CHAPTER 8

Improvement Program

CHAPTER 8

Improvement Program

In previous chapters, projections of future water demands were developed and used to analyze the existing water system. The analyses identified where it will be necessary to improve and expand the existing facilities and system to provide adequate service to current and potential customers. These improvements were evaluated and prioritized based on the District's criteria, discussed in Chapter 3. These criteria include health standards, land use, quantity, reliability, regional effects, environmental effects, flexibility, implementation, life expectancy, and risk. This chapter presents the estimated cost and schedule for implementation for each of the preferred alternatives previously identified.

8.1 Capital Cost Estimate Development

Construction costs presented for the projects included in the Capital Improvement Program (CIP) are order-of-magnitude estimates based on first quarter 2000 dollars. Order-of-magnitude is defined as an approximate estimate based on typical industry experience for similar work but made without detailed design-level data. Because all costs are provided in first quarter 2000 dollars, future costs must be adjusted to account for the effects of inflation and market conditions at the actual time of construction. The cost adjustments at the time of construction can be made using the *Engineering News-Record* (ENR) Construction Cost Index or similar methods. The March 2000 ENR Index of 7151 was used to prepare these estimates.

The costs for the improvement program were prepared to serve as a guide for project evaluation, funding, and implementation from the information available at the time of the estimate. The cost information was developed from a combination of recent bids on construction projects, cost curves, scale-up and scale-down factors, and size and cost comparisons with similar projects. These estimates reflect the costs for typical water system construction conditions, but should be adjusted for extraordinary costs, such as street under-crossings, deep or difficult trenching, and similar items. The final costs of the water system improvement projects will vary from the estimates because they depend on actual labor and materials costs, actual site conditions, productivity, competitive market conditions, final project scope, final project schedule, final design details, and other variables. Therefore, funding needs must be carefully reviewed before making specific decisions or establishing final budgets.

The project costs presented for each of the projects in the improvement program include:

- 30 percent contingency (for unknowns not yet identified at this level of engineering)
- 20 percent for mobilization of the contractor, allowance, general requirements, temporary facilities, bonds, and insurance.
- 8.6 percent sales tax

- 31 percent allowance for engineering, legal, and District administrative expenses

The complete cost estimate methodology is presented in Appendix W.

8.2 Capital Improvement Projects

The capital improvements projects are organized into the following six categories:

- Supply
- Conveyance
- Reservoirs
- Pump Stations
- Treatment Stations
- General

The following sections provide brief descriptions of each project or group of projects and identify the projects with the letter and number designation listed in the Capital Improvement Program presented in Table 8-1. Note that the construction of some of the projects depends on which supply alternative is implemented, as indicated by the shading at the left side of the table. Figure 8-1 provides a schematic of each capital project within the District service area.

8.2.1 Supply (S)

As discussed in Chapter 4, the District has chosen to proceed with three alternative sources of supply. In summary, the three alternative sources are:

- **Alternative #1**—Continued use of groundwater to supply the service area. This is the District's preferred source alternative. New water rights are required for Well 9 (S2) and Well 15 (S3). Costs associated with drilling and well pumps are attributed to this alternative.

- **Alternative #4**—Connection to the Issaquah Regional Pipeline, which will be constructed from Bellevue to Issaquah and convey surface water from Seattle Public Utilities (S1). The District will require a large portion of the capacity this line will carry and will connect at the south end of the service area near Well 9. Surface water and groundwater will be combined throughout the service area. Costs associated with connecting to the regional pipeline are included with this supply alternative.

- **Alternative #18**—Connection to the Issaquah Regional Pipeline at the south end of the District near Well 9, consistent with Alternative #4 (S1). With Alternative #18, portions of the District will be isolated and supplied only groundwater; the remaining service area will receive a blend of surface water and groundwater. This alternative includes costs associated with connecting to the Issaquah Regional Pipeline.

A fourth supply alternative, Alternative #3, was evaluated but no costs associated with capital facilities were included in the program. This alternative considers connecting to the regional system located to the north of the District. A routing study (G7) is designated for this alternative and is included in Section 8.3.6, General Programs.

TABLE 8-1

Capital Improvements Program Cost and Schedule

	#1	#3	#4	#18	Project	Description	Finance Source	2000	2001	2002	2003	2004	2005	2006 to 2015	Total
Supply															
S1					Issaquah 24" Pipeline connection at Well 9	Regional water from the City of Seattle via the I-90 24" pipeline connection at Well 9	District funds/[(a)] regional funding			$2,000,000	$9,500,000			$14,800,000	$26,300,000
S2					Well 9	New well pump	District funds			$370,000	$600,000				$970,000
S3					Well 15	New well and recharge facility, pump, and building	District funds			$328,500	$985,500				$1,314,000
S4					Regional Pipeline from the north	Regional water from Tolt Pipeline to connect into north end of Plateau Zone (45,000' of 30")	District funds			$4,207,500	$4,207,500	$4,207,500	$4,207,500		$16,830,000
					Sub-Total Supply Improvements for Alt #1			**$0**	**$0**	**$698,500**	**$1,585,500**	**$0**	**$0**	**$0**	**$2,284,000**
					Sub-Total Supply Improvements for Alt #3			**$0**	**$0**	**$4,207,500**	**$4,207,500**	**$4,207,500**	**$4,207,500**	**$0**	**$16,830,000**
					Sub-Total Supply Improvements for Alts #4 and #18			**$0**	**$0**	**$2,000,000**	**$9,500,000**	**$0**	**$0**	**$14,800,000**	**$26,300,000**
Conveyance Systems															
C1					North 650 and 550 Pipeline (Sec. 36)	Pipeline required to convey water to and from the Sec. 36 PS and Tank (550 and 650 Zones) (1086' of 20" for 550 Zone) (807' of 16" for 650 Zone)	District funds/ developer contributions	$150,250	$450,750						$601,000
C2					South 650 Pipeline (Sec. 36)	Pipeline required to convey water to and from the Sec. 36 PS and Tank (650 Zone) (6300' of 24") to Trossachs Boulevard	District funds	$428,250	$1,284,750						$1,713,000
C3					254th Ave, from NE 8th to Main (Sec. 36)	Pipeline needed to connect existing piping to Sec. 36 and Tank (550 Zone) (1175' of 16")	District funds			$35,250	$105,750				$141,000
C4					Main St, 258th to Section 36 (Sec. 36)	Pipeline needed to connect existing piping to the Sec. 36 PS and Tank (650 Zone) (1600' of 16")	District funds	$48,000	$144,000						$192,000
C5					SE 24th, between 239th Pl SE and 240th Pl SE	Needed to connect existing lines under culvert (200' of 12")	District funds		$24,000						$24,000
C6					228th, from SE 8th to Issaquah Pine Lake Rd	Upgrade of existing 12" to 24" during road improvement work (7000' of 20")	District funds	$1,646,000							$1,646,000
C7					228th, from Issaquah Pine Lake Rd to SE 43rd	Upgrade of existing 12" to 24" during road improvement work (5200' of 24")	District funds	$1,430,000							$1,430,000
C8					228th, from SE 43rd to SE 46th	Installation of new pipe between 2-MG and 7-MG Tanks (2200' of 24")	District funds							$608,000	$608,000
C9					228th, from SE 46th to SE 48th	Installation of new pipe between 297 Tank and 7-MG Tank (2000' of 24")	District funds					$134,250	$402,750		$537,000
C10					East Lake Sammamish Pkwy, SE 56th to Issaquah Fall City Road	Large-diameter pipe needed to convey new water right or regional water from Well 9 (3400' of 30")	District funds			$312,500	$937,500				$1,250,000
C11					SE 4th at 236th connection to Well 4	Pipe to connect Sec. 36 Tank (550) with Well 4 550 to 650 Zone Booster (3500' of 16")	District funds				$105,750	$317,250			$423,000
C12					From the Intersection of SE 43rd and East Lake Sammamish Pkwy to the 43rd St PS	Large-diameter pipe needed to convey new water right or regional water from Well 9 (2500' of 16")	District funds							$290,000	$290,000
C13					South of SE 43rd along East Lake Sammamish Pkwy	Large-diameter pipe needed to convey new water right or regional water from Well 9 (1260' of 16")	District funds							$241,000	$241,000
C14					SE 44th Wy, 230th SE to Issaquah Pine Lake Rd	Pipeline connected to the 7-MG Tank supplying the 650 Zone (2150' of 12")	Developer contributions		$80,750	$242,250					$323,000
C15					230th Wy SE, SE 44th to SE 47th	Pipeline connected to the 7-MG Tank supplying the 650 Zone (1200' of 8")	Developer contributions	$45,500	$136,500						$182,000
C16					SE 46th Pl, 228th SE to 230th SE	Pipeline connected to the 7-MG Tank supplying the 650 Zone (1400' of 16")	District funds							$255,000	$255,000
C17					NE 8th St along future 244th Ave NE alignment to Main St	Pipeline connecting 16" 550 Zone pipe along Main St. to NE 8th through new developments (3460' of 12")	District funds							$519,000	$519,000
C18					NE 8th St along future 250th Ave NE alignment to Main St	Pipeline connecting 16" 550 Zone pipe along Main St. to NE 8th through new developments (3100' of 12")	District funds	$116,250	$348,750						$465,000
C19					228th Ave SE between SE 8th and NE 8th	Main replacement as part of road-widening project (5400' of 24")	District funds		$371,250	$1,113,750					$1,485,000
C20					From the intersection of NE 8th and 244th Ave SE to Section 36 reservoirs	7000' of 24" pipeline (must be online when north pipeline is connected)	District funds			$481,250	$1,443,750				$1,925,000
C21					From the intersection of NE 8th and 244th Ave SE to the intersection of 288th Ave SE and Main Street	8000' of 24" pipeline (connects the regional pipeline to the 650 Zone)	District funds					$550,000	$1,650,000		$2,200,000
					Sub-Total Conveyance System Improvements for Alts #1, #4, and #18			**$3,864,250**	**$2,840,750**	**$1,703,750**	**$1,149,000**	**$451,500**	**$402,750**	**$1,913,000**	**$12,325,000**
					Sub-Total Conveyance System Improvements for Alt #3			**$3,864,250**	**$2,840,750**	**$1,872,500**	**$1,655,250**	**$867,250**	**$1,650,000**	**$1,127,000**	**$13,877,000**

[(a)] This financing schedule assumes the District can defer payment on a portion of the pipeline until 2008, with interest as discussed in Chapter 9. There are no agreements in place yet for this financing structure.

TABLE 8-1 (Continued)

Capital Improvements Program Cost and Schedule

	#1	#3	#4	#18	Project	Description	Finance Source	2000	2001	2002	2003	2004	2005	2006 to 2015	Total
Reservoirs															
R1	■	■	■	■	Cascade View Tank	Tank required for buildout storage volume	District funds	$72,000	$408,000						$480,000
R2	■	■	■	■	Section 36 Tank	Includes tank site stormwater detention and piping, property transaction, tank site and access road, landscaping/restoration, land appraisal, and permit costs	District funds	$1,162,500	$3,487,500						$4,650,000
R3	■	■	■	■	Contingency Tank Site	Site acquired on contingency to give District future flexibility	District funds		$750,000						$750,000
R4	■	■			10 MG tank		District funds			$1,637,324	$4,911,972				$6,549,296
	■	■			**Sub-Total New Reservoirs - Alts #1 & #3**			**$1,234,500**	**$4,645,500**	**$1,637,324**	**$4,911,972**	**$0**	**$0**	**$0**	**$12,429,296**
			■	■	**Sub-Total New Reservoirs - Alts #4 & #18**			**$1,234,500**	**$4,645,500**	**$0**	**$0**	**$0**	**$0**	**$0**	**$5,880,000**
Pump Stations															
P1	■	■	■	■	550 to 650 2-mgd PS (upgrade Well 4 booster)	PS required to convey 550 Zone Water to the 650 Zone	District funds	$240,000							$240,000
P2	■	■	■	■	Cascade View PS - 2 mgd	PS needed to boost water out of the new Cascade View Well 12 Tank	District funds	$108,100	$612,900						$721,000
P3	■	■	■	■	Section 36 4.5-mgd Booster Station	Includes Trailhead Stormwater Detention Pond and Beaver Dam Trailhead/Parking Lot	District funds	$512,500	$1,537,500						$2,050,000
P4	■		■	■	297 PS - 2-mgd Upgrade	Redundant pump needed at 297 PS	District funds			$62,500	$187,500				$250,000
P5	■		■	■	43rd St PS - 2.6-mgd	Redundant pump needed at 43rd St PS	District funds							$950,000	$950,000
P6			■	■	297 PS - 2-mgd Upgrade	Additional 2-mgd capacity needed at 297 BS under buildout conditions for Alts #4 and #18	District funds							$240,000	$240,000
P8		■		■	Section 36 2-mgd Upgrade and Reconfiguration	Additional 2-mgd capacity needed at Section 36 under Alt #3 and #18	District funds							$750,000	$750,000
P9		■			6 mgd PS at 228th/Main	Pump Station to convey Regional Supply to the 650 Zone								$1,350,000	$1,350,000
P10		■			6.5 mgd PS at 10 MG tank	Pump Station needed to supply at grade storage in the 10 MG Tank to the 650 Zone				$365,000	$1,095,000				$1,460,000
	■				**Sub-Total PS Improvements - Alt #1**			**$860,600**	**$2,150,400**	**$62,500**	**$187,500**	**$0**	**$0**	**$950,000**	**$4,211,000**
		■			**Sub-Total PS Improvements - Alt #3**			**$860,600**	**$2,150,400**	**$365,000**	**$1,095,000**	**$0**	**$0**	**$2,100,000**	**$6,571,000**
			■		**Sub-Total PS Improvements - Alt #4**			**$860,600**	**$2,150,400**	**$62,500**	**$187,500**	**$0**	**$0**	**$1,190,000**	**$4,451,000**
				■	**Sub-Total PS Improvements - Alt #18**			**$860,600**	**$2,150,400**	**$62,500**	**$187,500**	**$0**	**$0**	**$1,940,000**	**$5,201,000**
Treatment Systems															
T1	■	■	■	■	Well 1	Chlorination	District funds			$23,000	$70,000				$93,000
T2	■	■	■	■	Well 2	Chlorination and Manganese Sequestering	District funds			$31,000	$92,000				$123,000
T3	■	■	■	■	Well 2R	Corrosion Control, Well House, and Piping	District funds[(b)]	$50,000	$500,000						$550,000
T4	■	■	■	■	Well 4	Chlorination and Manganese Sequestering	District funds			$43,000	$128,000				$171,000
T5	■	■	■	■	Well 7	Chlorination (T5 and T6 can be combined)	District funds			$25,000	$75,000				$100,000
T6	■	■	■	■	Well 8	Chlorination (T5 and T6 can be combined)	District funds			$25,000	$75,000				$100,000
T7	■				Well 9	Chlorination	District funds			$50,000	$150,000				$200,000
T8	■	■	■	■	Well 10	Chlorination	District funds			$23,000	$70,000				$93,000
T9	■	■	■	■	Well 11	Chlorination and Manganese Sequestering	District funds			$76,000	$228,000				$304,000
T10	■	■	■	■	Well 12	Chlorination	District funds			$39,000	$116,000				$155,000
T11	■	■	■	■	Well 13	Chlorination	District funds			$30,000	$89,000				$119,000
T12	■	■	■	■	Well 14	Chlorination	District funds			$12,000	$35,000				$47,000
T13	■				Well 15	Chlorination	District funds			$25,000	$75,000				$100,000
T14	■	■	■	■	Systemwide Fluoridation	Fluoride Addition at All Existing Wells	District funds			$186,000	$557,000				$743,000
T15	■				Well 9 and 15 Fluoridation	Fluoride Addition at Wells 9 and 15	District funds			$37,000	$111,000				$148,000
T16	■	■	■	■	Well 12	Manganese Removal	District funds	$22,000	$133,000						$155,000
	■				**Sub-Total Treatment System Improvements - Alt #1**			**$72,000**	**$633,000**	**$625,000**	**$1,871,000**	**$0**	**$0**	**$0**	**$3,201,000**
		■	■	■	**Sub-Total Treatment System Improvements - Alt #3, #4 and Alt #18**			**$72,000**	**$633,000**	**$513,000**	**$1,535,000**	**$0**	**$0**	**$0**	**$2,753,000**

[b] **Public Works Trust Fund Loan**

TABLE 8-1 (Continued)

Capital Improvements Program Cost and Schedule

	#1	#3	#4	#18	Project	Description	Finance Source	2000	2001	2002	2003	2004	2005	2006 to 2015	Total
General															
G1					Groundwater Study	Study to determine the feasibility and requirements of recharge	District funds		$100,000	$50,000	$50,000				$200,000
G2					Fire Flow Improvements	Pipe and PRV improvements needed to meet fire flow requirements	District funds					$606,000	$606,000	$4,848,000	$6,060,000
G3					AC Pipe Replacement Program	Program to replace all AC pipe within SPWSD	District funds	$60,000	$1,400,000			$1,400,000	$1,400,000	$13,900,000	$18,160,000
G4					Small-Diameter Pipe Replacement Program	Program to replace all small-diameter PVC, steel and galvanized pipe	District funds	$50,000[b]	1,550,000[b]	$165,000	$165,000	$165,000	$165,000	$1,330,000	$3,590,000
G5					Intertie with Issaquah Highlands	Emergency Intertie with Issaquah Highlands. PRV supply from 742 Zone.							$700,000		$700,000
G6					Water Conservation Program	Program promotion, irrigation audits, and rebates. Full program description in Section 4.	District funds	$48,000	$60,000	$60,000	$60,000	$60,000	$60,000	$600,000	$948,000
G7					Routing Study for Alternative #3		District funds		$550,000						$550,000
					Sub-Total General Improvements			**$158,000**	**$3,660,000**	**$275,000**	**$275,000**	**$2,231,000**	**$2,931,000**	**$20,678,000**	**$30,208,000**
					TOTAL IMPROVEMENTS FOR ALTERNATIVE #1 - Groundwater Only			**$6,189,000**	**$13,930,000**	**$5,002,000**	**$9,980,000**	**$2,683,000**	**$3,334,000**	**$23,541,000**	**$64,658,000**
					TOTAL IMPROVEMENTS FOR ALTERNATIVE #3 - North Regional Water to Segregrated Plateau Zone			**$6,189,000**	**$13,930,000**	**$8,870,000**	**$13,680,000**	**$7,306,000**	**$8,789,000**	**$23,905,000**	**$82,668,000**
					TOTAL IMPROVEMENTS FOR ALTERNATIVE #4 - South Regional Surface Water Supply to Plateau Zone			**$6,189,000**	**$13,930,000**	**$4,554,000**	**$12,647,000**	**$2,683,000**	**$3,334,000**	**$38,581,000**	**$81,917,000**
					TOTAL IMPROVEMENTS FOR ALTERNATIVE #18 - South Regional Water to Segregated Plateau Zone			**$6,189,000**	**$13,930,000**	**$4,554,000**	**$12,647,000**	**$2,683,000**	**$3,334,000**	**$39,331,000**	**$82,667,000**

[b]Public Works Trust Fund Loan

LEGEND

Facilities

- PS
- Tank
- Well

Pipe Improvements

- Near-Term
- Build-Out
- Fire Flow Improvements
- AC Pipe Replacement
- Small Dia. Replacement
- Pipe >= 6"
- Street

Cascade View PZ

- 550
- 590
- 606
- 642
- 730

Plateau Zone PZ

- 300
- 360
- 380
- 385
- 410
- 425
- 445
- 447
- 450
- 475
- 500
- 555
- 550
- 590
- 650
- 700

S4: Regional Supply from Tolt Pipeline
Well 13 Tank
P2: 2 MGD PS (NT) R1: 0.6 MG Tank (NT)
Well 12 Tank
Well 14
S4
Install New PRV Station
3 MG Tank
Install New PRV Station
P1: 550 to 650 Zone 2MGD PS (NT #1, #4), P7: 550 to 700 zone 2MGD Pump (NT #18)
P3: 4.5 MGD PS (NT), P8: 2 MGD Upgrade (BO #18)
Wells 11,1
P9: 6 MGD PS (BO)
Well 4
Booster PS
Well 5
Well 4
Well 6
Section 36 PS
R2: 2 - 4 MG Tanks (NT)
Section 36 Tank
R4: 10 MG Tank (NT), P10: 6.5 MGD PS (NT)
2 MG Tank
Well 1
Well 10
Well 2
P5: 2.6 MGD Upgrade (BO)
43rd St PS
S3: New Water Right at Well 15 (NT #1)
Well 15
7 MG Tank
P4: 5 MGD Upgrade (NT), P6: 2 MGD Upgrade (BO #4, # 18)
297 Tank & PS
S1: Regional Pipeline Connection Point (NT #4, #18)
S2: New Water Right at Well 9 (NT #1)
Well 7
Well 8
Well 9

N
W
E
S

1:50000

0.2 0 0.20.40.60.8 1 Miles

SAMMAMISH PLATEAU
WATER & SEWER DISTRICT

Figure 8-1
Capital Improvement Program

Water Comprehensive Plan
Sammamish Plateau Water and Sewer District

99055 April 25, 2001

8.2.2 Conveyance (C)

A number of new pipelines will be required to meet projected flows through buildout within the District. As noted in Table 8-1, pipelines C1, C2, C4, C17, and C18 are associated with the new reservoirs and pump station at Section 36. Pipelines C6 and C19 are required to convey projected flows and are influenced by the roadway improvements on 228th Avenue SE.

The remaining pipeline projects C5 and C7 through C16 are required to convey additional water supply to meet projected demands regardless of which of the three supply alternatives is implemented.

8.2.3 Reservoirs (R)

A new 0.6-MG tank is being constructed in Cascade View at the existing Well 12 Tank site (R1). This will be a ground-level tank that requires a pump station to boost water to the 730 Zone. The Section 36 Tanks will be constructed and on-line by the summer of 2001 (R2). This site includes two 3.84-MG tanks that will serve the 550 Zone by gravity and the 650 Zone through a newly constructed pump station. The purchase of an additional contingency tank site is included in the CIP (R3). This tank site may never be required if the District obtains additional water supply; however, as buildout approaches, large parcels of land located at adequate elevation will become extremely difficult to obtain.

8.2.4 Pump Stations (P)

The Well 4 Booster Station (P1) will be equipped with an additional pump to coincide with the completion of the Section 36 Tanks. This pump will be used to boost water from the 550 Zone to the 650 Zone south along 228th Avenue SE toward the 2-MG Tank. The Section 36 Pump Station (P3) will boost water from the 550 Zone Section 36 Tanks to the 650 Zone.

A new pump station is currently being designed for the Well 12 Tank in the Cascade View Zone (P2). This pump will boost water from the newly constructed ground-level tank to the 730 Zone.

Due to the increased supply to be delivered at Well 9 (from new water rights or a regional pipeline), a redundant pump will be required at the 297 Pump Station (P4). Under near-term conditions, the 297 Pump Station will be the major conveyor of water between the 297 Zone and the 650 Zone.

If Alternative #18 is implemented, the 550 Zone to 650 Zone pump located at the Well 4 Booster Station will not be required. Instead, a 550 Zone to 700 Zone pump will be installed at the Well 4 Booster Station (P7). An upgrade of the 43rd Street Booster Station (P6) will be required after 2005 once the suction line piping has been upgraded to 16-inch-diameter piping (C12 and C13). The upgrade of this Booster Station will be significant because no empty equipment pads currently exist for the installation of new pumps.

8.2.5 Treatment Systems (T)

Consistent with the District's new policy, chlorine disinfection will be implemented at all wells within the District regardless of which supply alternative is chosen (#1, #4, or #18). Under Alternative #1, Wells 15 and 9 would also require chlorination (T7, T13). Wells 2, 4,

11, and 12 will require either manganese removal or sequestering (T2, T4, T9, T16) due to elevated levels of this substance found at those locations and the addition of chlorine, which will tend to oxidize manganese and result in a black precipitate settling out in plumbing fixtures.

The District is also considering systemwide fluoridation (T14, T15) at all of the wells. For budgeting purposes, these costs have been included in the CIP. As a minimum, fluoridation will be required in any area that receives regional water to provide uniform fluoride levels to customers in each area.

8.2.6 General Programs (G)

Several independent projects/programs will be implemented under the general CIP category. A groundwater study will be funded to determine the feasibility of recharge at District wells (G1).

A number of fire flow improvements have been identified that the District must pursue if it is to meet DOH requirements (G2). The fire flow improvements are associated primarily with the installation of pipelines and PRVs.

As noted in Chapter 3, there is a significant amount of AC pipe within the District. The District has already begun to replace this pipe with ductile iron and will continue through buildout (G3).

Another replacement program the District has already begun entails replacing all small-diameter (less than 4-inch) PVC, steel, and galvanized pipe (G4) with ductile iron.

An emergency 12-inch-diameter intertie will be constructed to connect to the newly developed Issaquah Highlands area (G5). This connection will be made along Black Nugget Road and will entail a PRV station to reduce the dynamic head from the Issaquah Highlands 742 Zone to the District's 650 Zone.

The Conservation Program (G6) will be funded at an annual rate and will continue through build-out conditions. The District is increasing funding of this program by nearly four times its current budget in recognition of the importance of the program for the District to reach its water use goals.

The routing study (G7) for supply Alternative #3 was mentioned previously. A number of steps are required before capital facilities could be identified for this regional water option. The routing study will evaluate alternative pipeline routes for locating a pipeline between a connection with Seattle Public Utilities' Tolt 2 Pipeline and the District's 550 Plateau Zone near the intersection of 224th Avenue SE and NE 8th Street. A SEPA checklist would also be required to identify a preferred route. Based on the results of the study, a more in-depth SEPA process may be required and the CIP revised accordingly.

8.3 Capital Improvement Schedule

A generalized description of the recommended improvements were included in Chapter 3. Descriptions of the improvements are provided in Table 8-1, along with their costs and schedules for implementation. Table 8-1 also presents the following information:

- Brief description with the project designation representing the category of project
- Estimated project cost in 2000 dollars based on factors described above
- Assumed funding mechanism such as District funds (rates, general facility charges, Public Works Trust Fund loan, and mainline charges), developer contributions, or regional funding

The schedule shows the distribution of projects that have been identified for implementation over the next 6 years and those that are slated to occur after 2005.

8.3.1 Supply (S)

As discussed in Chapter 4, the District is moving forward with a source development plan that will require a decision to be made in the near future whether to implement a regional source of water supply (Alternatives #3, #4, and #18) or to continue using groundwater-only supplies (Alternative #1). If a regional source is selected, the District must then decide if this water supply will be distributed to the entire Plateau Zone (Alternative #4) or if the zone will be segregated with specific areas receiving only groundwater and all other areas receiving a mix of groundwater and regional surface water (Alternative #3 and #18). The supply decision will be based on the District's ability to secure new water rights, as discussed previously. As shown in Table 8-1, the supply decision must be made by 2002 because additional supply is required to meet projected demands by 2003. The improvement projects identified for the early years are similar for the three source alternatives. In cases where there are slight differences, such as reservoir size, the District has decided to proceed with the more conservative approach to keep its decision about a water source alternative open. Figure 8-2 illustrates the overall decisions and actions required in the water supply decision process.

8.3.2 Conveyance (C)

Pipelines associated with the new reservoirs and pump stations at Section 36 must be constructed before or concurrently with the reservoirs going on-line in 2001 and 2002. These projects include C1, C2, C3, C4, C17, and C18. Roadway improvements currently taking place along 228th Avenue SE are driving the schedule on improvements C6 and C19. To ensure adequate capacity in pipelines along East Lake Sammamish Parkway if the regional line to the south is connected, improvement C10 will need to be implemented before 2003. Additional improvements after 2005 attributed to the augmented supply at Well 9 are scheduled along East Lake Sammamish Parkway and SE 43rd Street (C12, C13). These improvements include upgrading existing 12-inch-diameter piping to 16-inch-diameter. Improvements to upgrade the section of 228th Avenue SE south of Issaquah Pine Lake Road will also be required before 2005 to ensure adequate transmission capacity from the 297 Zone to the 650 Zone and between the 2-MG and 7-MG Tanks (C7, C8, and C9). Other improvements around the 7-MG Tank and on the suction side of the 43rd Street Pump Station will be implemented after 2005 (C14, C15, and C16).

8.3.3 Reservoirs (R)

The Section 36 Tanks in the Plateau Zone (R2) will be on-line in 2001, and the 0.6-MG Tank in the Cascade View Zone (R1) will be on-line in 2002.

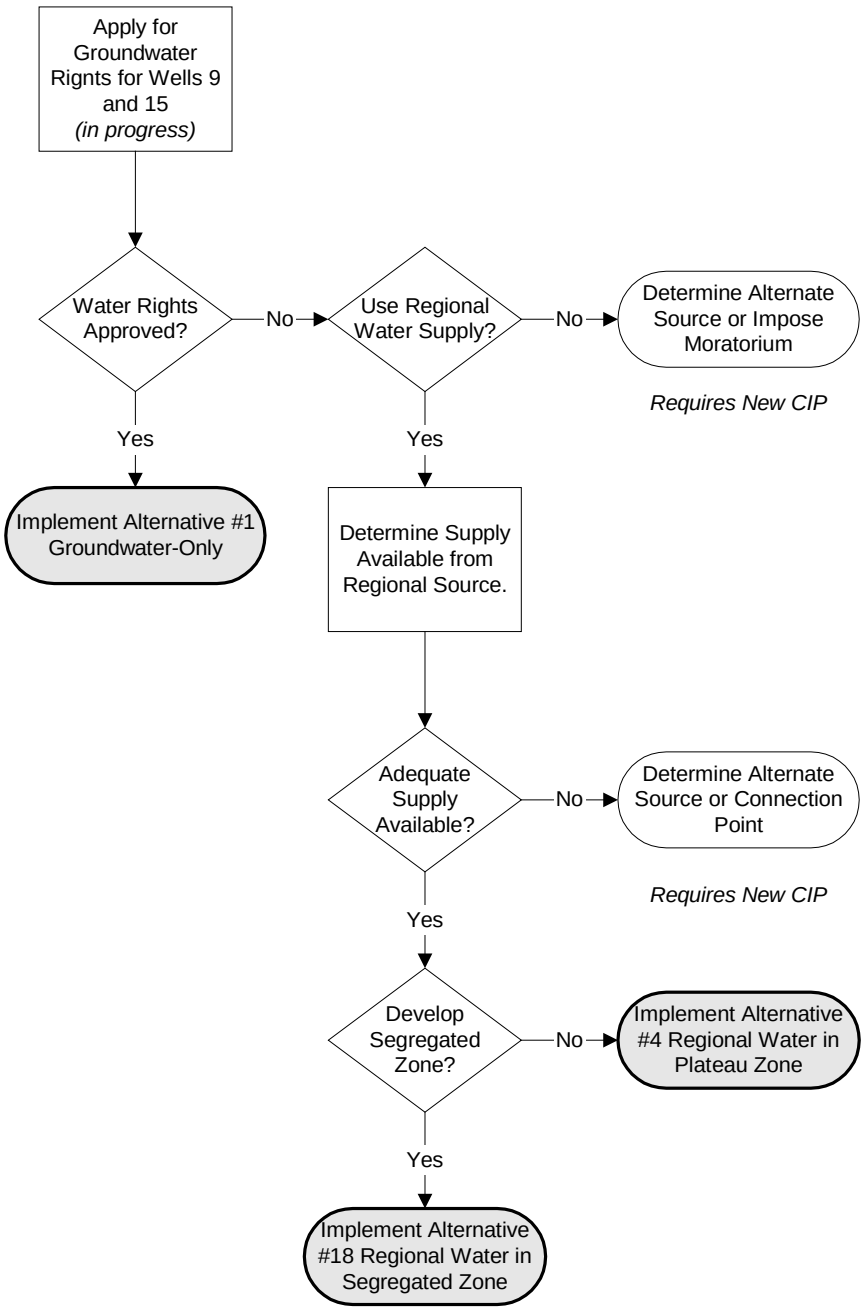

Figure 8-2
Water Supply Decision Process
Water Comprehensive Plan
Sammamish Plateau Water & Sewer District

8.3.4 Pump Stations (P)

The Section 36 Pump Station (P3) will be constructed and on-line in 2002. The Well 4 Booster Station (P1) will be completed in mid-2001 to coincide with the construction of the Section 36 Tanks. Since the Section 36 Pump Station will not be operational until 2002, the Well 4 Booster Station will be the only way to convey water from the 550 Zone to the 650 Zone in 2001 and early 2002.

8.3.5 Treatment Systems (T)

The majority of the treatment projects are scheduled for implementation in 2002 and 2003. If Alternative #4 or #18, connection to the Issaquah Regional Pipeline in 2003, is pursued, it would require the chlorination and potential fluoridation systems to be operational by that time. If Alternative #3, connection to the Tolt Pipeline, is pursued by 2005, then chlorination and potential fluoridation systems would be required to be operational by that time. If the groundwater alternative (#1) were implemented, there would be more flexibility in the schedule for constructing the treatment systems.

8.3.6 General Programs (G)

The groundwater study (G1) will be conducted during the first few years of the CIP because the viability of artificially recharging groundwater is a basic premise of the groundwater supply Alternative #1. The identified fire flow improvements (G2) will be implemented at an annual spending level beginning in 2004 and continuing through buildout. The District has already begun to implement the AC Pipe Replacement Program (G3) and will generally continue on an annual basis. The Small Diameter Pipe Replacement Program (G4) is currently under way and will continue at an annual spending level through buildout. The emergency intertie with Issaquah Highlands (G5) will not be constructed until 2005. The Conservation Program (G6) will be funded annually through buildout. The routing study (G7) is scheduled to be conducted in 2001. Results of the study will be used to help determine whether Alternative #3 is a cost-effective and implementable future water supply alternative for the District's consideration.

8.4 Annual Operations and Maintenance

Annual operation and maintenance costs were derived for each costing category. These are annual costs, assuming operation for 365 days per year, unless otherwise indicated. These costs reflect only costs that are in addition to the costs of current operations.

Supply costs depend on the supply alternative selected. If regional water is purchased, the cost is assumed to be $2.20 per hundred cubic feet. For the groundwater-only alternative, additional supply costs result from additional pumping and treatment. Pumping costs are based on 1,500 gpm at a total dynamic head of 340 feet. Power costs are assumed to be 5¢ per kWh. Additional treatment costs were calculated using the methodology described below for treatment:

- Well/artificial groundwater recharge maintenance costs were assumed to be based on the volume of water pumped each year at $0.35 per hundred cubic feet.
- Conveyance system or pipeline maintenance costs were assumed to be 0.5 percent of capital costs per year.
- Pump station maintenance costs were assumed to be 1 percent of capital costs per year.
- Reservoir maintenance costs were assumed to be 1 percent of capital costs per year.
- Treatment operations and maintenance costs were evaluated separately for each well. They were based on chemical requirements (based on flow and dose) and on labor hours required for system maintenance (e.g., cleaning, refilling, and testing). Chemical costs were obtained from chemical suppliers, labor costs were assumed to be $50/hour and include materials, tools, and transportation.

The resulting annual costs are shown in Table 8-2.

TABLE 8-2

Annual Operating and Maintenance Cost Increases

#1	#3	#4	#18	Project	Description	Finance Source	2000	2001	2002	2003	2004	2005	2006 to 2015	Total
Alt. #1 Groundwater Only (including Aquifer Storage and Recovery [ASR])														
				New Wells (9 and 15)	Pumping and treatment costs. ASR costs not included.						$ 69,000	$ 69,000	$ 690,000	$ 828,000
				ASR Operation	ASR operation at Well 15.					$ 181,000	$ 181,000	$ 181,000	$ 1,810,000	$ 2,353,000
				Conveyance Systems			$ 19,000	$ 33,000	$ 42,000	$ 48,000	$ 50,000	$ 52,000	$ 620,000	$ 864,000
				Pump Stations			$ 9,000	$ 31,000	$ 32,000	$ 34,000	$ 34,000	$ 34,000	$ 440,000	$ 614,000
				Reservoirs			$ 12,000	$ 46,000	$ 16,000	$ 49,000	$ -	$ -	$ -	$ 123,000
				Treatment Systems - Chlorine and Manganese	Chlorination, manganese sequestering, and removal. Includes chemicals and labor.					$ 39,000	$ 72,000	$ 72,000	$ 720,000	$ 903,000
				Treatment Systems - Fluoride	Fluoridation. Includes chemicals and labor.					$ 54,000	$ 105,000	$ 105,000	$ 1,050,000	$ 1,314,000
				TOTAL			**$ 40,000**	**$ 110,000**	**$ 90,000**	**$ 405,000**	**$ 511,000**	**$ 513,000**	**$ 5,330,000**	**$ 6,999,000**
Alt. #3 Regional Surface Water from the north														
				Regional Water	Purchase regional water from Tolt 2 connection point					$ 712,000	$ 740,000	$ 770,000	$ 9,609,000	$ 11,831,000
				Conveyance Systems	Including regional line from Tolt 2		$ 19,000	$ 33,000	$ 63,000	$ 92,000	$ 117,000	$ 146,000	$ 1,520,000	$ 1,990,000
				Pump Stations			$ 9,000	$ 31,000	$ 35,000	$ 46,000	$ 46,000	$ 46,000	$ 670,000	$ 883,000
				Reservoirs			$ 12,000	$ 46,000	$ 16,000	$ 49,000	$ -	$ -	$ -	$ 123,000
				Treatment Systems - Chlorine and Manganese	Chlorination, manganese sequestering and removal. Includes chemicals and labor.					$ 33,000	$ 66,000	$ 66,000	$ 660,000	$ 825,000
				Treatment Systems - Fluoride	Fluoridation. Includes chemicals and labor.					$ 49,000	$ 99,000	$ 99,000	$ 990,000	$ 1,237,000
				TOTAL			**$ 40,000**	**$ 110,000**	**$ 114,000**	**$ 981,000**	**$ 1,068,000**	**$ 1,127,000**	**$ 13,449,000**	**$ 16,889,000**
Alt. #4 Regional Surface Water in Plateau Zone (No Segregated Groundwater Zone)														
				Regional Water	Purchase regional water from southern connection point at Well 9.					$ 712,000	$ 740,000	$ 770,000	$ 9,609,000	$ 11,831,000
				Conveyance Systems			$ 19,000	$ 33,000	$ 42,000	$ 48,000	$ 50,000	$ 52,000	$ 620,000	$ 864,000
				Pump Stations			$ 9,000	$ 31,000	$ 32,000	$ 34,000	$ 34,000	$ 34,000	$ 460,000	$ 634,000
				Reservoirs			$ 12,000	$ 46,000	$ -	$ -	$ -	$ -	$ -	$ 58,000
				Treatment Systems - Chlorine and Manganese	Chlorination, manganese sequestering and removal. Includes chemicals and labor.					$ 33,000	$ 72,000	$ 72,000	$ 720,000	$ 897,000
				Treatment Systems - Fluoride	Fluoridation. Includes chemicals and labor.					$ 54,000	$ 105,000	$ 105,000	$ 1,050,000	$ 1,314,000
				TOTAL			**$ 40,000**	**$ 110,000**	**$ 74,000**	**$ 881,000**	**$ 1,001,000**	**$ 1,033,000**	**$ 12,459,000**	**$ 15,598,000**
Alt. #18 Regional Surface Water in Plateau Zone, Segregated Groundwater Plateau Zone														
				Regional Water	Purchase regional water from southern connection point at Well 9.					$ 712,000	$ 740,000	$ 770,000	$ 9,609,000	$ 11,831,000
				Conveyance Systems			$ 19,000	$ 33,000	$ 42,000	$ 48,000	$ 50,000	$ 52,000	$ 620,000	$ 864,000
				Pump Stations			$ 9,000	$ 31,000	$ 32,000	$ 34,000	$ 34,000	$ 34,000	$ 530,000	$ 704,000
				Reservoirs			$ 12,000	$ 46,000	$ -	$ -	$ -	$ -	$ -	$ 58,000
				Treatment Systems - Chlorine and Manganese	Chlorination, manganese sequestering and removal. Includes chemicals and labor.					$ 33,000	$ 66,000	$ 66,000	$ 660,000	$ 825,000
				Treatment Systems - Fluoride	Fluoridation. Includes chemicals and labor.					$ 54,000	$ 105,000	$ 105,000	$ 1,050,000	$ 1,314,000
				TOTAL			**$ 40,000**	**$ 110,000**	**$ 74,000**	**$ 881,000**	**$ 995,000**	**$ 1,027,000**	**$ 12,469,000**	**$ 15,596,000**