolt supply taps. Annual data from the District's master source meters is not available to assess the percentage of unaccounted-for water in the system. In the past, because of inaccuracies in the SPU meters, the amount of water sold to the District by SPU was lower than the amount of water that the District has sold to its customers. In 1998, SPU began replacing its source meters with more accurate meters. The new source meters will allow the District to keep an accurate record of unaccounted-for water.

Service Meters

The District has a testing and repair program for service meters and a scheduled replacement program for older meters.

Conservation Pricing

The District has implemented a 4-tiered increasing block rate structure. This rate structure encourages conservation by charging a higher unit price for water as customer consumption increases. The District periodically evaluates the rate structure to maintain its aggressive conservation rate structure.

Future Conservation Program Recommendations

The emphasis of the continuing conservation program will be to reduce peak demand. The conservation program will target landscape irrigation.

The following specific conservation measures are recommended:

1. Continue educational programs to promote conservation including both school outreach and public outreach.
2. Promote the use of soil amendments. Provide incentives to use soil amendments in new construction and remodeled landscapes.
3. Continue water audit program, particularly for high peak users.
4. Continue and refine current commercial and residential landscape programs.
5. Evaluate the use of a System Development Charge (SDC) based on the square footage of the landscaped areas.

6. Continue the use of an aggressive conservation rate structure.
7. Evaluate the amount of unaccounted-for water. Conduct a leak detection and repair program to reduce excessive unaccounted-for water if necessary.

CHAPTER 5 SOURCE WATER PROTECTION

The District's primary water source is the South Fork Tolt River Watershed, which is occasionally supplemented by the Cedar River Watershed. The water is purchased directly from Seattle Public Utilities (SPU), and is supplied via the Tolt Pipeline. SPU has a watershed protection program for the watersheds. Because the District purchases all of its water from SPU, the District does not have its own Source Water Protection Program.

CHAPTER 6 - OPERATION AND MAINTENANCE PROGRAM

ORGANIZATION

The organization chart for the District is shown in Figure 6-1 *Organization Chart*. The primary functions of each of the lead staff positions are summarized on Table 6-1 *Water System Personnel Major Responsibilities*. Staff members currently filling positions within the Department are listed on Table 6-2 *Staff Members and Certifications*.

Operator Certification

The DOH waterworks certification program establishes minimum requirements and standards by which operators in charge of public water systems are examined and certified. The assigned classification of the public water systems is based on the complexity of the water treatment process and the population served for a distribution system. The assigned classification determines the required grade level for operator certification.

The District is classified as a Group III distribution system, requiring the District General Manager to have a minimum certification level of Water Distribution Manager (WDM) III. Certification levels of District personnel are summarized in Table 6-2 *Staff Members and Certifications*. The District requires a minimum grade of Water Distribution Specialist (WDS) I for all operations personnel.

The District supports ongoing training to ensure that the operators comply with the professional growth requirements, listed in WAC 246-292-090. The District encourages attendance at American Water Works Association (AWWA) sponsored seminars, as well as course work available through the Washington Environmental Training Resource Center (WETRC) at Green River Community College. The District pays the tuition for job related seminars and classes.

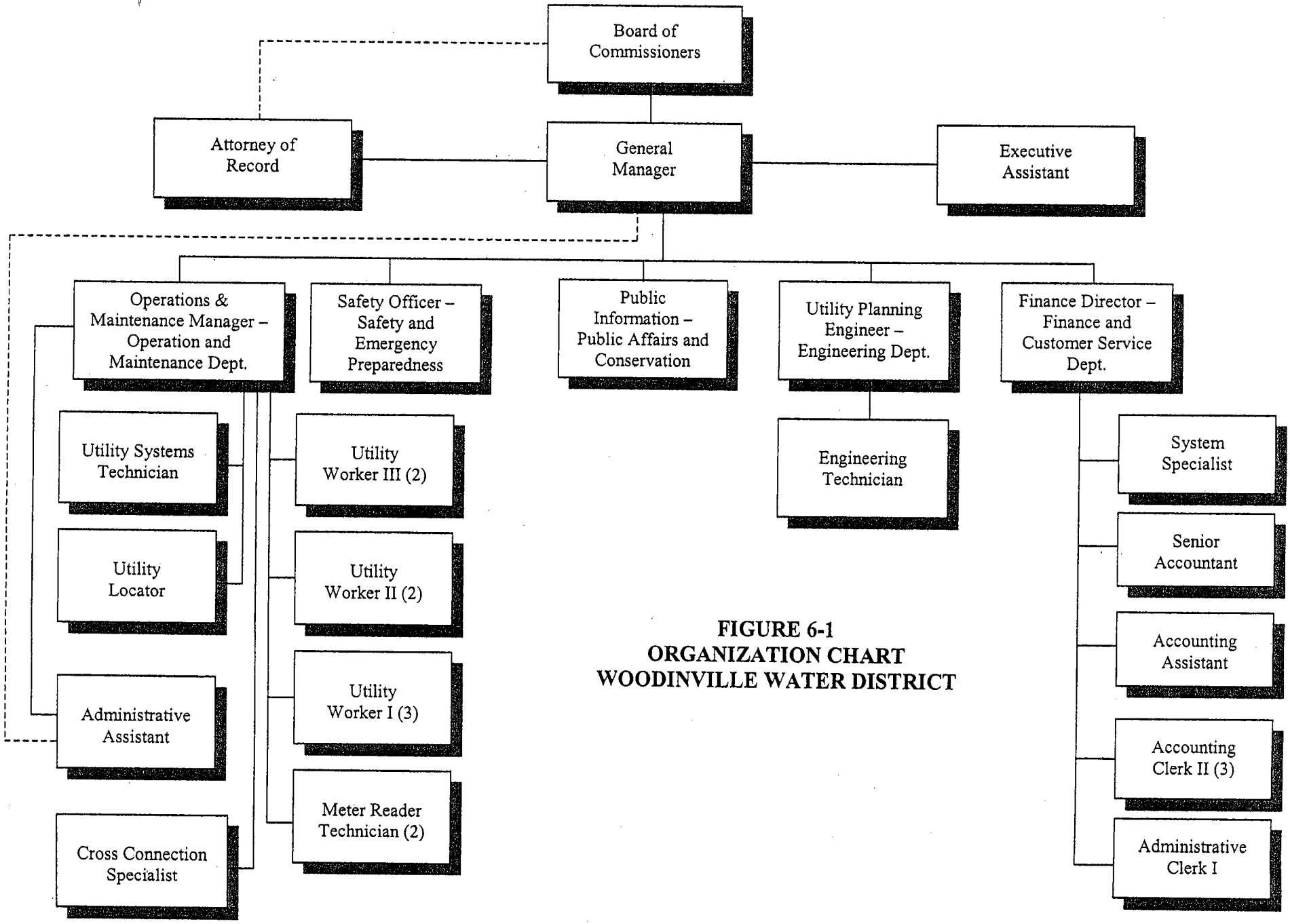


FIGURE 6-1
ORGANIZATION CHART
WOODINVILLE WATER DISTRICT

TABLE 6-1
WATER SYSTEM PERSONNEL MAJOR RESPONSIBILITIES
WOODINVILLE WATER DISTRICT

General Manager

- Responsible for overall management and operation of District.
- Staffs and directs District operation, administrative, financial, engineering and customer service personnel.
- Primary District contact to government agencies, the press and the general public.
- Supervises District budgeting, financial reports and investment reports.

Executive Assistant

- Assists the General Manager in meeting the goals and objectives of the District.
- Provides assistance and support to the Board of Commissioners.

Utility Planning Engineer

- Coordinates and manages the design and construction of water (and sewer) system facilities projects.
- Oversees engineering planning studies and engineering contracts.

Engineering Technician

- Coordinates and supports all administrative functions and activities of District projects, including developer extensions projects, contracts, and annexations.

Operations and Maintenance Manager

- Manages daily operations and maintenance functions of the District's water system in accordance with District policies, procedures and standards, and the DOH WAC 296-290 requirements.
- Oversees the purchase and inventory of equipment and materials.
- Tracks and schedules preventative maintenance activities.
- Checks and maintains daily reports, records, field drawings and maps to ensure accuracy and regulatory conformance.
- Ensures cross-connection testing and inspection program is properly enforced.

Utility Worker III

- Directs and trains less experienced personnel on water system maintenance, repair and construction, and equipment operation.
- Installs and directs the installation of new water services according to District design and construction standards.
- Inspects new and existing lines, valves and service installations to assure compliance with District standards.
- Maintains accurate record keeping systems to track water line cleaning and maintenance programs.
- Monitors pumping station operations and analyzes malfunctions.

Utility Worker II

- Performs maintenance of flow control pumping stations and tanks.
- Inspects all pumps, motor controls, meters, programmable controllers and generators to ensure proper operation of equipment and systems.
- Performs basic programming of the SCADA system.
- Installs new water services including water mains, valves, service connections and meters.

TABLE 6-1 (Continued)
WATER SYSTEM PERSONNEL MAJOR RESPONSIBILITIES
WOODINVILLE WATER DISTRICT

Utility Worker I

- Performs pressure checks in the water distribution system.
- Performs routine inspections and monitors performance of pumping stations, water lines, valves and hydrants.
- Inspects new and existing lines, valves and service installations to assure compliance with construction and operation requirements.
- Administers District's cross-connection control and inspection program.

Administrative Assistant (Operations)

- Assists both General Manager and Operations and Maintenance Manager in meeting goals and objectives of the District.
- Maintains administrative functions of Operations division workload plan.
- Assists Operations Manager in preparation of annual budgets and tracks budget expenditures on ongoing basis.
- Administers Hydrant Meter program.

Cross Connection/Water Quality

- Coordinates and implements District's cross connection control program.
- Coordinates and implements District's main flushing program.
- Responds to customer complaints on water quality.

Utilities Systems Technician

- Conducts inspection and maintenance for all electrical and mechanical devices.
- Monitors and maintains water storage facilities.
- Responds to customer complaints on flows and pressure problems.
- Performs fire hydrant flow testing.
- Inspects new pressure reducing valve stations (PRVs) to verify proper installation.
- Maintains all PRVs and pump stations.

Utility Locator

- Identifies and locates underground District utilities using location equipment and "as-built" maps and records.
- Maintains locating equipment.
- Maintains records and reports related to locate requests and locates performed.
- Responds to customer complaints and concerns regarding leaks, high or low water bills, water quality, and meter location.

Meter Reader/Technician

- Reads and records water meter activity.
- Maintains meters and areas around meters. Replaces meters as assigned.
- Notes meter malfunctions and any changes in water consumption or meter location.
- Responds to emergency shut-offs for customers with problems such as a broken pipe in the house.

Safety Officer

- Develops, coordinates and implements District's Comprehensive Safety Program.
- Develops and coordinates District's Emergency Response Program.

TABLE 6-1 (Continued)
WATER SYSTEM PERSONNEL MAJOR RESPONSIBILITIES
WOODINVILLE WATER DISTRICT

Public Information/Water Conservation Coordinator

- Develops and implements the water conservation program.
- Develops conservation goals for the District in compliance with State and regional guidelines.
- Maintains, coordinates and cross-references records of water use and conservation programs. Analyzes the status and effectiveness of programs. Coordinates local conservation programs with adjacent cites, water districts and citizen groups.
- Assists in coordinating the District emergency response plan.
- Issues press releases and serves as liaison for contacts with the media.

Finance Director

- Responsible for the preparation and maintenance of the District's accounting records and activities, including billing, payroll, accounts receivable, accounts payable, monthly and quarterly financial statements and the year-end financial statement.
- Manages investments and cash flow requirements.
- Maintains inventory control.

Senior Accountant

- Implements District's investment policies and guidelines, analyzes cash flows and positions of the District, and prepares investment reports.
- Prepares and enters daily and monthly journal entries into automated General Ledger system.
- Prepares monthly financial statements, and assists in preparation of annual statements.
- Audits financial records.
- Oversees Accounts Payable function, reviewing transactions and A/P edits for propriety.

System Specialist

- Maintains and supports District computer systems.
- Troubleshoots software and hardware problems.
- Maintains telecommunications system.
- Develops and provides software training to District personnel.
- Serves as District Webmaster.

Accounting Assistant

- Researches District purchases for compliance with District resolutions and State statutory requirements as related to competitive bidding processes.
- Prepares inventory reports as required.
- Processes payroll information.
- Maintains all personnel files and records and assists employees in enrolling, changing, or dropping benefits coverage.
- Prepares quarterly and year-end payroll reports, payroll tax deposits, summary reports and W-2 forms according to state and federal regulations.
- Monitors all requests for expenditures.
- Maintains District's petty cash account.

Accounting Clerk II

- Verifies and processes customer accounts receivable, posts customer payments and prints journals and billing registers.
- Maintains rate schedule files in automated billing system.
- Verifies and balances all daily cash totals with computer generated payment input.
- Responds directly to customer inquiries regarding billing and meter issues.
- Generates and prints repair service orders and notifies field operations.
- Monitors and coordinates delinquent account collections.
- Prepares and maintains various customer records and files.

TABLE 6-1 (Continued)
WATER SYSTEM PERSONNEL MAJOR RESPONSIBILITIES
WOODINVILLE WATER DISTRICT

Public Information/Water Conservation Coordinator

- Develops and implements the water conservation program.
- Develops conservation goals for the District in compliance with State and regional guidelines.
- Maintains, coordinates and cross-references records of water use and conservation programs. Analyzes the status and effectiveness of programs. Coordinates local conservation programs with adjacent cites, water districts and citizen groups.
- Assists in coordinating the District emergency response plan.
- Issues press releases and serves as liaison for contacts with the media.

Finance Director

- Responsible for the preparation and maintenance of the District's accounting records and activities, including billing, payroll, accounts receivable, accounts payable, monthly and quarterly financial statements and the year-end financial statement.
- Manages investments and cash flow requirements.
- Maintains inventory control.

Senior Accountant

- Implements District's investment policies and guidelines, analyzes cash flows and positions of the District, and prepares investment reports.
- Prepares and enters daily and monthly journal entries into automated General Ledger system.
- Prepares monthly financial statements, and assists in preparation of annual statements.
- Audits financial records.
- Oversees Accounts Payable function, reviewing transactions and A/P edits for propriety.

System Specialist

- Maintains and supports District computer systems.
- Troubleshoots software and hardware problems.
- Maintains telecommunications system.
- Develops and provides software training to District personnel.
- Serves as District Webmaster.

Accounting Assistant

- Researches District purchases for compliance with District resolutions and State statutory requirements as related to competitive bidding processes.
- Prepares inventory reports as required.
- Processes payroll information.
- Maintains all personnel files and records and assists employees in enrolling, changing, or dropping benefits coverage.
- Prepares quarterly and year-end payroll reports, payroll tax deposits, summary reports and W-2 forms according to state and federal regulations.
- Monitors all requests for expenditures.
- Maintains District's petty cash account.

Accounting Clerk II

- Verifies and processes customer accounts receivable, posts customer payments and prints journals and billing registers.
- Maintains rate schedule files in automated billing system.
- Verifies and balances all daily cash totals with computer generated payment input.
- Responds directly to customer inquiries regarding billing and meter issues.
- Generates and prints repair service orders and notifies field operations.
- Monitors and coordinates delinquent account collections.
- Prepares and maintains various customer records and files.

TABLE 6-1 (Continued)
WATER SYSTEM PERSONNEL MAJOR RESPONSIBILITIES
WOODINVILLE WATER DISTRICT

Administrative Clerk I

- Responsible for front-line contact with customers of the District.
- Responds to customer inquiries regarding billings and accounts.
- Analyzes and reviews customer complaints to determine best method of resolution.
- Processes payments received on customer accounts and for other District services.

TABLE 6-2
STAFF MEMBERS AND CERTIFICATIONS
WOODINVILLE WATER DISTRICT

Name	Title	Water System Certification
Administration		
Robert Bandarra	General Manager	WDM IV
LeAnne Mauhl	Executive Assistant	--
Engineering		
Kenneth Pick, PE	Utility Planning Engineer	--
Bob Bieker	Engineering Technician	--
Finance		
Bill White, CPA, CFE	Finance Director	--
Dianne Clark	Accounting Assistant	--
Cecilia Ford	Administrative Clerk I	--
DeAnna Gilbert	Accounting Clerk II	--
Jodi Hill	Accounting Clerk II	--
Jan Light	Accounting Clerk II	--
Darcie McAllister	System Specialist	--
Cynthia Turner	Senior Accountant	--
Operations		
Kenneth King	Operations and Maintenance Manager	WDM III, WWC I
Jim Bard	Utility Systems Technician	WDM II, WW I, CCS I, WWC I
Kathy Caldwell	Utility Lead - Water	WDM III, CCS I, WWC I, BAT
Tim Cantwell	Cross Connection/Water Quality	WDM IV, CCS I, BAT
Joel Clark	Meter Reader	--
Steve Cona	Utility Worker - Water	WDS II, WW I
Brady Hjort	Utility Worker - Sewer	--
Becky LaFrance	Utility Locator	WDS I, CCS I
Mike Massena	Utility Worker - Sewer	WDS I
Jane Nichols	Administrative Assistant	--
Sami Estaphan	Utility Worker - Water	WDS I, WDM II, CCS I
Kurt Oakland	Utility Worker - Sewer	WDS I
Kate Santee	Meter Reader	WDS (in training)
Clifford E. Sherbon	Utility Lead - Sewer	WDM III, CCS I, WWC I, WTPOIT
Todd Young	Utility Worker	WDS II
Public Information/Water Conservation		
Deborah Rannfeldt	Public Information/Water Conservation Coordinator	--
Safety and Emergency Preparedness		
Steve Brown	Safety Officer	WDM III, CCS I, BAT

BAT = Backflow Assembly Tester
CCS = Cross Connection Control Specialist
WDM = Water District Manager
WDS = Water Distribution Specialist
WTPOIT = Water Treatment Plant Operator (in training)
WWC = Wastewater Collection Specialist
PE = Registered Professional Engineer, State of Washington
CPA = Certified Public Accountant
CPE = Certified Fraud Examiner

SYSTEM OPERATION AND CONTROL

Under normal operations, the District tries to maintain a relatively constant flow from the Seattle supply system. The storage tanks are operated as full as possible, while preventing closure of the altitude valve that controls flow into those tank with altitude valves. Each day, the District establishes a set point on each Tolt tap. During the peak water demand period (June 1 to September 1), this set point is usually adjusted daily based on water demand, reservoir levels, and weather conditions. During the low water demand period (September 1 to June 1), the flow control set point is adjusted as required.

System Components and Routine Operation

SCADA

The District has a Supervisory Control and Data Acquisition (SCADA) system developed and installed by TSI. The SCADA system uses On Spec software for Windows NT and is run through a personal computer located in the Maintenance Building office. The SCADA system allows for continuous monitoring and control of the system. Primary monitoring, control and reporting with the SCADA system includes:

Monitoring

- Pump Stations - Cumulative and instantaneous flow.
- Reservoirs - Flow and reservoir levels.
- Source Meters - Cumulative and instantaneous flow.
- Tolt Taps - Hydraulic gradient at T76, T77, T78, T80, and T167.
- Alarm status.

Control

- Pump Stations - The SCADA system does not control the pumps.
- Reservoirs - Control of altitude valves, where applicable.
- Source Meters Locations - Control of flow control valves.
- Alarms - Auto dialer goes to computer modem using WIN 911 software. WIN 911 has a separate modem and a dedicated phone line.

Reporting

- Daily, monthly, and annual reports.
- Alarm history.
- Historical trends for 1 year period.

Source Meters

The District has source meters at each Tolt Tap. There are nine taps to the Tolt River supply, eight to the Tolt Pipeline and one to the Tolt Eastside Supply Line. Details on the source meters are presented in Chapter 1, Table 1-3 *District Source Meters on Tolt Supply*. The District is gradually replacing the propeller meters with mag meters to reduce maintenance expenses.

The source meters are located in the same vaults as the source flow control valves. Flow at the source meters is monitored through the SCADA system. The flow control valve set points are manually controlled from the District headquarters through the SCADA system.

Reservoirs

The District has eight storage reservoirs. Storage facility data is summarized in Chapter 1, Table 1-4 *Storage Facilities*. The control of each storage facility is summarized in Table 6-3 *Reservoir Monitoring and Control*. In general, reservoirs are operated as full as possible while preventing closure of the altitude valve which controls flow into each tank.

TABLE 6-3
RESERVOIR MONITORING AND CONTROL
WOODINVILLE WATER DISTRICT

Storage Facility	Altitude Valve Set Points (feet) On	Off	Control System
Hollywood	24.9	26.5	Reservoir is fed directly from the Tolt Tap T80.
Brookside	15.6	17.1	Fed by Tolt Tap T125. Floats on Zone 10 (420 feet).
Sammamish	--	32.4	Fed by Tolt Tap T167. A combination flow control valve/altitude valve controls reservoir flow.
Ringhill/Saybrook	--	19.7	Fed from PRV stations (primarily PRV 25 and PRV 39). Reservoir is operated full and cycled manually once per month to maintain water quality.
Kingsgate	96	97	Fed by two Tolt Taps, T76 (through PRV 1) and T77 (through PRV 16). During high demand periods, reservoir floats on Tolt, when EGL on Tolt is low.
South Hollywood	83.7	87.5	Fed by Tolt Tap T57. Currently, in order to maintain system pressures only the first 10 feet of the reservoir is used. The District plans to install a booster pump station on the discharge of the reservoir to maintain pressures in the service zone.
Wellington	75.2	77.4	Reservoir floats on Zone 9 (570 feet).
Aspenwood	--	--	Fed by Ringhill Pump Station during high demand periods and by gravity during low demand periods. No altitude control valve. The reservoir has a PRV set at 80 psi to keep reservoir from overflowing. The Ringhill Pump Station gravity feed has a PRV set to 64 psi.

EGL = Energy Grade Line

Pump Stations

The District has five pump stations. Table 1-7 *Pumping Stations* in Chapter 1 summarizes the pump station data. Control of the three active pump stations is listed in Table 6-4 *Pumping Station Control*. There is a generator at each pump station that can provide from 7 to 14 days of standby power.

TABLE 6-4
PUMPING STATION CONTROL
WOODINVILLE WATER DISTRICT

Pump Station and Function[1]	Control
Hollywood	
Pumps from Tolt Tap T80 to Zone 7 (670 feet)	Pumps operate when system pressures in Zone 7 (670 feet) are low which generally occurs when: 1) Pressure on the Tolt Tap T80 drops below 55 psi or 2) The Hollywood Pump Station is filling.
Ringhill	
Pumps from Tolt Tap T78 to Zone 15 (670 feet)	There is a pressure sensor in Service Zone 15 (670 feet). Pumps operates when zone pressures are low. Variable frequency drives adjust the speed of the pumps to match the pressure and flow demand in the system. The pump station is also equipped with a local pressure transmitter located on the pump discharge header to enable backup or alternative automatic operation if there is a failure with the remote sensor, or communications failure at Aspenwood water tank.
Lake of the Woods East	
Pumps from Zone 15 (670 feet) to Zone 20 (770 feet)	There is a pressure sensor in Service Zone 20 (770 feet). Pump operates when zone pressures are low (first pump at 72 psi, second pump at 68 psi, and third pump at 45 psi).

[1]Reintree and Cottage Glen Pump Station not included (on standby).

Pressure Reducing Valves

The District has 44 PRVs which control flow from the Tolt Pipeline and between pressure zones. Information on the PRVs is summarized in Chapter 1, Table 1-6 *Pressure Reducing Valve Stations.*

Preventative Maintenance Program

The District has a preventative maintenance program to ensure reliable operation of the system components. The Operation and Maintenance Manager tracks and schedules the preventive maintenance program through a formal workload management plan.

Source Meters

The propeller meters are pulled out and rebuilt annually. The meters are inspected more frequently if the SCADA system identifies unusual readings during monitoring. The District plans to replace all source propeller meters with Mag meters.

Service Meters

Service meters are inspected visually when read (once every two months for residential and commercial customers). Service meters are replaced approximately once every ten years.

Reservoirs

Reservoir maintenance includes:

- Weekly – Inspect.
- Monthly - Cathodic protection checked by District.
- Annually - Cathodic protection checked by vendor.

- Every five years – Drain, clean, inspect and photograph. Standpipes are cleaned and photographed by divers or using remote controlled robotic devices.
- As required – Paint.

Pump Stations

Pump station maintenance includes:

- Weekly - Inspect visually and check for vibration and other unusual operational characteristics.
- Monthly - Exercise generators, read hour meters.
- Semi-annually - Change oil and filters.
- As required - Major maintenance, replace packing.
- Annually – Load bank test generator sets to verify rated output and to exercise PRV stations.

Valves

Annual maintenance on valves includes inspection, exercising, cleaning finger strainers, and verifying settings. Valves are overhauled approximately once every five to seven years.

Mains

Currently, all mains are flushed as water quality problems occur. The District is developing a regular main flushing program.

Equipment and Supplies Inventory

The District maintains an inventory of spare parts for valves, telemetry, circuit boards, repair sleeves and couplings for all pipe sizes in the system. The District has two fully equipped service trucks for the water system, one for PRV maintenance and one for main repair.

A list of service representatives used by the District for major water system components is provided in Table 6-5 *Service Representatives*.

TABLE 6-5
SERVICE REPRESENTATIVES

Electrical and Power	Puget Sound Energy (425) 885-7599	18150 NE Fall City Hwy. Redmond 98052
Telephone and Special Service Lines	GTE Northwest (425) 455-3121	5501 Lake View Dr. Kirkland 98033
Natural Gas	Puget Sound Energy (425) 447-0700	805 – 156th NE Bellevue 98004
Telemetry	Technical Systems, Inc. (TSI) (425) 775-5696	2303 – 196th SW Suite B Lynnwood 98036
Pumps	Pump Tech (425) 644-8501	13253 Northup Way Bellevue 98005
	PACO Pumps (425) 885-3666	14908 NE 31st Circle Redmond 98052
Control Valves	G.C. Systems, Inc. (425) 882-2198	13107 NE 20th, No. 6 Bellevue 98007

TABLE 6-5 (Continued)
SERVICE REPRESENTATIVES

Miscellaneous Repair Fittings	Pacific Water Works (425) 483-2724	5823 – 238th SE Woodinville 98072
	Material Distributors (425) 483-8800	13716 NE 177th Pl. Woodinville 98072
Emergency Field Repair	The District maintains a Small Works Roster containing a list of contractors which are available for emergency field repair work. This list is updated every 6 months in accordance with statutes.	

SAFE DRINKING WATER ACT (SDWA) MONITORING

This section discusses the Safe Drinking Water Act (SDWA) water quality monitoring requirements within the District's distribution system. A summary of the District's water quality and status with the SDWA requirements is provided in Chapter 3.

Water Quality Monitoring Requirements

Sampling and monitoring requirements for drinking water quality in the State of Washington are published in the Drinking Water Regulations (Chapter 246-290 WAC) and are administered and enforced by the Washington Department of Health (DOH). As a source water supplier, SPU is responsible for the monitoring of all source water parameters. Sampling within the distribution system is required under the following SDWA regulations for the indicated parameters:

- Total Coliform Rule (TCR) – Coliform.
- Stage 1 Disinfectants - Disinfection By-Products Rule (DBPR) - Total trihalomethane (TTHM).
- Lead and Copper Rule (LCR) - Lead and copper.
- Surface Water Treatment Rule (SWTR) - Distribution system residual disinfectant concentration monitoring.

The District participates in regional monitoring programs with SPU for the monitoring of these parameters. As part of the regional program, SPU is responsible for collecting and analyzing all distribution system samples, as well as documenting compliance with all SDWA regulations to the DOH.

TCR - Coliform Monitoring Plan

The TCR, which became effective on December 31, 1990, prescribes monitoring and compliance protocols for assuring the bacteriological quality of water in distribution systems. It applies to all types of systems, and establishes a maximum contaminant level goal of zero for total coliform, fecal coliform, and *E. coli.*

The District has participated in a regional, DOH approved, coliform monitoring program since 1972. Under the regional program, the District is responsible for developing its own Coliform Monitoring Plan, and identifying, installing and maintaining the coliform monitoring locations. SPU is responsible for collecting and analyzing all samples. The District's current Coliform Monitoring Plan was approved by the DOH in June, 1997. A copy of the District's Coliform Monitoring Plan is included in the Appendix .

The number of samples that a utility is required to collect each month under the TCR is based on the population served. Under the regional monitoring plan, SPU and its purveyors are allowed to collect a reduced number of samples compared with the number identified in WAC 246-290-300 Table 2. SPU and its purveyors must sample at a rate of at least 0.7 samples per 1,000 customers per month. The total

of 28 samples must be collected per month within the District. The sample locations are listed in Table 6-6 *Coliform Monitoring Plan Sampling Locations*.

TABLE 6-6
COLIFORM MONITORING PLAN SAMPLE LOCATIONS

Sample Stand No.	Location	Address
104-1	Emerald Lake	136 Ave. NE & NE 190 Pl.L
104-2	Leota Lake	NE 195 St. & 168 Ave. NE
104-3	Totem Lake	132 Ave. NE & NE 132nd St.
104-4	Ringhill	172nd Sf. & Mink Rd. NE
104-5	Ringhill	228th Ave. NE & NE 150th St.
104-6	Tuscany	198th Dr. NE & 128th St.
104-7	Hollywood Hill	NE 153 St. & 152 Ave. NE
104-8	Reintree	194 Ave. NE & NE 194th St.
104-9	English Hill	NE 142 St. & 180th Ave. NE

Stage I DBPR - TTHM

As required by the 1996 Amendments to the SDWA, the EPA promulgated two new regulations which come under the Microbial/Disinfection By-Products (M/DBP) set of rules: the Interim Enhanced Surface Water Treatment Rule (IESWTR) and the Stage 1 DBPR. The rules set requirements to simultaneously control waterborne pathogens and chemical disinfectants and by-products of disinfection. The Stage 1 DBPR applies to all water systems that add a disinfectant during any part of the treatment process. The Stage 1 DBPR includes distribution system monitoring requirements for DBPs. Large surface water systems (i.e., serving 10,000 or more) must comply by December 2001.

Monitoring for TTHMs is currently required under the WAC 246-290-320 (6) and will continue with the Stage I DBPR. TTHM is the sum of the measured concentration of chloroform, bromoform, bromodi-chloromethance, and dibromochloromethane. Under the current requirements and the DBPR Stage I, four samples are required every three months. One of the samples must be at the extreme end of the distribution system. The other three samples are from representative locations in the distribution system. The DBPR Stage I will add five haloacetic acids (HAA5) and implement a more stringent Maximum Contaminant Limit (MCL) for TTHM.

LCR - Lead and Copper

Published June 1991, the LCR sets treatment technique requirements for lead and copper. Minor revisions to the LCR were proposed in April 1996. The LCR calls for monitoring to establish compliance with action levels for lead and copper of 0.015 mg/L and 1.3 mg/L, respectively. Should either action level be exceeded, the utility is required to conduct an assessment of corrosion control alternatives and implement an "Optimal" corrosion control program and/or treat the source water. Systems that remain in non-compliance after implementing "optimal" corrosion-control strategies are required to locate and replace lead service lines, according to a prescribed schedule. The specific provisions of the rule vary depending on the size of the system.

The LCR required initial 6-month monitoring periods of lead, copper, and water quality parameters in the source, distribution system, and customer taps. Under the LCR regional monitoring program, the system exceeded the 90th percent action levels for lead. The District is required to notify the public each year of the

lead exceedance. LCR compliance monitoring is on-hold and will resume once the Tolt treatment facilities are on-line.

SWTR - Distribution System Residual Disinfectant Concentration Monitoring

Published in June 1989, the SWTR regulates the treatment and disinfection of all surface waters and GWI sources used for public water supply. Many of the requirements of the SWTR will be superseded by the more stringent Interim Enhanced SWTR (IESWTR) which becomes effective December 2001.

Under the SWTR, the purveyor must measure the residual disinfectant concentration within the distribution system at the same time and location that a routine or repeat coliform sample is collected, or once per day, whichever is greater. There are no chlorine injection points within the District.

Violation Procedures

General

Follow-up action is required in the event that water quality monitoring results exceed the MCL. SPU is responsible for notifying the DOH in accordance with WAC 246-290-330. The District is required to notify the public in accordance with WAC 246-290-495.

Bacteriological

When total coliform bacteria are present in any sample and the sample is not invalidated, the following must take place:

1. Analyze the sample for fecal coliform or *E. coli*.
2. Collect repeat samples as follows:
    a. A set of three repeat samples shall be collected and submitted for every sample in which the presence of coliform is detected. The samples shall be collected on the same day and submitted for analysis within 24 hours after notification by the laboratory of a coliform presence, except when waived by the DOH on a case-by-case basis.
    b. At least one repeat sample must be taken from the site of the original positive coliform sample. Two repeat samples must be within five active services of the site of the sample with coliform presence, one upstream and one downstream.
    c. When repeat samples have coliform presence, the system must collect one additional set of repeat samples for each sample where coliform presence was detected.
3. Notify the DOH.
4. Determine and correct the cause of the coliform presence.

There are both acute MCLs and nonacute MCLs for coliform bacteria. An acute MCL occurs when there is: 1) Fecal coliform or *E. coli* presence in a repeat sample; or 2) Coliform presence in a set of repeat samples collected as a follow-up to a sample with fecal coliform or *E. coli* presence. For a system obtaining 40 or more routine coliform samples per month, a nonacute MCL occurs when more than five percent of the monthly samples are detected with coliform presence.

Public Notification

The notification process includes:

1. Newspaper notice within 14 days of violation.

2. Direct mail notice or hand delivery to all consumers within 45 days of the violation. The DOH may waive this requirement if the violation is corrected within 45 days.
3. Notice to radio and television stations serving the area within 72 hours of a nitrate, MCL, or other acute violation.
4. Repeat mail or hand delivery every three months until the violation is corrected.

The contents of the public notification notice should include:

- A clear, concise explanation of the violation.
- Discussion of potential adverse health effects and any segments of the population that may be at higher risk.
- Mandatory health effects information.
- The steps that the purveyor has taken or is planning to take to remedy the situation.
- The steps the consumer should take, including advice on seeking an alternative water supply, if necessary.
- The purveyor's name and phone number.

Consumer Confidence Report

The Consumer Confidence Rule (finalized August 1998) requires that water utilities provide an annual water quality report to their customers. The Woodinville Water District supports this regulation and believes the required report can provide a valuable service to its customers. A copy of the District's 1999 Water Quality Report is included in the appendix. The District will publish an updated version of the water quality report each spring.

Sanitary Survey

The DOH conducted a sanitary survey of the system on June 24, 1999. They reported the District's system appears to be well operated, maintained, and managed. The survey revealed no immediate health concerns. A copy of the DOH sanitary survey notes is included in the appendix.

EMERGENCY RESPONSE PROGRAM

The District is preparing a separate Emergency Response Program. Unusual system conditions are detected through the SCADA system. The on-call staff person is automatically notified through the alarm auto dialer system. One person from the operations staff is on-call 24-hours per day for seven days per week. The on-call person is rotated each week.

CROSS-CONNECTION CONTROL PROGRAM

District Resolution No. 3320 (October 5, 1999) establishes the District's Cross Connection Program and outlines the program requirements. A copy of Resolution 3320 is included in the appendix. The District protects the public water supply with premise isolation cross connection control protection and by installation of approved air gaps or approved backflow prevention assemblies at the property line.

The District employs a DOH-certified Cross Connection Control Specialist (CCS). The CCS:

- Administers the District's cross connection control policy under the direction of the District Manager.
- Develops the Cross Connection Control Program.

- Oversees installation, maintenance, and testing of cross connection control devices.
- Enforces the Cross Connection Control Program.
- Develops and maintains records.

Installation, inspection and testing of all backflow devices is in accordance to the current edition of *Manual of Cross Connection Control* (USC Manual), *The Accepted Procedure and Practice in Cross-Connection Control Manual,* (PNWS-AWWA Manual), or other approved DOH references.

SAFETY PROCEDURES

The District has a Comprehensive Safety Program. The District's Safety Officer develops, coordinates and implements the program. Copies of the safety procedures and records are maintained by the Safety Officer and are available at the District Office.

CHAPTER 7 – DISTRIBUTION FACILITIES DESIGN AND CONSTRUCTION STANDARDS

In accordance with WAC 246-290-125, the District has advanced DOH approval of distribution related projects (such as distribution mains and PRV stations).

DISTRICT REVIEW PROCEDURES

All distribution-related projects are reviewed by the District Engineer, Ken Pick, P.E., or by a consulting engineer under contract to the District (currently CHS Engineers).

POLICIES AND REQUIREMENTS FOR OUTSIDE PARTIES

Minimum design and performance standards for new development are listed in the *Standard Water Specifications of the Woodinville Water District for Developer Extensions* (February 5, 1997) (*District's Standard Specifications)*. A copy of the standards is included in the Appendix .

DESIGN STANDARDS

The Districts adheres to the criteria in the *Water System Design Manual* (DOH, June 1999). The District also meets the minimum design and performance standards of the *CWSP* for the East King County Critical Water Supply Service Area. Individual design and performance standards and sizing criteria are summarized in Table 7-1.

TABLE 7-1
SIZING AND SPACING CRITERIA
TRANSMISSION AND DISTRIBUTION SYSTEM

Component	Standard
Minimum pipe size	8-inch for new pipelines. Existing 6-inch mains are replaced as part of the District's pipe replacement program. Permanent dead-end mains may be 6-inch pipe, if no extensions are anticipated and fire hydrants are not required.
Maximum hydrant spacing	600 feet in residential areas. 300 feet in commercial/industrial areas.
Maximum valve spacing	1,200 feet.
Minimum System Pressure	Maintain 30 psi in any point in the distribution system during PHD conditions. Maintain 20 psi in any point in the distribution system during fire flows under MDD conditions.
Maximum System Pressure	Limit main pressures in the distribution system to 100 psi.
Maximum Pipe Velocities	Goal is to limit pipe velocities to 8 fps under PHD conditions.

CONSTRUCTION STANDARDS

Construction materials and construction methods are addressed in the *District's Standard Specifications.*

CONSTRUCTION CERTIFICATION AND FOLLOW-UP PROCEDURES

Upon completion, all material and completed work are subject to final inspection by the District, to determine whether the work complies with the Plans and Specifications. For PRV stations, the District requires that the contractor furnish the services of a technical manufacture's representative who checks the installation, tests the equipment, places it in operation and trains the District's representative. Procedures for testing and disinfection of pipelines are provided in the *District's Standard Specifications.* Design and construction record drawings are maintained at the District office. For each project, the District maintains on file a completed construction completion report (DOH form) in accordance with WAC 246-290-120(5).

INTRODUCTION

The Capital Improvement Plan (CIP) was developed based on the findings of the system analysis. The CIP itemizes the requirements and costs for system improvements and expansions including pump stations, storage reservoirs, transmission, and distribution.

SCHEDULE

The CIP schedule covers through the year 2020. A six-year annual schedule was developed for 2000 through 2005. For the remaining years, projects are scheduled in five-year increments. Projects were selected and prioritized on the schedule using the following criteria of importance:

1. Compliance with regulatory/health and safety requirements.
2. Transmission, distribution, storage improvements.
3. System reliability/repair.
4. Scheduling of project budgets for financing.

COST ESTIMATES

Budgetary costs for improvement projects were estimated in 1999 dollars (Seattle ENR CCI 6950), construction year dollars, and present worth. The costs were developed based on recent costing data from the District, bid tabulation costs, unit takeoffs from designs, and published data. Project costs include construction costs, construction contingency, engineering and administration, and sales tax. Costs for future projects were escalated to the year of construction at a rate of three percent per year. Present worth calculations are based on a discount rate of six percent.

RECOMMENDED IMPROVEMENTS

Supply

As discussed in Chapter 4.1, the District is exploring various source of supply options. Included in the CIP are:

- The Clearview Transmission Project
- The Lake Tapps Project
- Installation of a sodium hypochlorite feed system to bring the District's existing ground water well on-line as an emergency supply.
- A project to develop a source as a partner in the SRRWA. (Two alternatives are under consideration; the higher cost alternative is listed in the CIP).

Within the distribution system, source recommendations are made to add redundancy to the individual service zones through additional PRVs.

Storage

Storage improvements are recommended for Zone 1 (Kingsgate) and Zone 11 (Reintree).

Zone 1 (Kingsgate)

Zone 1 has an existing storage deficiency of about 0.7 MG. Coincidentally, the Kingsgate Standpipe which serves the zone, has an existing dead storage volume of about 0.7 MG. The CIP includes an initial pre-design study to evaluate system configurations to utilize the existing dead storage to meet existing demand. Construction of a 700 gpm booster pump station for the storage facility by 2001 is included in the CIP.

To meet future storage requirements, an additional 1.0 MG standpipe located adjacent to the existing facility is recommended by 2010.

Zone 11 (Reintree)

As it is currently operated, Zone 11 has an existing storage deficiency of approximately 0.4 MG. Storage options for the zone include either constructing a new storage facility or operating Zone 11 and Zone 9N as one pressure zone (at 570 feet). Operating the two zones as one zone would allow the two zones to use existing storage in Zone 9N, which is sufficient though 2020. The CIP includes an initial study to evaluate storage options for the zone and the CIP includes construction of a 0.5 MG storage facility by 2001.

Transmission

No improvements to the Wellington and Avondale Transmission mains are recommended.

Distribution

The majority of the distribution improvements are to replace existing 6-inch pipe with 8-, 10-, or 12-inch pipe to improve flows and pressures under fire flow conditions. Since the majority of the 6-inch pipe is asbestos cement, these improvements allow the District to continue its aggressive asbestos cement replacement program.

In addition, the recommended improvements include:

- A parallel 10-inch pipeline from Zone 5 to Zone 4, which will allow the system to provide additional fire flow to a school zone, while maintaining pressures in Zone 4.
- Installation of PRV stations to add source redundancy for two service zones: Zone 8 to Zone 16 and Zone 23 to Zone 17.

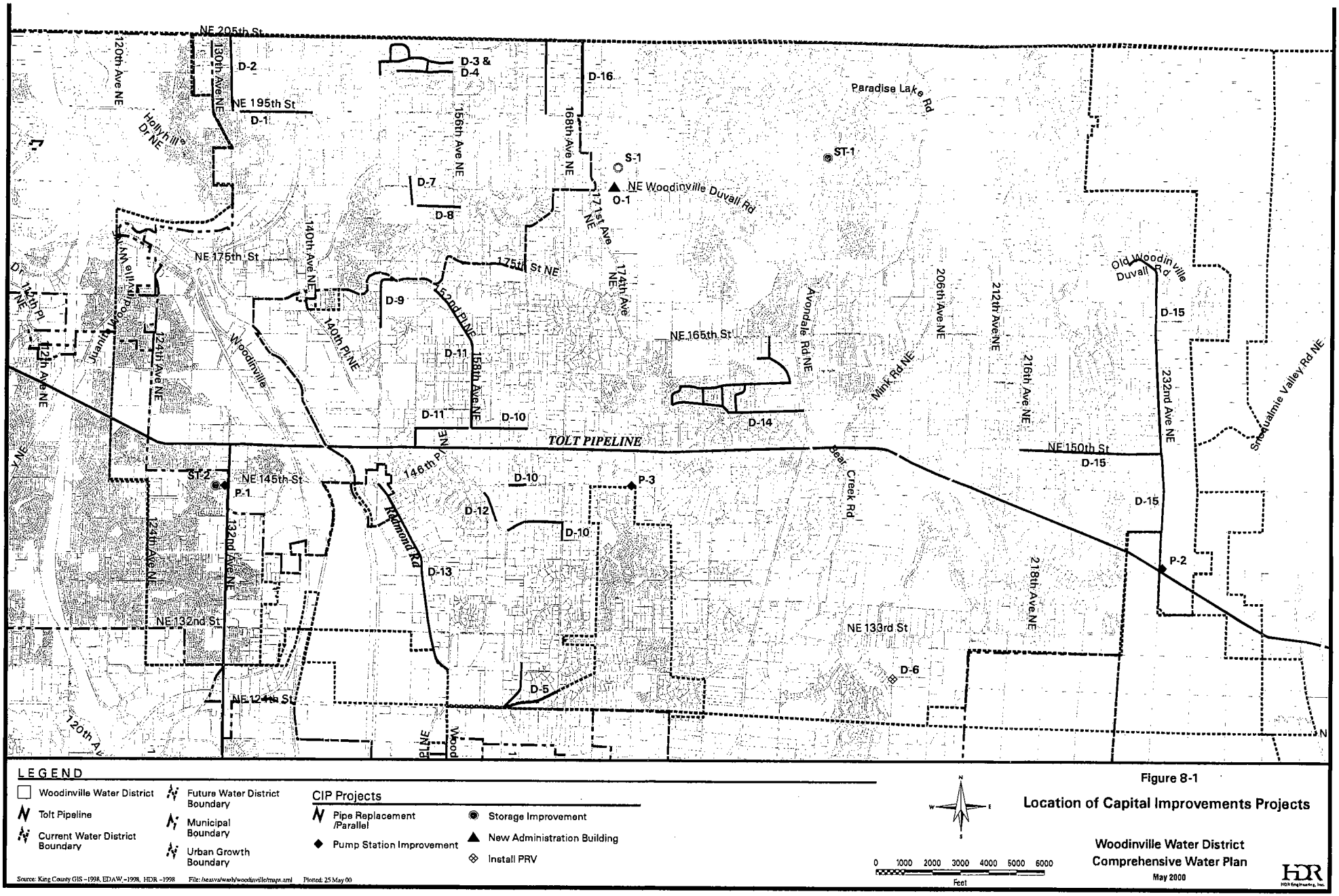
Pumping

Construction of a 700 gpm pump station to utilize the dead storage from the Kingsgate Reservoir is included (additional discussion of this project is presented above under storage) in the CIP.

The District is performing modifications to the Ringhill Pump Station to optimize its operation.

CAPITAL IMPROVEMENT PROJECTS

Figure 8-1 shows the location of the CIP projects. Table 8-1 summarizes the 20-year CIP projects by type (distribution and transmission, storage, and pumping). A summary of the projects and costs by year is provided in Table 8-2.



LEGEND

- Woodinville Water District
- Tolt Pipeline
- Current Water District Boundary
- Future Water District Boundary
- Municipal Boundary
- Urban Growth Boundary

CIP Projects

- Pipe Replacement /Parallel
- Pump Station Improvement
- Storage Improvement
- New Administration Building
- Install PRV

Source: King County GIS - 1998, EDAW - 1998, HDR - 1998 File: /seasva/wash/woodinville/maps.aml Plotted: 25 May 00

0 1000 2000 3000 4000 5000 6000
Feet

Figure 8-1

Location of Capital Improvements Projects

Woodinville Water District
Comprehensive Water Plan
May 2000

HDR Engineering, Inc.

TABLE 8-1
20-YEAR CAPITAL IMPROVEMENT PROGRAM BY PROJECT TYPE
WOODINVILLE WATER DISTRICT

Project ID	Project Year	Project Description	Purpose	1999 Project Cost	Project Year Cost	Project Costs - Funding Sources		
						District Percent	Project Year District Cost	District Present Worth
Source								
S-1	2003	Emergency Ground Water Supply Bring existing ground water well on-line as an emergency supply. Includes sodium hypochlorite feed system.	Provide emergency supply	$ 205,000	$ 236,000	100%	$ 236,000	$ 187,000
S-2	2001	Clearview Transmission Project Construct transmission facilities to transfer Everett Water Treatment Plant supply to the Clearview Reservoir.	Provide alternative source of supply.	$ 2,200,000	$ 2,357,000	100%	$ 2,357,000	$ 2,098,000
S-3	2014	Snohomish River Regional Water Authority Project Develop source as a partner in SRRWA. (Two alternatives under consideration, higher cost alternative is listed).	Provide alternative source of supply.	$ 80,000,000	$ 134,028,000	100%	$ 134,028,000	$ 55,925,000
S-4	2001	Lake Tapps Project Development Study	Provide alternative source of supply.	$ 125,000	$ 134,000	100%	$ 134,000	$ 119,000
S-5	2015	Lake Tapps Project Construction	Provide alternative source of supply.	$ 24,000,000	$ 41,616,000	100%	$ 41,616,000	$ 16,382,000
		Subtotal Source		106,530,000	178,371,000		178,371,000	74,711,000
Distribution and Transmission								

TABLE 8-1
20-YEAR CAPITAL IMPROVEMENT PROGRAM BY PROJECT TYPE
WOODINVILLE WATER DISTRICT

Project ID	Project Year	Project Description	Purpose	1999 Project Cost	Project Year Cost	Project Costs - Funding Sources		
						District Percent	Project Year District Cost	District Present Worth
D-1	2002	Zone 4 Supply Parallel the 10-inch line along NE 195th Street from approximately 142nd Ave NE to 132nd Ave NE with 12-inch DI. (3,375 lf)	Provide additional fire flow for school in Zone 4	$ 365,000	$ 405,000	100%	$ 405,000	$ 340,000
D-2	2005	Zone 4 Distribution System Replace 2,600 lf of 6-inch AC pipe with 8-inch DI along 130th Ave. NE from NE 195th St. to NE 205th St.	AC Replacement; Improve fire flow to northwest portion of service area	$ 211,000	$ 259,000	100%	$ 259,000	$ 183,000
D-3	2002	Feed to PRV 27/AC Pipe Replacement Schedule 3 Replace approximately 6,300 lf of 6-inch AC pipe in Zone 9N with 8- and 10-inch DI in the area circumscribed by NE 201st St., NE 204th St., 149th PL NE and 153rd Ave. NE.	Provide additional fire flow for Zone 5; AC replacement	$ 735,000	$ 815,000	100%	$ 815,000	$ 684,000
D-4	2002	Feed to PRV 27 Replace 450 lf of 6-inch DI with 10-inch DI on 148th Ave. NE from NE 201 St. to NE 202nd St.	Provide additional fire flow for Zone 5	$ 43,000	$ 48,000	100%	$ 48,000	$ 40,000
D-5	2003	Zone 8 Supply Connect Zone 8 (S. English Hill) with Zone 16 (SW Hollywood) with 3,900 lf of 12-inch main: From existing 8-inch main on 164th Ave NE, located just south of NE 132nd St., to NE 124th St., then northeast along NE 124th Way to connect with the existing 8-inch main.	Add source redundancy to Zone 8.	$ 422,000	$ 484,000	100%	$ 484,000	$ 383,000

TABLE 8-1
20-YEAR CAPITAL IMPROVEMENT PROGRAM BY PROJECT TYPE
WOODINVILLE WATER DISTRICT

Project ID	Project Year	Project Description	Purpose	1999 Project Cost	Project Year Cost	Project Costs - Funding Sources		
						District Percent	Project Year District Cost	District Present Worth
D-6	2005	Zone 17 Supply Add PRV to connect Zone 23 to Zone 17.	Provide source redundancy to Zone 17 once Zone 23 system is installed.	$ 23,000	$ 28,000	100%	$ 28,000	$ 20,000
D-7	2010	Zone 7 Distribution System Replace 930 lf of 6-inch AC with 8-inch DI on 151st Ave NE from 170 feet north of NE 182nd Pl. to Wdinville Duvall Rd.	AC Replacement; Improve fire flow	$ 75,000	$ 110,000	100%	$ 110,000	$ 58,000
D-8	2010	Zone 7 Distribution System Replace 1,620 lf of 6-inch CI with 8-inch DI on NE 182nd Pl. from 8-inch pipe located approx. 300 feet west of 157th Ave NE to 151st Ave. NE, and north on 151st Ave NE for 170 feet (to AC pipe).	Improve fire flow to dead-end line	$ 131,000	$ 192,000	100%	$ 192,000	$ 101,000
D-9	2010	Zone 5 Distribution System Replace 2,040 lf of 6-inch AC with 8-inch DI on NE 148th Ave from NE 166th St. to NE 172nd St.	AC Replacement; Improve fire flow	$ 165,000	$ 241,000	100%	$ 241,000	$ 127,000

TABLE 8-1
20-YEAR CAPITAL IMPROVEMENT PROGRAM BY PROJECT TYPE
WOODINVILLE WATER DISTRICT

Project ID	Project Year	Project Description	Purpose	1999 Project Cost	Project Year Cost	Project Costs - Funding Sources		
						District Percent	Project Year District Cost	District Present Worth
D-10	2010	Connection between Zone 9S and Zone 6 Replace 4,600 lf of 6-inch AC pipe that connects Zone 6 and Zone 9S with 10-inch DI: - 168th Ave. NE from NE 141st St. to NE 143rd St. - NE 143rd St. from 168th Ave. NE to 160 PL NE - NE 145th St. from approx. 162nd Ave. NE to 164th Ave. NE - NE 153rd St. from 158th Ave. NE to 164th Ave. NE	Improve connection between zones to better utilize S. Hollywood Reservoir Storage in Zone 6	$ 439,000	$ 641,000	100%	$ 641,000	$ 338,000
D-11	2010	Zone 6 AC Replacement Replace 7,500 lf of 6-inch AC pipe in Zone 6 with 8-inch DI: - From PRV 22, along NE 153rd St. to 158th Ave NE - 158th Ave. NE from NE 153rd St. continuing along 152nd PL NE to PRV 35	AC Replacement; Strengthen Distribution Grid	$ 608,000	$ 888,000	100%	$ 888,000	$ 468,000
D-12	2005	Zone 6 Distribution Grid Complete 8-inch pipe on 160 PL NE from NE 143rd St. to NE 145th St.	Strengthen Distribution Grid	$ 97,000	$ 120,000	100%	$ 120,000	$ 85,000
D-13a	2000	AC Pipe Replacement Schedule 1 Replace approximately 6,000 feet AC pipe with new 8-inch DI pipe along Woodinville-Redmond Road from approximately 136th Ave. NE to NE 145th St.	AC Replacement	$ 275,000	$ 284,000	100%	$ 284,000	$ 268,000

TABLE 8-1
20-YEAR CAPITAL IMPROVEMENT PROGRAM BY PROJECT TYPE
WOODINVILLE WATER DISTRICT

Project ID	Project Year	Project Description	Purpose	1999 Project Cost	Project Year Cost	Project Costs - Funding Sources		
						District Percent	Project Year District Cost	District Present Worth
D-13b	2001	AC Pipe Replacement Schedule 1 See project description above (D-13a). Continue with second year of construction.	AC Replacement	$ 264,000	$ 282,000	100%	$ 282,000	$ 251,000
D-14a	2000	AC Pipe Replacement Schedule 2A Replace approximately 5,300 feet AC pipe with new 8-inch and 10-inch DI pipe along 187th Ave. NE between NE 159th St. and NE 165th St., and along NE 162nd PL between NE 159th St. and NE 165th St.	AC Replacement	$ 328,000	$ 339,000	100%	$ 339,000	$ 320,000
D-14b	2001	AC Pipe Replacement Schedule 2A See project description above (D-14a). Continue with second year of construction.	AC Replacement	$ 314,000	$ 337,000	100%	$ 337,000	$ 300,000
D-15a	2000	AC Pipe Replacement Schedule 4 Replace approximately 14,100 feet AC pipe with new 8-inch and 12-inch DI pipe. Includes approximately 3,600 feet 8-inch pipe along NE 150th Street from about 216th Ave. NE to 232nd Ave. NE, and approximately 10,500 feet of 12-inch pipe along 232nd Ave. NE from approximately NE 149th St. to NE 175th St.	AC Replacement	$ 675,000	$ 699,000	100%	$ 699,000	$ 659,000
D-15b	2001	AC Pipe Replacement Schedule 4 See project description above (D-15a). Continue with second year of construction.	AC Replacement	$ 647,000	$ 693,000	100%	$ 693,000	$ 617,000

TABLE 8-1
20-YEAR CAPITAL IMPROVEMENT PROGRAM BY PROJECT TYPE
WOODINVILLE WATER DISTRICT

Project ID	Project Year	Project Description	Purpose	1999 Project Cost	Project Year Cost	Project Costs - Funding Sources		
						District Percent	Project Year District Cost	District Present Worth
D-16a	2000	AC Pipe Replacement Schedule 5 Replace approximately 5,400 6-inch AC pipe with new 8-inch DI pipe along 166th Ave. NE and 170th Ave. NE between NE 195th St. and NE 203rd St.	AC Replacement	$ 301,000	$ 312,000	100%	$ 312,000	$ 294,000
D-16b	2001	AC Pipe Replacement Schedule 5 See project description above (D-15a). Continue with second year of construction.	AC Replacement	$ 287,000	$ 307,000	100%	$ 307,000	$ 273,000
		Subtotal Distribution		$ 6,405,000	$ 7,484,000		$ 7,484,000	$ 5,809,000

TABLE 8-1
20-YEAR CAPITAL IMPROVEMENT PROGRAM BY PROJECT TYPE
WOODINVILLE WATER DISTRICT

Project ID	Project Year	Project Description	Purpose	1999 Project Cost	Project Year Cost	Project Costs - Funding Sources		
						District Percent	Project Year District Cost	District Present Worth
Storage								
St-1a	2000	Reintree Standpipe - Predesign Study Evaluate options to optimize operation of Zones 11 and 12.		$ 20,000	$ 21,000	100%	$ 21,000	$ 20,000
St-1b	2000	Reintree Standpipe - Design Project dependent on results of Pre-design Study. Cost based on construction of 1.3 MG standpipe	Provide 0.5 MG of effective storage volume in Zones 11 and 12; maintain system pressures when Tolt head is low.	$ 75,000	$ 78,000	100%	$ 78,000	$ 74,000
St-1c	2001	Reintree Standpipe - Construction (see above description)	(see purpose above)	$ 1,254,000	$ 1,343,000	100%	$ 1,343,000	$ 1,195,000
St-2a	2009	Kingsgate Standpipe - Design Additional 1.0 MG of storage adjacent to existing reservoir.	Provide required storage volume	$ 60,000	$ 85,000	100%	$ 85,000	$ 47,000
St-2b	2010	Kingsgate Standpipe - Construction (see above description)	(see purpose above)	$ 965,000	$ 1,408,000	100%	$ 1,408,000	$ 742,000
		Subtotal Storage		$ 2,374,000	$ 2,935,000		$ 2,935,000	$ 2,078,000
Pumping								
P-1a	2000	Kingsgate Pump Station - Pre-design Evaluate system configurations to utilize dead storage from Kingsgate Standpipe	Utilize the dead storage at existing and future Kingsgate Standpipes	$ 20,000	$ 21,000	100%	$ 21,000	$ 20,000
P-1b	2000	Kingsgate Pump Station - Design Project dependent on Pre-design study. Cost based on 700 gpm P.S. with TDH of 100 ft.	(see purpose above)	$ 25,000	$ 26,000	100%	$ 26,000	$ 25,000

TABLE 8-1
20-YEAR CAPITAL IMPROVEMENT PROGRAM BY PROJECT TYPE
WOODINVILLE WATER DISTRICT

Project ID	Project Year	Project Description	Purpose	1999 Project Cost	Project Year Cost	Project Costs - Funding Sources		
						District Percent	Project Year District Cost	District Present Worth
P-1c	2001	Kingsgate Pump Station - Construction (see above description)	(see purpose above)	$ 284,000	$ 304,000	100%	$ 304,000	$ 271,000
P-2	2000	Ringhill Pump Station Control Modifications	Optimize operation of the Ringhill Pump Station	$ 50,000	$ 52,000	100%	$ 52,000	$ 49,000
P-3	2000	South Hollywood Pump Station Construction phase of new pump station.	Utilize the dead storage at South Hollywood Reservoir	$ 334,000	$ 346,000	100%	$ 346,000	$ 326,000
		Subtotal Pumping		$ 713,000	$ 749,000		$ 749,000	$ 691,000
Miscellaneous Projects								
O-1a	2000	New Administration Building Project Construct new administration building, remodel existing building, construct new inventory and storage building.		$ 1,500,000	$ 1,553,000	100%	$ 1,553,000	$ 1,465,000
O-1b	2001	New Administration Building Project See project description above (O-1a). Continue with second year of construction.		$ 3,275,000	$ 3,508,000	100%	$ 3,508,000	$ 3,122,000
		Subtotal Miscellaneous Projects		$ 4,775,000	$ 5,061,000		$ 5,061,000	$ 4,587,000
		Total System Improvements		$ 120,797,000	$ 194,600,000		$ 194,600,000	$ 87,876,000

Cost Estimating Year: 1999
Inflation: 3.5%
Discount Rate: 6.0%

362,391,000 583,800,000 583,800,000 263,628,000
120,797,000 194,600,000 194,600,000 87,876,000

TABLE 8-2
20-YEAR CAPITAL IMPROVEMENT PROGRAM BY YEAR
WOODINVILLE WATER DISTRICT

Project ID	Project Title	1999 Project Cost	Project Year Cost	Project Costs - Funding Sources: District Percent	Project Costs - Funding Sources: Project Year District Cost	Project Costs - Funding Sources: District Present Worth
Year 2003						
S-1	Emergency Ground Water Supply	205,000	236,000	100%	236,000	187,000
D-5	Zone 8 Supply	422,000	484,000	100%	484,000	383,000
	Subtotal Year 2003	$ 627,000	$ 720,000		$ 720,000	$ 570,000
Year 2005						
D-2	Zone 4 Distribution System	211,000	259,000	100%	259,000	183,000
D-6	Zone 17 Supply	23,000	28,000	100%	28,000	20,000
D-12	Zone 6 Distribution Grid	97,000	120,000	100%	120,000	85,000
	Subtotal Year 2005	$ 331,000	$ 407,000		$ 407,000	$ 288,000
Year 2009						
St-2a	Kingsgate Standpipe - Design	60,000	85,000	100%	85,000	47,000
	Subtotal Year 2009	$ 60,000	$ 85,000		$ 85,000	$ 47,000
Year 2010						
D-7	Zone 7 Distribution System	75,000	110,000	100%	110,000	58,000
D-8	Zone 7 Distribution System	131,000	192,000	100%	192,000	101,000
D-9	Zone 5 Distribution System	165,000	241,000	100%	241,000	127,000
D-10	Connection between Zone 9S and Zone 6	439,000	641,000	100%	641,000	338,000
D-11	Zone 6 AC Replacement	608,000	888,000	100%	888,000	468,000
St-2b	Kingsgate Standpipe - Construction	965,000	1,408,000	100%	1,408,000	742,000
	Subtotal Year 2010	$ 2,383,000	$ 3,480,000		$ 3,480,000	$ 1,834,000
Year 2014						
S-3	SRRWA Project	7,300,000	12,230,000	100%	12,230,000	5,103,000
	Subtotal Year 2014	$ 7,300,000	$ 12,230,000		$ 12,230,000	$ 5,103,000
	Total	$ 20,694,000	$ 27,567,000		$ 27,567,000	$ 17,411,000

Project Type: S = Source; D = Distribution; St = Storage; P = Pumping

The purpose of this financial analysis is to summarize Woodinville Water District (District) financial status and evaluate the ability of the District to financially support necessary capital improvements identified in the Capital Improvement Plan (CIP). It also addresses rate and financing options, and potential long-term problems, including both capital and operating requirements. The various sources considered include outside low-interest loan/grant programs, rates, connection charges, and debt financing. Finally, it reviews the District's current rate structure with respect to financial policies and conservation objectives.

FUNDING OPTIONS

The funding options available to the District for capital projects consist primarily of debt mechanisms or cash funding through various user charges. Historically, federal and state grant programs were available for financial assistance; however, these have been mostly eliminated or replaced by loan programs. Remaining miscellaneous grant programs are generally funded lightly and heavily subscribed. Nonetheless, the benefit of even low-interest loans makes the effort of applying worthwhile.

State Funding Programs

State programs identified as potential funding sources for the utility improvements set forth in this comprehensive plan are summarized below:

- **Public Works Trust Fund** - The Public Works Trust Fund (PWTF) is a commonly used, low cost revolving loan fund established in 1985 by the state legislature to provide financial assistance to local governments for public works projects. Eligible projects include repair, replacement, rehabilitation, reconstruction, or improvement of eligible public works systems to meet current standards for existing users. Growth related projects are not eligible.

  PWTF Loans are available at interest rates of .5 percent, 1 percent, and 2 percent, with the lower interest rates given to applicants who pay a larger share of the total project costs. The loan applicant must pay a minimum of 5 percent towards the project cost to qualify for a 2 percent loan, 10 percent for a 1 percent loan, and 15 percent for a .5 percent loan. The useful life of the project determines the loan term up to a maximum of 20 years.

  The applicant must be a local government, such as a city, county, or special purpose utility district, and have an approved long-term plan for financing its public works needs. Local governments must compete for PWTF dollars since more funds are requested each year than are available. The Public Works Board evaluates each application and transmits a prioritized list of projects to the legislature. The legislature then indicates its approval by passing an appropriation from the Public Works Assistance Account to cover the cost of the approved loans. Once the Governor has signed the appropriations bill into law, the local governments receiving the loans are offered a formal loan agreement with the appropriate interest rate and term, as determined by the Public Works Board.

- **Community Economic Revitalization Board** - Managed by the Department of Community Trade and Economic Development, this program provides grants and loans to fund public facilities that result in specific private sector development. Eligible projects include water, sewer, roads, and bridges. Funding varies.

- **Community Development Block Grant (CDBG) Program** - Also administered by the State Department of Community Trade and Economic Development, the CDBG program provides grants and loans for infrastructure improvements, including water projects, for business development that create or retain jobs for low and moderate-income residents.

- **Department of Ecology** - The Department of Ecology Water Quality Financial Assistance Program sponsors four grant and loan programs: the Centennial Clean Water Fund, Federal 319 Programs, State Revolving Fund Loans, and the Aquatic Weeds Grant Programs. While most of the funding goes to wastewater programs, projects such as development and implementation of groundwater and wellhead protection programs are included. Congress has authorized a limited amount of money for the Drinking Water State Revolving Fund (DWSRF) loan specifically for programs to improve water quality. Funding is generally limited to 50 percent and comes in the form of either a grant or low interest loan (0 percent for up to 5-years, increasing to 4.8 percent for 15- to 20-years).

Of these programs, the PWTF is the most attractive program for the District. The emphasis of PWTF loans on replacement and rehabilitation fits well with the District's plan to replace portions of its transmission and distribution system at an estimated cost of $8.3 million over the next 10-years. The District has received a PWTF loan of $1.8 Million for the year 2000 and $3.2 Million for 2001. The District should continue to apply for PWTF loans in the future and the District is eligible for $10 million from the PWTF every two years. In addition, the District should participate at the 15 percent level to receive the .5 percent PWTF loan rate. The benefits of participating at the 15 percent level and receiving the .5 percent rate reduces the overall interest rate on borrowing by 40 basis points or .4 percent versus the District participating at the 5 percent level and receiving a 2 percent interest rate. This calculation assumes the District issues revenue bonds to cover their portion at a net effective interest rate of 6 percent. Translated into dollars, the District would save $4,000 annually for every $1 million of PWTF loans outstanding by participating at the 15 percent level versus the 5 percent level. The economics of this financing strategy hold true until the alternative interest rate, such as that on revenue bonds equals 9.5 percent.

Existing District Funds and Reserves

The District has several funds containing cash and investments. As noted below, most are restricted in their use, or have minimum requirements, which limit or preclude their use for funding capital programs.

- **Construction Fund** - The Construction Fund beginning balance for 2001 is $10,091,793 and is assumed to be available to support project costs. This includes the proceeds of the 1999 bond issue.
- **Rate Stabilization Fund** - The Rate Stabilization Fund balance is $941,943 at the beginning of 2001. This fund is restricted in use to meeting unanticipated or emergency revenue shortfalls and would not normally be available to support capital project costs.
- **Bond Reserve Fund** - The District will have approximately $1,000,000 in its bond reserve fund after the 1999 Bond Issue is distributed in compliance with its bond covenants. These funds must remain in place as required by those bond covenants.

General Facilities Charges/System Development Charges

General Facilities Charges (GFCs) or System Development Charges (SDCs) are sources of funding typically used by utilities to support capital needs. GFCs are a form of connection charges as authorized in the Washington Revised Code 57.08.010. GFCs are imposed on new customers connecting to the system as a condition of service, in addition to any other costs incurred to connect the customer such as meter installation charges. Typically, the basis for the GFC is the capital cost the utility will or has incurred to provide the water system. The underlying premise of the GFC is that growth (i.e. future customers) will pay for growth related costs that would not have been necessary absent the increase in customer base. A ten-year horizon is used to determine the capital facilities necessary to be constructed to serve the projected growth during the same period.

The purpose of the GFC is two-fold: 1) to provide funding sources for capital financing, and 2) to recover an equitable level of investment in the system from new customers. In the absence of such a right-to-connect charge, growth-related costs would be borne, in large part, by existing customers. In addition, the current customers' net investment in the utility would be diluted by the addition of new customers absent a GFC. This dilution would, in effect, be a subsidy to new customers.

Excluding installation expenses, the cost of the system to be recovered by the general facilities charge can be defined in two parts:

- The cost of existing facilities of general benefit, such as storage tanks, transmission mains, etc. In addition, State law allows collection of up to 10-years of interest on the cost of these assets. This cost is net of donated facilities, whether from grants, developers or through ULIDS.
- The cost of future capital facilities. This includes all capital projects funded by the utility for the next ten years based on the current system growth projections. Projects funded by developers or special assessments are not included in this calculation.

The summary calculation of the GFC is displayed in Table 9-1. The current charge is $2,260 for a 5/8" and 3/4" meter. The new charge for a 5/8" and 3/4" meter is $2,625. The primary driver for the increase is due to a $15.8 million increase in net assets from 1998 through 2001. Asset additions include AC main replacements, the Aspenwood Reservoir, and costs-to-date for the District's new administration building. Another factor contributing to a higher charge in 2001 over 1998 is that outstanding debt principal was not deducted from total assets in arriving at the charge. Ordinarily outstanding debt is deducted from the asset base if there is insufficient cash and investments available to pay the debt. In this case the cash and investments exceeded the debt principal outstanding and consequently the debt was not deducted from total assets in arriving at the final charge.

TABLE 9-1
CAPITAL FACILITY CHARGE – CALCULATION SUMMARY

Net Existing Plant (as of 12/31/00) including 2001 CIP	$28,557,889
Accumulated Interest on Existing Plant	$14,278,944
Total Net Assets	$42,836,833
Total Planned Capital Improvements (2002-2011)	$13,708,860
Existing Meter Equivalents	17,199
Projected Future Meter Equivalents	21,538
Net Assets and Improvements	$56,545,693
divided by Total Projected Meter Equivalent	21,538
Capital Facility Charge(5/8" SFR Meter)	**$2,625**

Note: 5/8" Meter is a 1.5 Flow Factor

PROJECTION OF FINANCIAL PERFORMANCE

The projection of financial performance uses the District's existing financial condition as a baseline for projecting future costs and estimating the impacts of recommended improvements and program.

Historical District Financial Performance

The District provides Water and Sewer Service. Table 9-2 shows a consolidated audited income statement of revenues and expenses from 1994 – 1999. The District is providing positive cash flow and well exceeds its bond covenant obligations. Table 9-3 shows the District's Balance Sheet. Again, the District is very financially healthy. Retained Earnings is steadily growing while liabilities are remaining steady.

Basis for Revenue Requirements

The revenue requirements analysis determines that the operating revenues, operating expenses, debt service requirements, and any other identified revenues or expenses necessary to meet the revenue sufficiency tests. Three separate conditions must be met for user charge revenues to be sufficient: periodic cash needs must be met, net earnings must be positive, and the minimum revenue bond debt service coverage requirement must be realized.

The cash flow test identifies cash requirement for the utility in the year addressed. Those requirements can include cash operating and maintenance expenses, debt service, directly-funded capital outlays, and any projected additions to reserves. The total cash needs are then compared to projected utility revenues. Any shortfalls are identified and the level of rate increase necessary to make up the shortfall is estimated.

District policy is for net earnings to be positive. This earning test is similar to the cash flow test with two differences. Any capitalized expenses (revenues) are netted out, but non-cash expenses (e.g. depreciation) are added in. This test is required for the District to fully fund deprecation.

The coverage test is based on the bond covenants for revenue bonds which requires that a specific test of revenue sufficiency be met. This requirement states that revenues must be sufficient to meet operating expenses plus a factor, set at 1.25, times annual debt service on all revenue bond debt issued. The coverage factor adds some protection for bondholders against the risk of poor financial performance. The District may wish to consider maintaining a higher target to enhance or maintain credit worthiness. Coverage targets of 1.50 to 2.0 are common for municipal utilities with this objective.

TABLE 9-2
HISTORICAL INCOME STATEMENT 1994-1999
COMPARATIVE STATEMENT OF REVENUES AND EXPENDITURES
(Fiscal Years Ended December 31)

		1995	1996	1997	1998	1999
Operating Revenue						
Water Service	$4,833,147	$4,610,544	$4,771,080	$4,800,164	$5,862,614	$5,494,661
Sewer Service	1,219,895	1,459,588	1,609,067	1,864,796	1,901,365	1,946,245
Street Lights	127,200	128,724	138,600	114,661	114,959	115,078
Other Revenue	26,908	28,598	26,804	74,043	50,345	55,175
Total Operating Revenue	6,207,150	6,227,454	6,545,551	6,853,664	7,929,283	7,611,159
Operating Expenses						
Water Purchased	1,434,396	1,514,590	1,670,936	1,732,008	2,514,322	2,136,733
Metro Charges	759,554	878,136	1,104,867	1,223,192	1,368,824	1,356,591
Power for Street Lights	109,692	112,276	115,207	93,209	89,883	88,796
Personnel Expense	1,194,715	1,224,408	1,342,619	1,382,240	1,516,306	1,703,467
Plant Expense	708,528	603,329	626,772	781,972	742,449	903,106
Professional Services	140,858	105,085	130,223	148,877	133,948	132,007
Depreciation and Amortization	1,205,396	1,235,512	1,356,380	1,422,069	1,602,714	1,649,511
Total Operating Expenses	5,553,139	5,673,336	6,347,004	6,783,567	7,968,446	7,970,211
Net Income from Operations	654,011	554,118	198,547	70,097	-39,163	-359,052
Other Revenue						
Investment Interest	398,725	627,998	712,539	771,835	815,986	867,573
Misc. Revenue	74,501	35,361	39,315	170,600	-10,749	19,087
Total Other Revenue	473,226	663,359	751,854	942,435	805,237	886,660
Other Expense						
Other Interest Expense		214	18		13,254	45,434
Amortization of Debt Discount	13,715	12,813	12,813	12,812	12,813	13,718
Loss on Abandoned Assets			505,014			
Loss on Early Extinguishment of Debt	528,141					
Total Other Expenses	541,856	13,027	517,845	12,812	26,067	59,152
Net Income	**$585,381**	**$1,204,450**	**$432,556**	**$999,720**	**$740,007**	**$468,456**
Add: Depreciation	1,205,396	1,235,512	1,356,380	1,422,069	1,602,714	1,649,511
Add: Connection Fees	912,184	614,285	548,871	995,531	1,093,558	628,157
Add: Loss on Abandoned Assets and Early Debt Extinguishment	528,141		505,014			
Funds Available to Pay D/S on Parity Bonds	$3,231,102	$3,054,247	$2,842,821	$3,417,320	$3,436,279	$2,746,124
Debt Service on Parity Bonds	$865,014	$754,720	$844,640	$849,390	$835,590	$636,577
Debt Service Coverage	3.74	4.05	3.37	4.02	4.11	4..31

TABLE 9-3
COMPARATIVE BALANCE SHEET 1994-1999

	1994	1995	1996	1997	1998	1999
ASSETS						
Utility Plant - net	$40,734,585	$42,379,499	$42,976,784	$46,481,804	$48,716,603	$49,963,587
Restricted Assets						
Cash	7,326,760	7,939,226	9,665,294	11,290,152	12,111,299	17,931,293
Accounts Receivable	24,065	19,207	22,652	18,636	15,587	14,279
Interest Receivable	49,398	0	7	57,463	58,022	89,814
Assessments Receivable	304,224	229,849	131,552	82,365	52,330	26,447
Total Restricted Assets	$7,704,447	$8,188,282	$9,819,505	$11,448,616	$12,237,238	$18,061,833
Current Assets						
Cash & Investments	3,199,975	3,095,518	2,914,051	3,549,700	2,104,468	1,875,442
Accounts Receivable	816,815	936,507	897,746	52,674	1,012,742	1,049,965
Interest Receivable	17,744	42,857	4	13,812	11,288	9,898
Inventory & Prepaid Expenses	90,493	76,153	73,854	97,080	69,557	128,922
Due From Developers	42,834	21,231	27,107	5,164	1,616	8,923
Total Current Assets	$4,167,861	$4,172,266	$3,912,762	$3,718,430	$3,199,671	$3,073,150
Other Assets						
Investment in Deferred Compensation Plan	188,957	256,862	435,794	794,357	0	0
Unamortized Discount on Debt	128,125	115,313	102,500	89,688	76,875	169,996
Deferred Excise Tax Credits	124,410		7,360	2,861	1,980	2,389
Total Other Assets	$441,492	$372,175	$545,654	$886,906	$78,855	$172,385
Total Assets	**$53,048,385**	**$55,112,222**	**$57,254,705**	**$62,535,756**	**$64,232,367**	**$71,270,955**
LIABILITIES AND FUND EQUITY						
Equity						
Contributions in Aid of Construction	$39,835,473	$41,232,331	$43,173,890	$46,891,269	$49,572,699	$51,354,800
Appropriated Retained Earnings	571,773	596,464	649,931	686,330	727,808	654,294
Unappropriated Retained Earnings	6,754,382	7,864,169	8,118,464	9,003,105	9,701,634	10,243,604
Total Equity	$47,161,628	$49,692,964	$51,942,285	$56,580,704	$60,002,141	$62,252,698
Long Term Debt						
Public Works Trust Fund Loan	$0	$208,050	$415,605	$883,404	$979,031	$1,119,163
Revenue Bonds Outstanding	4,465,000	3,790,000	3,090,000	2,380,000	1,835,000	6,405,000
Total Long Term Debt Outstanding	$4,465,000	$3,998,050	$3,505,605	$3,263,404	$2,814,031	$7,524,163
Liabilities from Restricted Assets						
Accounts Payable	$130,563	$162,859	$50,278	$267,316	$72,346	$295,987
Retainage Payable	4,253	17,218	341	14,061	54,499	19,826
Accrued Interest	99,056	90,220	79,201	67,039	57,992	101,282
Public Works Trust Fund Loans	0	0	10,950	96,951	106,061	123,751
Revenue Bonds	660,000	675,000	700,000	710,000	545,000	430,000
Liabilities From Restricted Assets	$893,872	$945,297	$840,770	$1,155,367	$835,898	$970,846
Current Liabilities						
Accounts Payable	$189,624	$166,968	$307,840	$484,201	$351,800	$279,540
Accrued Vacation and Sick Leave	70,630	83,575	119,072	148,443	168,082	187,155
Developer Extension Agreements	78,674	77,413	103,339	93,095	60,415	43,096
Other Current Liabilities	0	0	0	16,186	0	13,457
Total Current Liabilities	$338,928	$327,956	$530,251	$741,925	$580,297	$523,248
Other Liabilities						
Deferred Compensation	188,957	256,862	435,794	794,537	0	0
Total Liabilities and Equity	**$53,048,385**	**$55,221,129**	**$57,254,705**	**$62,535,937**	**$64,232,367**	**$71,270,955**

Source: Woodinville 1999 Revenue Bond Statement / 1999 Washington State Auditor's Report

Forecast Assumptions

The District provided its 1999 audited financial statements, 2000 draft financial statements, and current projections for 2001 revenues and expenses. A number of forecast assumptions are used in the analysis including:

- Revenue is calculated to increase with growth for future years. The growth assumptions are consistent with the growth assumptions published by the Puget Sound Regional Planning Council (PSRPC).
- Most future expenses are projected using an inflation rate of three percent. The major exception is the cost of Seattle wholesale water. Established SPU water rates are used to project the District's wholesale water costs through 2002. After 2002 through 2011 water costs are increased by inflation plus customer growth. The growth factor is increased by 25 percent to reflect that "new" customers connecting to the District's system will be served by "new water" at an additional cost under the current Seattle contract. From 2012 through 2014 water is purchased from Seattle Water for twice the prevailing rate. After 2014 wholesale water is purchased through the Snohomish River Regional Water Authority (SRRWA) (see the section called Long Term Supply Financing).
- A Capital Improvement Program that will invest $13.7 million in the District's infrastructure over the next 10-years is included in the computation of the Capital Facility Charge (GFC). The District issued $5 million in bonds in 1999 and will receive $5 million Public Works Trust Fund Loans in 2000 and 2001 to help cover these expenses. The SRRWA and Lake Tapps capital projects have been included in the forecast after the GFC planning horizon with the assumption that funding will be provided by issuing debt.
- An average inflation rate of three percent and a fund earnings rate of five percent are also assumed in the analysis.

Capital Financing Strategy

Table 9-4 shows the projected sources of revenue that the District will use to fund its proposed Capital Improvement Program. The District issued $5,000,000 in Revenue Bonds in 1999 and will receive a total of $5 million in Public Works Trust Fund Loan proceeds over the next two years. These debt issues along with existing reserves should enable the District to finance its Capital Program without difficulty.

TABLE 9-4
CAPITAL PROJECTS FINANCING

	2000	2001	2002	2003	2004	2005	2006
Capital Projects to be Financed	$3,731,000	$9,265,000	$1,268,000	$720,000	$0	$407,000	$0
Connection Charges	$425,323	$690,502	$1,268,000	$720,000	$0	$407,000	$0
Rates		$464,954	$0	$0	$0	$0	$0
Use of Capital Reserves		$1,103,531	$0	$0	$0	$0	$0
Debt Financing (*)	$3,305,677	$7,006,013					

** Includes 1999 Bond and 2000 and 2001 PWTF Loans*

Long Range Projected Revenue Requirements

This analysis shows that wholesale water costs will be the major driver for Woodinville Water District rate increases until 2014. After 2014 the major drivers are the debt service cost related to the SRRWA and Lake Tapps capital projects. Figure 9-1 shows the correlation between projected wholesale water costs and projected Woodinville user rates.

FIGURE 9-1
CUMULATIVE RATE INCREASES

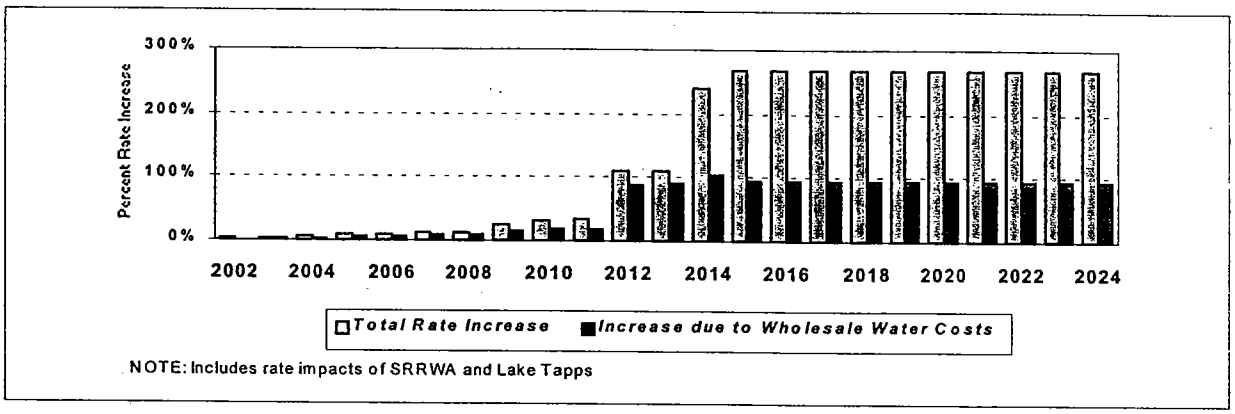
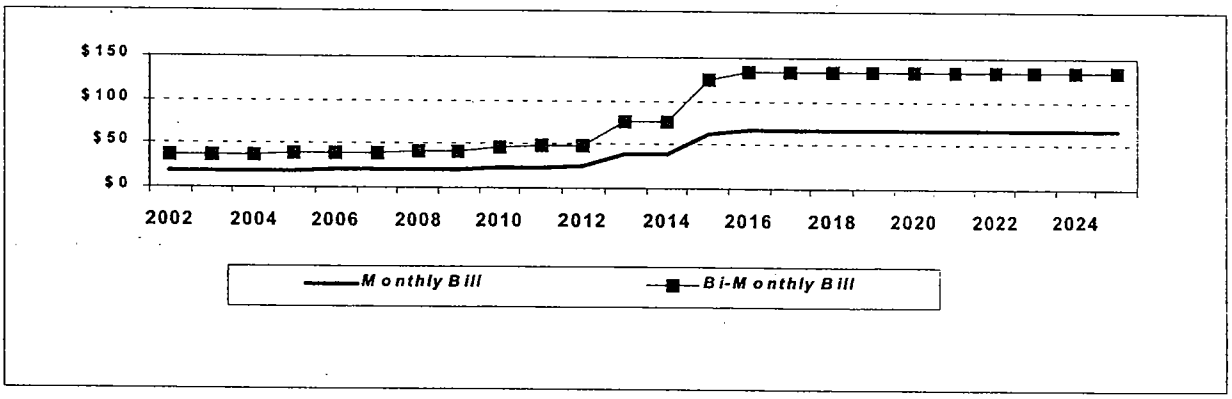


Figure 9-2 shows the impact on a typical single family residence bill from these projected rate increases.

FIGURE 9-2
SINGLE FAMILY RESIDENCE MONTHLY AND BI-MONTHLY BILL



Long Term Supply Financing

Figure 9-1 shows cumulative rate increases through 2025 with wholesale water costs based on the assumption that Woodinville Water District will participate in the Snohomish River Regional Water Authority (SRRWA) in 2015 and wholesale water payments to Seattle Water will be consistent with Scenario 1 as outlined below. This also assumes Seattle's continued willingness to supply all of the District's needs.

The SRRWA project is expected to provide Woodinville Water District with 11 million gallons of water per day at a cost of $134 million in 2015 ($86 million in 2001 dollars) plus $2.8 million in O&M Costs ($1.8 million in 2001 dollars).

This delay puts Woodinville in a difficult situation in contract negotiations with SPU. Woodinville will totally rely on SPU supply until the SRRWA is operational in about 2015 and will need SPU supply for its peak days even with SRRWA fully operational. Seattle may not offer favorable terms to Woodinville upon the contract extension which provides both a supply commitment and an option to terminate or greatly reduce demands when SRRWA is available. The following two scenarios illustrate the possible effect of negotiated outcomes with Seattle.

The two scenarios are used to illustrate potential adverse outcomes. It may be possible to avoid all or some of these impacts, depending on the outcome of negotiations with Seattle. The two scenarios are:

- Scenario 1 - SPU supplies the District with necessary capacity until SRRWA is operational in 2015. This scenario assumed that in return for this commitment, the District pays a rate comparable to marginal water costs, or roughly double the prevailing rate. Beginning in 2015, the District would buy peak water from SPU at that same higher rate, but maximize the use of SRRWA to meet its needs.
- Scenario 2 - Same as Scenario 1, except that Seattle requires "take or pay" provision which allow annual reductions in demand over a 10-year period (10 percent per year). This may be required to protect Seattle customers from the impact of the revenue loss.

Figure 9-3 compares Scenario 1 to SRRWA and CWA options. The figure illustrates the annual water cost to the District under a scenario whereby SPU doubles the cost of Woodinville from 2012 until 2015 when the SRRWA would come on line. It is anticipated that SPU would charge a high premium to give Woodinville the option of walking away from its contract in 2015. In 2015, Woodinville would be buying just peak water from Seattle but would also have to pay the $10 million a year in debt service plus approximately $3 million a year in O&M costs for SRRWA. However, in 2030 the SRRWA would become less costly than Seattle water and in 2035, when the debt service ends, the cost of water to Woodinville customers would be much less than buying water from Seattle.

FIGURE 9-3
SUPPLY COSTS – SRRWA SCENARIO 1

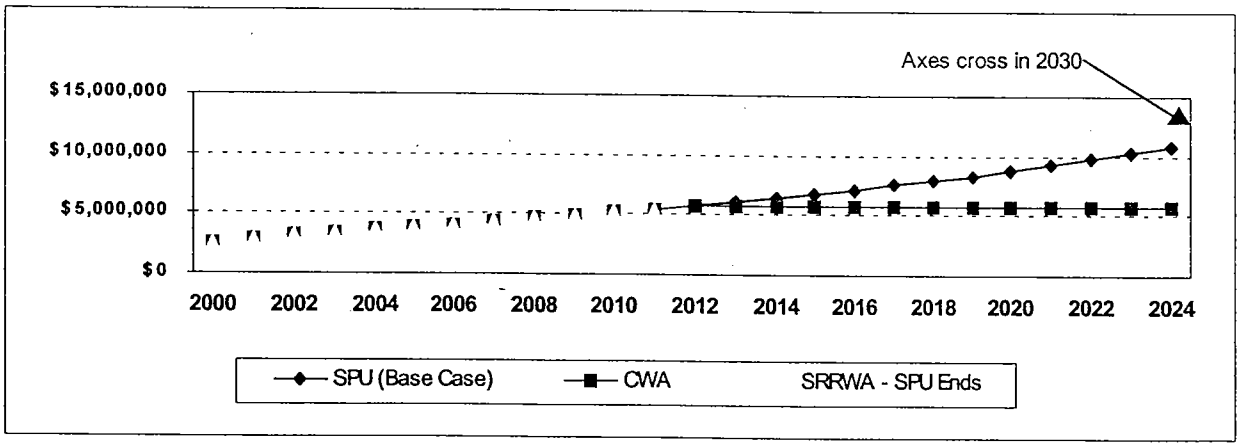
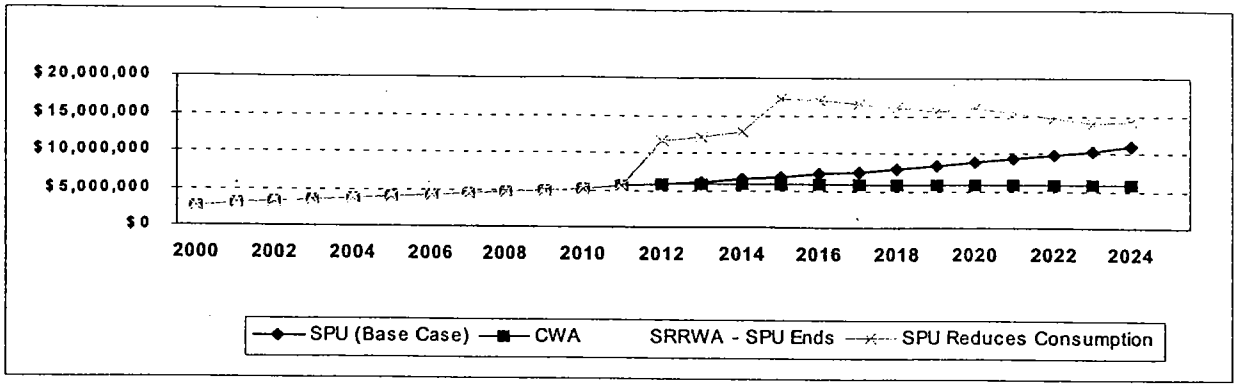


Figure 9-4 shows the same wholesale water supply costs as Scenario 1. However, Figure 9-4 also illustrates the financial implications if Seattle doubles the price of water in 2012 and then starting in 2015 allows Woodinville to purchase 10 percent less per year for 10-years as a way to slowly withdraw from the regional system. In 2027, the axes cross and the SRRWA becomes more cost efficient for Woodinville. Again, Woodinville would have the debt paid off in 2035, and the system would just need to recover O&M costs to operate.

FIGURE 9-4

SUPPLY COSTS- SCENARIO 2



Long Term Supply Summary

The scenarios above are not meant to suggest which supply options the District commissioners are to pursue but to show the financial impacts of the source options as well as the timing impacts of those options. These illustrations are meant to show a worst case scenario of potential choices that the District commissioners will have to decide on in the future. The charts also do not project the financial implications past 2025. The debt for the SRRWA will be paid off at some point, and at the time, it will be a much more cost effective resource than purchases from the Seattle system.

The financial impact of pursuing independent supply sources can be mitigated through various means, including the use of longer term debt, sale of surplus water (when available) to other agencies, and the use of grants or loans. Most importantly, the District must address supply from Seattle beyond contract termination in 2011. The above scenarios describe potentially adverse circumstances, while potentially beneficial circumstances may also exist. The critical issues when negotiating an extended water commitment from Seattle include:

- A "bridge" supply from 2012 until SRRWA is operational.
- Ability to reduce supply commitment and payment when SRRWA is operational.
- Flexibility on SRRWA availability date.
- Cost and rate structure.
- Hold harmless conditions, such as take or pay provisions.
- Continued capacity commitment for needs beyond SRRWA capacity, such as peak periods.
- Wheeling or transfer ability of Seattle commitment.
- Access to other new "regional" resources.

Rate Structure

Woodinville Water District has essentially kept the same rate structure since 1992. The structure was put in place in 1992 in response to droughts and shortages that occurred that year. The Commissioners modified the structure in 1999 by increasing the volume charge and adding a fourth block to send a stronger conservation signal to their customers.

The current rate structure has four blocks for its bimonthly residential bills (see Table 9-5), with each block costing more per unit than the previous block. For example, a customer will currently pay, under the new rates, $1.85 for their 10th CCF for the bimonthly bill but will pay $4.30 per CCF for the 52nd CCF they use in that period.

TABLE 9-5
SINGLE FAMILY RESIDENCE BLOCK STRUCTURE CHANGE

	0 – 12 CCF	13 – 25 CCF	28 – 50 CCF	Over 50 CCF
2001 Structure	$1.75	$2.55	$3.35	$4.15
2002 Structure	$1.85	$2.65	$3.45	$4.30

The 2002 projected charges for non-residential customers is a volume charge of $2.25 per CCF for usage up to their winter average and $2.60 per CCF for water usage over their winter average. For billing purposes, the winter average is determined by evaluating the customers' actual water usage as metered during the winter months.

Some examples of possible rate structure enhancements that the District commissioners could consider in the future:

- Smaller blocks to further encourage conservation. This would force more usage into the higher "more expensive" blocks. The District Board of Commissioners generally does not consider this to be a viable option.
- Adjusting the residential structure to one more based on each residence average winter usage, similar to the commercial basis. The District could charge customers a certain price for their winter average or some fraction there of, and then establish a series of usage blocks of fixed size which begin at the benchmark volume.
- Developing a pattern-based rate structure. This structure would have a conservative user discount and actively reward customers that use less water. Examples of this program could include sending a rebate check at the end of the year if the customer met certain conservation goals or having an automatic adjustment on their bills to reward them if their usage history conforms to some targeted pattern. Additional studies may be required to implement a pattern-based rate structure.