

APPENDIX O

Supply Alternatives

ATTACHMENT 01

Source of Supply Analysis

Source of Supply Analysis

July 20, 1998 Supply Workshop

The following presents the information that was developed and presented at the July 20 workshop with the Board of Commissioners.

01.1 Groundwater Recharge

The concept of groundwater recharge is to obtain water in the winter (when it is plentiful) and store it for use in the summer to augment existing supplies. A water right to recharge groundwater from Issaquah Valley wells was obtained by the District in 1994. The District is also currently searching for other potential groundwater sources to use as recharge supplies.

Requirements for a successful groundwater recharge program are (1) a winter water source and (2) a “tight” aquifer that can serve as an underground storage reservoir. The District has been conducting investigations to determine the feasibility of artificially recharging Plateau aquifers and to assess the storage capacity available for artificially recharged groundwater in the aquifer system. Recent results of a three-month testing and monitoring program indicate Plateau Aquifer Zone IV can be used to store artificially recharged water (AGI, 1998).

Supply Capacity

The District may currently recharge as much as 565 acre feet of groundwater from Wells 7 and 8 to Plateau wells annually between November 1 and April 30 (Dames & Moore, 1998) based on current water rights. To date, this is the only supply of water available for a long-term artificial recharge program. There are a number of other possible recharge sources. It may be possible to request additional recharge water rights for the Issaquah Valley aquifer to further recharge groundwater into the Plateau aquifer, but obtaining these additional water rights would require approval from the Washington State Department of Ecology (Ecology). Other sources of water to artificially recharge the aquifer could possibly be purchased during the winter when water supplies are abundant and relatively inexpensive. Purchased water could also be supplied to District customers and surplus water from the Valley aquifer could then be used to recharge the Plateau aquifer. It is recommended that the District evaluate the seasonable availability, quality, and cost of other potential sources of water for artificial recharge (AGI, 1998).

The District has initiated hydrogeologic investigations to assess the available storage capacity for artificially recharged groundwater in both the shallow and deep Plateau aquifers (AGI, 1998). The portions of the aquifer with the highest storativity values have the greatest potential for storage of groundwater.

Estimated Cost

The cost of this alternative is primarily the cost of studies. The cost of water from groundwater recharge will be the District's supply cost. The District's existing infrastructure (wells and pipelines) can be used for groundwater conveyance, recharge, and extraction. Operational costs will include: (1) electricity to pump water from Wells 7 and 8 to the Plateau for recharge, and from the recharge/production wells (costs would be greater to pump water from deeper zones than shallow zones); (2) modifications to the existing wellhead at the production wells to allow controlled groundwater recharge; and (3) monitoring.

Environmental, Permitting, and Institutional Issues

Additional constraints may be placed on the withdrawal of groundwater after recharge, and will affect the amount of additional spring and summer capacity provided by recharge. It has been recommended that the District apply for water rights to begin artificial recharge of at least 500 acre feet per year into Zone IV aquifers (AGI, 1998). Ecology has indicated that the District's ownership of an existing water right to recharge water should not require another water right to extract and use that water. Under RCW 90.44.130, Ecology designates and has jurisdiction over groundwater areas, subareas, and zones. If the Sammamish Plateau has been designated a groundwater area, subarea, or zone and if the District recharges water there, the District will need to file a certified declaration of ownership claiming artificially stored water in the groundwater area (Dames & Moore, 1998).

The District is exploring the economic feasibility of winter water purchases for groundwater recharge. Depending on the source, institutional agreements may be required.

Technical Feasibility

Groundwater recharge as a water supply alternative fits well with the District's existing groundwater system. It is unclear at this time how much groundwater recharge increases the amount of water stored within the aquifer beyond the amount stored under natural conditions. Early hydrogeologic studies have shown that storing water in shallow aquifers is not feasible. However, the preliminary results of studies regarding deep aquifer storage have been positive. Completed aquifer studies should determine which aquifer system beneath the Plateau is most suitable for use in artificial recharge.

Existing wells on the Plateau that are not used much during the winter can be used to recharge water between November and April and then to extract water between May and October. According to recent studies, future Zone IV wells can be designed to serve double functions as efficient recharge and production facilities (AGI, 1998). Changes to the District's existing infrastructure would be minimal, except for some wellhead modifications to allow for recharge. Additional wells and pipelines would not be required unless the District purchases regional supplies for recharge, in which case conveyance facilities will be necessary.

Overall Feasibility and Schedule

There is a high probability of groundwater recharge becoming a feasible water supply opportunity. Wells 7 and 8 have already been designated for a supply of water to be

recharged. Recent studies indicate that the deep Plateau aquifer may be a suitable recharge reservoir that could be accessed by Well 11.2 (AGI, 1998). Most of the necessary infrastructure to take, recharge, and extract groundwater is currently in place. Additional hydrogeologic studies need to be completed to further quantify the Plateau aquifer's storage potential.

Water supply could be available from groundwater recharge at the earliest in 2000, as soon as physical testing and other studies are complete (Dames & Moore, 1998). A delay of several additional years could result if Ecology requires further action.

01.2 Transfer of Water Rights

One option available to the District is to pursue the purchase of water rights currently held by others in the area and transfer them to use within the District. According to Ecology records, there are currently 25 water rights within the District's boundaries that appear to be potential candidates for purchase and transfer (Dames & Moore, 1998). In addition, the District could evaluate the potential for acquiring water rights from other utilities.

Supply Capacity

The 25 available water rights represent the following aggregate amounts of water supply: $Q_i = 4,945$ gpm, and $Q_a = 5,015$ acre feet. In addition to this volume would be added any potential water rights that could be obtained from other utilities. The District has already commenced discussions with owners of some of these water rights, and Ecology is working with the other owners to determine the possibility of selling their water rights (Dames & Moore, 1998).

Cost

The cost of water right purchase and transfer would be approximately \$1,000 per acre foot of water supply (Dames & Moore, 1998).

Environmental, Permitting, and Institutional Issues

To transfer water rights, the District will have to contact the current owners, negotiate purchases, sign contingency agreements, and prepare and submit transfer applications to Ecology. The applications must then be published and survive any protest. The amount of time Ecology takes to process the transfers is a primary institutional constraint (see "Cost and Schedule" above). The District must ensure that water rights being considered for purchase are "wet," meaning that they are for non-municipal rights and that they have not been abandoned or relinquished due to the failure to put the water rights to beneficial use within the last 5 years. The proposed water transfers must also be determined to not injure or impair any other water right holder, whether or not the holder is junior to the transferred water right. This includes the effects of water rights on instream flows. If minimum instream flows are not being met when groundwater rights are considered, hydraulic continuity may be asserted to prevent the water right transfer. Effects of transfers on threatened or endangered salmonids may also prevent water right transfers that might otherwise be approved.

Technical Feasibility

The purchase and transfer of water rights is an excellent fit with the District's water system. This new water supply can be incorporated into the District's existing system without the need for additional infrastructure. The District has unused capacity in its Plateau and Issaquah Valley wells that could allow purchased water rights to be transferred and consolidated into existing wells.

Overall Feasibility and Schedule

The probability of realizing water rights purchase and transfer as a water supply source is estimated to be low in the near term and fair over the long term for a number of reasons. Many of the available water rights will probably have been relinquished or abandoned. Water in current use will be difficult to displace. Most water made available for purchase and transfer is typically from farmland irrigation, which is not a large consumer in the District's area. Other barriers that might prevent water rights transfers include the time to process transfer applications and the potential for impairment, hydraulic continuity, conflicts with minimum instream flow, and impacts to fish.

The timeframe for implementing this alternative would be the time it takes for Ecology to approve the transfers. It is estimated that this would require a minimum of 3 to 4 years, and at least 7 to 8 years if it is determined that a Basin Plan must be completed. Ecology's Northwest Regional Office has a backlog of pending applications for new water rights or transfers that will require at least 2 years to work through (including pending transfers already filed by the District). Under Ecology's current policy, applications to transfer new water right purchases would not be reviewed until after Ecology reviews the existing backlog of applications. Unless budget appropriations or other legislative actions change this situation, it could be an additional several years before the District's applications were processed.

01.3 Regional Water

There are four regional options available to the District. Essentially, each option would deliver water to the District via a pipeline along I-90 to the District's system near Wells 7 and 8 or via a pipeline from the Seattle Public Utilities (Seattle) Tolt Pipeline to the north. The options differ by which governmental entity the District chooses to be its partner. The options are Seattle, the Cascade Water Alliance (CWA), or the East King County Regional Water Association (EKCRWA).

Seattle has indicated a willingness to offer a purveyor contract to the District to purchase additional water supplies, and the District has filled out the standard purveyor questionnaire.

Supply Capacity

Water supply up to the limit of the District's future demands, estimated at 2,100 acre feet to serve 7,000 ERUs, would be provided by a purveyor contract with Seattle or by becoming a member of the CWA. Becoming a purveyor or joining CWA increases the District's water supply reliability by ensuring an additional large-volume source of supply. As a result of

cost-efficient conservation programs, Seattle is projected to have available water supply through the year 2020 that would meet all of the District's demands.

Estimated Cost

Based on contract terms, Seattle has proposed that it would charge the District the wholesale rate during the years between 2001 and 2020, varying from \$1.49 to \$2.14 per hundred cubic feet (ccf) of water. The range of rates reflects the difference in cost between new winter water and new summer peak water. These costs are based on Interim Water Group/Cascade Water Alliance (IWG/CWA) data and are "potentially subject to future revisions" (Dames & Moore, 1998).

The CWA cost structure is quite different from Seattle's. As of spring 1998, CWA is not planning to have a new water rate; instead, CWA will impose uniform charges to all customers. In the long term, these are comparable to, and somewhat less than, Seattle's old water costs. In addition, CWA will impose a regional connection charge, the Regional Capital Facilities Charge (RCFC), as a capital funding mechanism. This would be imposed on growth that relies on CWA capacity, and has currently been set at about \$900 per ERU. Instead of volume charges, CWA will charge based on the greater of average annual or peak season (June – September) demand. If the District can use less water than the summer peak during this period, it would pay less per unit volume. This may provide cost-effective opportunities for combining use of recharge water with CWA supply. The CWA structure is intended to accommodate combined or integrated uses. In particular, peak shaving options such as groundwater recharge or water reuse would result in substantial savings under the CWA structure, which would not be available to the same degree under a Seattle purveyor structure (FCS Group, 1998).

The cost of purchasing water through the EKCRWA has not been determined.

Environmental, Permitting, and Institutional Issues

The District could join CWA and receive all the benefits of joining. The open enrollment period for CWA would be between January 1, 1999, and November 14, 1999. Application would be possible after this period, but subject to greater discretion from CWA regarding membership terms and willingness to take over independent supplies (FCS Group, 1998).

A purveyor contract must be finalized and executed between Seattle and the District before CWA forms and becomes a legal entity. This is not expected to occur before January 1, 2000. This option would be withdrawn if the CWA proceeds to form. The Principals of Agreement that formed IWG/CWA are clear that if the CWA forms, Seattle will not offer water supply contracts to any new purveyors or serve their existing purveyors after the expiration of their current contracts on December 31, 2011.

If the District becomes a purveyor of Seattle, it could rely on Seattle to serve all of its current water supply demands as well as future demands, at least through 2011. The District would also benefit from this relationship by being relieved of all risks if the capacity of any of its wells diminishes. The District will want to ensure that new conservation requirements in a purveyor contract do not reduce the District's flexibility to meet its needs in the most cost-effective manner in the future. The District should also verify whether a contract with

Seattle would constrain the District's ability to explore and develop other new economical water supply sources.

After December 31, 2011, when all existing Seattle purveyor contracts expire, there are no assurances for the terms of water supply from Seattle. All relationships between Seattle and its purveyors would need to be negotiated after that date.

Technical Feasibility

This option is considered an average fit with the District's existing water system. If the District became a purveyor to Seattle, the District may need to invest in an intertie transmission pipeline. Whether or not Seattle would construct and pay for any necessary infrastructure to deliver water to the District would need to be determined. The cost of these investments would be recovered in the uniform water supply rates that Seattle charges to all of its purveyors or it would need to be paid for by the District from its rates.

If the District joined CWA, there are several possibilities for financing a regional transmission system to the District. Due to CWA's initial limits on funding new infrastructure projects:

- (1) The District could finance the project and be reimbursed by CWA through regular payments. The District would pay regular RCFC's and rates.
- (2) The District could finance the project and be reimbursed by CWA through rate and/or RCFC credits. The District would pay regular RCFC's and rates, net of any credits available.
- (3) CWA would finance the project and require minimum annual payments to offset the project costs. If these payments exceeded regular RCFC's and rates, the District would receive future RCFC credits.
- (4) CWA would finance the project and the District would pay regular RCFC's and rates; and
- (5) CWA may arrange for wheeling capacity through members, to the extent possible, potentially deferring all or parts of the project. Possible scenarios might include extension of a pipeline to Issaquah, and using CWA supply to displace Issaquah demand for groundwater, transferring that capacity to the District in lieu of a direct regional connection (FCS Group, 1998)

Treatment of blended water may be required as part of this alternative.

Overall Feasibility and Schedule

This option is a highly probable source of water supply for the District if CWA does not form, if the contract with Seattle is fully executed before formation of the CWA as a legal entity, or if the District becomes a member of IWG/CWA. The year that purveyor service would begin depends on how quickly the I-90 pipeline could be constructed.

A contract with Seattle could begin as early as 2001. The actual permitting and construction of a pipeline to convey water could prolong that schedule. The estimated cost of a pipeline

from Bellevue to the District is approximately \$10 to 14 million, assuming a 24-inch pipeline to carry a maximum of 15 mgd of water.

01.4 Water Reclamation and Reuse

The District has been investigating the feasibility of water reuse on the Plateau, both to free up potable water that is being used where reclaimed water could replace it, and to free up other water rights from owners who currently use potable water but could use reclaimed water. Potential uses include irrigation, wetlands, groundwater recharge, and commercial and industrial applications. King County has also expressed an interest in a regional reuse facility in the vicinity of the District, even though King County has not completed detailed studies.

Supply Capacity

A water reuse feasibility study completed for the District in 1995 evaluated nine alternatives for the use of reclaimed water that would benefit the District and/or a nearby development (CH2M HILL, 1995). The project capacities ranged from a 1.0-mgd program to a comprehensive 11.7-mgd program. A more recent study (Dames & Moore, 1998) estimated that water reclamation programs could make 270-300 acre feet of supply available for reuse. A 1.0- to 2.0-mgd pilot project could provide irrigation water in the near term and provide a base for potential increases in the future. Existing wastewater flow levels in the District appear to support an approximate 1.0-mgd start-up demonstration plant. An additional 4.25-mgd of water rights have been identified for which reclaimed water could be substituted. (These water rights are not necessarily being put to their full beneficial use, and, therefore, may not be available to displace.) A phased approach to the use of reclaimed water is recommended. Long-term wastewater flows available for reclamation and reuse may increase to 5.0 to 8.0 mgd by 2014 (Dames & Moore, 1998).

Estimated Cost

The capital cost of this option is estimated to be \$5 million (Dames & Moore, 1998). This cost could potentially be shared with a number of participants. The total cost of water reclamation and reuse is largely dependent on the size of the installed distribution system. The estimated cost for reclaimed water is 80 percent of the District's current irrigation rate, or approximately \$1.80 per ccf. (This represents more of a market-driven, rather than a capital-driven, cost.)

Environmental, Permitting, and Institutional Issues

The King County Department of Natural Resources is the key agency for this alternative and has appointed a Water Reuse team for leadership on the issue. The County recently hired a water reuse coordinator and has expressed interest in pursuing pilot and demonstration projects. There is no scale limitation on such projects, and funds are available from the County's wastewater revenues. An environmental assessment will need to be conducted for locating a demonstration plant (a negative declaration should be adequate for pipelines). Using a small pilot or demonstration project would match current wastewater flows and irrigation use, and facilitate permitting and institutional constraints

with the County. Potential irrigation and other industry customers will need to be contacted and user agreements will need to be obtained.

The agency has indicated that a Regional Water Supply Plan will need to be completed before full implementation of a water reclamation program. It is expected that this could take several years to complete. The County believes that its contract with the District will preclude the District from treating its own wastewater. The County intends to hold the State Health permit for all reclaimed water projects that displace potable water. All reclaimed water is intended to be marketed through CWA (Dames & Moore, 1998).

Technical Feasibility

Water reuse is compatible with the District's water system. Separate location and identification of the reclaimed water system is essential to prevent cross-connections. Depending on the use of the reclaimed water, a number of treatment processes could be used to achieve the desired water quality. All aspects of a reuse facility would be governed by the Departments of Health and Ecology Water Reclamation and Reuse Standards, which were finalized in 1997.

Overall Feasibility and Schedule

There is a high probability that a water reuse pilot project could become a viable water supply opportunity for the District, particularly for irrigation and nonpotable uses. User acceptance and approvals from the County and community will be essential for this alternative to move forward. The District should develop and maintain a public relations program for water reuse, emphasizing it as a safe nonpotable supply based on proven technology.

The King County Water Reuse Task Force Report contains policies on how the County will proceed with and evaluate reclaimed water projects. The King County Council may not take action on these policies until the fall of 1998. However, the County expects to begin discussions with municipal purveyors with reclaimed water projects before then. A demonstration plant could be on-line within 18 to 24 months, depending on urgency and the ability to get environmental permitting and institutional agreements. A minimum timeframe for an overall pilot project would probably be about 3 years. The timeframe for any projects other than a demonstration or pilot would be affected by permitting and institutional issues, including the Washington Department of Health, Ecology, IWG/CWA, and the King County Regional Water Supply Plan, and could possibly take 5 to 10 years. Reuse facilities should be phased to match the available wastewater flow, available uses, and customers.

01.5 Supply Alternative Combinations

To meet the District's ultimate water demands of 2,100 acre feet, the quantity of each of the supply options were evaluated. While some options may be able to solely provide the required volume of water, other options required a combination of resources to provide the necessary volume. Water conservation aimed at the King County goal of 8 percent water savings was considered to be a common element in all combination scenarios, unless stated

otherwise. By continuing with and expanding on its conservation program, the District demonstrates a commitment to make the best use of its available resources.

I. Regional Supply (including Conservation)

This alternative would allow purchase of the full amount of supply from Seattle, CWA, or EKCRWA, through a purveyor contract with Seattle or similar instrument with CWA or EKCRWA. This scenario would improve the District's system reliability by providing a guaranteed supplemental supply to meet its future demand needs. The Seattle contract has a potential endpoint of 2011, while a contract with CWA would be long term. A contract with EKCRWA is indeterminate at this time.

II. Water Rights Transfers from Issaquah Wells + Conservation

This scenario would involve transferring the use of groundwater wells from Issaquah. The water rights to wells 1, 2, 4, and 5 represent a total of 2,800 acre feet of new supply. This scenario assumes that Issaquah uses solely regional water supplies through CWA. The benefit to the District would be to remain exclusively on groundwater supply. The benefits to Issaquah would be the elimination of water blending issues. The District would extract supplemental water supply from the Issaquah wells, in addition to implementing conservation measures.

III. Groundwater Recharge + Conservation

The District would recharge the deep aquifer on the Plateau in the short term, and potentially recharge from another aquifer in the Snoqualmie Valley for storage of additional supply in the long term. The District would also implement 8 percent conservation measures (the amount currently required by King County to be in place by the year 2000) as necessary.

IV. Groundwater Recharge + Conservation + Water Reuse + Water Rights Transfer

This alternative involves a combination of alternatives to meet the District's water supply needs and its overriding goal of continuing to be supplied solely by groundwater sources. Groundwater recharge of the deep aquifer on the Plateau would provide approximately 55 acre feet of new supply. Enhanced conservation measures of up to 11 percent could provide another 1,000 acre feet. Water reclamation programs would make 270 to 300 acre feet of supply available for reuse. The remainder of the District's supply needs could be met through water rights transfers from within SPWSD's service area.

Table O1-1 presents a summary of the water supply potential from each water supply alternative.

TABLE 01-1
 Comparison of Water Supply Combination Alternatives on an Acre-Foot Basis

Resource	Scenario				
	I	II	III	IV	V
Groundwater Recharge			1,950	565	
Water Conservation	150	150	150	1,000	
Transfer of Water Rights		Up to 2,800		235	
Regional Supply	1,950				
Water Reclamation and Reuse				300	
Total Acre Feet	2,100	2,950	2,100	2,100	

ATTACHMENT O2

Water Supply Options and Suboptions

November 30, December 22, and January 18 Workshop

Water Supply Options and Suboptions

I. List of Water Supply Options and Sub-Options

Groundwater

- A. Existing Water Rights
 - A1. Counted with 22975 in Plateau Zone plus Cascade View
 - A2. Not Counted with 22975 in Plateau Zone
- B. Conservation
 - B1. Existing Water Use Rate < 0.3 ac-ft/yr per ERU
 - B2. Future Program, such as 1% per year
- C. Recharge
 - C1. Deep Aquifer Pilot Study
 - C2. Existing Recharge Water Right = 565 ac-ft/yr
 - C3. (see also J) Recharge Seattle Water to Groundwater
 - C4. Additional Recharge Rights
- D. Transfer of Existing Water Rights from Others
 - D1. Aldarra Farms Excess Water Rights
 - D2. Issaquah Water Rights
 - D3. White River Basin Water Rights
- E. Water Reuse
 - E1. Aldarra Farms Package Plant for Golf Course Water Rights
 - E2. Beaver Dam Package Plant for Golf Course Water Rights
 - E3. Other Irrigation Uses
 - E4. Other Exchange/Mitigation for Water Rights
- F. New Groundwater Rights
 - F1. Issaquah Valley Aquifer Water Rights (Well 9)
 - F2. Shallow Plateau Aquifer Water Rights (Well 15)
 - F3. Deep Plateau Aquifer Water Rights
 - F4. Snoqualmie Valley Wells Water Rights (Section 5 and __)
 - F5. North Bend Aquifer to River to Ground Water Rights (EKCRWA)

Surface Water

- G. Seattle/Regional Water through South “Issaquah” Pipeline
 - G1. Blend with Plateau Zone
 - G2. Isolate
 - a. 297/Freegard
 - b. 297/Freegard + 650 South end

- H. Seattle/Regional Water through North Cascade View Connection
- I. North Bend Aquifer to River to Snoqualmie River Treatment Plant
- J. (see also C3) Recharge Source Seattle/Regional Water to Groundwater

A. Existing Water Rights

A1. Counted with 22975 in Plateau Zone plus Cascade View

The following table contains the existing water rights being counted for supply purposes. The Plateau Zone and Cascade View Zone rights are totaled separately to match the manner in which they are currently administered.

TABLE A1-2

Existing Water Rights for Sammamish Plateau Water and Sewer District

Well No.	Certificate Number	Priority Date	Water Rights		
			Inst. (gpm)	Annual (af/yr)	ERUs (0.3 af/ERU)
Plateau Zone					
1R	G1*00342C	7/7/64	300	448	1,493
1R Additional	G1-25438A	5/10/89	200		
2	G1*09533C	6/21/68	500	800	2,667
4	G1*10373C	8/25/89	200	224	747
4 (additional)	G1-23022C	12/19/77	550		
4 (supplemental)	G1-23022C	12/19/77		880	
5	G1-22861C	5/2/77	1,000	1,600	5,333
6	G1-23897C	7/31/81	600	768	2,560
7 & 8	G1-00289C	1/20/72	3,200	936	7,030
7 & 8 (additional)	G1-25428A	4/24/89	2,300	1,173	
9 (supplemental)	G1-26014A	12/24/90	2,000	1,608	
10	G1-27166	6/4/93	500	378.5	1,262
10 (supplemental)	G1-27166	6/4/93		186.5	
11.2 D	G1-26572	4/30/92	500	565	1,883
Plateau Zone Total ERUs					22,975
Cascade View Zone					
Well 12	G1-00027C	6/19/70	100	108	360
Well 12	G1-24363C	7/25/83	100	12	40
Well 13	G1-25963C	7/7/90	200	224	747
Well 14	G1-25831C	6/26/90	100	112	373
Cascade View Zone Total ERUs					1,520
Sammamish Plateau Water & Sewer District – Total ERUs					24,495

POLICY DECISION: Zone Break**Description**

Zone break refers to keeping the Cascade View Zone and Plateau Zone separate. This is the current physical situation and has been used by the Board of Commissioners as a reason to allow the Cascade View Zone to be kept out of the Plateau Zone Allocation.

Study Requirements

Network modeling of each system Plateau and Cascade View needs to be completed. The District is coding the system in the Cybernet program.

Connection of the zones could improve redundancy, especially in the Cascade View Zone.

In addition, the long-term growth level needs to be verified with the Cascade View water rights.

Interagency Agreements

The District currently has interties with several adjacent utilities. However, these are all considered emergency interties, and there are no water right use issues.

Tying the two zones together to use water rights from one zone to the other will require review of the water rights and their place of use. If changes are required, approval by the Ecology would be required.

Additional District System Requirements

Water main installation from 244th and Redmond–Fall City Road to Amesbury would be required to connect the two zones. A booster pump would also be required to provide Plateau Zone water to Cascade View Zone areas above the 550 pressure zone. It is possible to connect the two District zones physically for use similar to an emergency intertie to gain the redundancy without the water right issue.

Additional Non-District System Requirements

If the two District zones are kept separate physically, interties with Union Hill Water Association and possibly Ames Lake Water Association become more important. This is not really a water supply option issue, but is mentioned as an auxiliary item.

Estimated Date of Availability (Completion)

A pipeline connecting the two District zones could be completed within 1 year. If a Change in Point of Use permit is required with the water rights through Ecology, the date of completion would be after completion of the Tri-County Basin Plan, which is estimated for planning purposes to occur in 2003.

Estimated ERUs

There are approximately 600 to 900 estimated ERUs in addition to existing customers. The Cascade View demand will be further verified as part of the demand estimation portion of the plan, but there are approximately 600 existing ERUs in the Cascade View zone.

POLICY DECISION: Comprehensive Use of Existing Water Rights**Description**

The existing list of water rights in the previous table includes the water rights as initially provided by the state. The District has made application to Ecology to transfer some rights from one well to others. Well 6 has an odor problem, Well 5 has a sanding problem, and pumping Well 4 and 11 at their full potential is being investigated. Management of the water rights the District has to their fullest and best potential is the subject.

Study Requirements

Each well's ability to pump at its permitted capacity has been looked at by AGI. The compatibility of the north deep wells is also being investigated as part of the recharge study. A comprehensive look will be included in the comprehensive plan.

Interagency Agreements

Ecology needs to approve all changes in point of withdrawal for transfers between District wells. Several years ago the District had planned with Ecology how and where these transfers could occur, and has made application for several. However, Ecology has taken no formal action, and it will probably not be taken until after the Tri-County Basin Plan is completed, estimated in 2003.

Additional District System Requirements

If the transfers are not approved by Ecology, or not approved in a manner which works for the District, the District may need to re-drill or rehabilitate certain wells, such as Well 5, or add treatment to others, such as Well 6.

Estimated Date of Availability (Completion)

Not applicable.

Estimated ERUs

0 additional ERUs.

A2. Not Counted with 22975 in Plateau Zone**TABLE A2-1**

Pending Water Right Applications for Sammamish Plateau Water and Sewer District

Well No.	Certificate Number	Priority Date	Water Rights		
			Inst. (gpm)	Annual (Af/yr)	ERUs (0.3 AF/ERU)
Pending					
3 – Chg. Pt. of Diversion	G1*07653C	8/25/69	100	160	243
Mint Grove – Chg. Pt. Of Diversion	5140-A	3/23/62	100	22.5	75
Other Rights					
Original Well 1 no action	G1*02486C	?	40	64	213
Original Well 2 no action	G1*04782C	2/21/58	150	169	563
7 & 8 (recharge) - study	G1-25428A	4/24/89		565	1,883

POLICY DECISION: Follow-up**Description**

There are no real policy decisions to be taken on the water rights currently waiting for action at Ecology.

Reactivation of rights associated with Original Wells 1 and 2, listed under Other Rights, has not been attempted. Wells 7 and 8 Recharge rights are addressed later in this write-up under item C "Recharge."

Study Requirements

None.

Interagency Agreements

Continued attention to action by Ecology on pending water right transfer requests.

Additional District System Requirements

None.

Additional Non-District System Requirements

None.

Estimated Date of Availability (Completion)

Following completion of Tri-County Basin Plan, estimated for planning purposes to occur in 5 years (2003).

Estimated ERUs

Well 3 @ 243 ERUs plus Mint Grove Transfer @ 75 ERUs = 318 ERUs

B. Conservation**B1. Existing Water Use Rate < 0.3 ac-ft/yr per ERU**

POLICY DECISIONS: Adopt a Planning Use Rate of < 0.3 ac-ft/year Average Annual Use/ERU

Description

The District currently uses the 0.3 ac-ft/year figure as the annual use rate defining an Equivalent Residential Unit ("ERU"). The January 8, 1998 report prepared by Dames and Moore, "Evaluation of Water System Capacity and Reliability and Ability to Serve Growth," noted that the District's per capita consumption in 1996 was 7% less than the 0.3 ac-ft/year. Redefining the amount of water used per ERU to a lower figure would essentially increase the number of ERUs the District could serve with existing water rights, on an annual average basis. The factor of safety or buffer associated with water use estimates and actual water rights would also be reduced.

Study Requirements

Review the historical District water use trends. Link trends to past conservation efforts and estimate the likelihood that a lower use rate will be maintained.

Interagency Agreements

Both DOH and Ecology have approved the current definition of an ERU. Recent discussions with DOH regarding this matter indicated they would likely approve a reduction in the ERU use rate definition. The Ecology is expecting implementation of conservation plans in compliance with the Coordinated Water Supply Plans that would lower the amount of water used by each ERU. [The District is supposed to lower per capita consumption by 8% during the period between 1990 to 2000.]

Additional District System Requirements

Conservation program development and maintenance would need to be improved. A Conservation Coordinator position should be considered.

Additional Non-District System Requirements

Conservation friendly State and Federal plumbing codes, and County building and landscape codes should be actively supported. Input to the creation of the City of Sammamish's building and landscape codes, where water resources are impacted, should also be considered.

Estimated Date of Availability (Completion)

Any ERUs would be available upon adoption of the District's updated Water Comprehensive Plan in mid-1999.

Estimated ERUs

Assume a 3% reduction rate until verified by study.

$$0.3 \text{ ac-ft/ERU} \times 97\% = 0.291 \text{ ac-ft/yr/ERU.}$$

$$\text{Plateau Zone Annual Water Rights} = 6,892.5 \text{ ac-ft/yr}$$

$$\text{Revised ERUs} = (6,892.5 \text{ ac-ft/yr}) / (0.291 \text{ ac-ft/yr/ERU}) = 23,685 \text{ ERUs}$$

$$\text{Increased ERUs} = 23,685 - 22,975 = 710 \text{ ERUs.}$$

B2. Future Program, such as 1% per year

POLICY DECISIONS: Adopt a Conservation Goal beyond that required by the Coordinated Water Supply Plan

Description

The District can implement future conservation programs to go beyond the Coordinated Water Supply Plan requirements alone or as part of a regional program. If regional water supplied by Seattle Public Utilities (SPU) is adopted as part of the District's supply program, the regional program would become a requirement. In either case, the SPU conservation program has been used as the basis of this evaluation.

In a news release by SPU on September 10, 1998, the utility announced its commitment to an aggressive regional water conservation initiative with the goal of attaining 1% per year reduction in personal water consumption. The initiative is derived from the Water Conservation Potential Assessment (CPA) put out by SPU earlier this year. Conservation measures for the CPA were developed under the criterion that no measure identified and analyzed will result in a loss of service or satisfaction for the customer. The initiative will begin by accelerating existing programs first while concurrently designing and testing new programs. The SPU conservation measures target customer water use through education and rebates on conservation products.

The District should also consider measures such as further reforming its water rate structure, which can be very effective but were not evaluated by SPU during this round of conservation planning as SPU has already optimized these programs.

Study Requirements

An evaluation of conservation measures is needed as well as an implementation plan to allocate resources.

Interagency Agreements

If the conservation plan is pursued through SPU, coordination with their planning efforts will be required. In the past the District has been active in regional groups such as the Water Conservation Coalition of Puget Sound. This group provides information on programs being implemented by its individual members as well as some regional efforts.

Additional District System Requirements

Due to the aggressive nature of the future conservation plan, it is recommended that the District hire a dedicated Conservation Coordinator to plan and implement the program.

Additional Non-District System Requirements

Potential Savings (as ERUs)

The savings laid out in the water conservation initiative are 1% per year, measured as per capita annual average water demand. Based on 30,000 ERUs in 2010 and a pre-conservation use rate of 0.3 af/year, the savings would equate to 0.03 af/ERU/yr or 900 acre-ft/year or 3,000 ERUs. The savings will increase steadily over the 10-year planning period.

Estimated Date of Water Availability

The SPU program will begin in 1999. The programs initiated by the District will likely start with the hiring of a Conservation Coordinator in 1999 and the full program can be launched by 2000. The savings will increase each year as new programs are introduced.

Estimated Cost

Based on the Water Conservation Potential Assessment, the average levelized cost over the 10 year period is \$ 0.86/ccf and the marginal levelized cost is \$ 1.99/ccf, which reflects the most expensive measure needed to achieve a particular volume of savings. These costs are

based on SPU peak savings. This would represent an estimated annual cost of approximately \$35,000, which does not include a Conservation Coordinator. These costs are based on the '10% Peak Savings Package' for SPU's Water Conservation Potential Assessment. Assumptions need to be verified.

NOTE: Given costs are based on peak savings for SPU's 10% program. Program costs may need to be modified once District peak water usage rates are factored into the calculation.

C. Recharge

To be supplied by Jim Carr at the meeting.

C1. Deep Aquifer Pilot Study

Current recharge program. The 1998 Deep Aquifer Pilot study recharged 51 ac-ft into the Plateau Deep Aquifer. This represents 170 ERUs if 100% of the recharged water is recoverable.

C2. Existing Recharge Water Right = 565 ac-ft/yr

This is an extension of the pilot study in C1 to the 565 ac-ft/year allowed by the Recharge Water Right. This represents 1700 ERUs, in addition to the 170 ERUs in C1, if 100% of the water is recharged and recoverable. C3. (see also J) Recharge Seattle Water to Groundwater

C3. (see also j) Recharge Seattle Water To Groundwater

Recharge surface water to the Issaquah Valley Aquifer before mixing it with the SPWSD distribution system. Then withdraw the water through the regular groundwater wells. The recharged water would be used to mitigate impacts to the area surface waters from pumping the groundwater.

C4. Additional Recharge Rights

If the recharge programs are successful, additional sources of water could be identified for recharge. This option is to identify water available that will not impact surface water sources, and obtain rights to recharge the water for use during peak use periods. Identification of the "non-impact" waters would be done through the groundwater model and the Tri-County Basin Plan.

D. Transfer of Existing Water Rights from Others

D1. Aldarra Farms Excess Water Rights

POLICY DECISIONS: Enter Negotiations to Obtain Excess Rights

Description

Purchase or trade for existing water rights held by the Aldarra/Boeing Farms property owners that are in excess of those required for their golf course.

Boeing Farms has four existing water rights, both surface and groundwater, used historically for operation of the Boeing Farms. The owners are in the midst of developing the Boeing Farms property for both a golf course facility and plat. The District has allocated water supply for the single family plats as well as clubhouse facilities associated with the golf course.

The existing water rights owned by Boeing Farms are in excess of those required for the golf course irrigation. Boeing Farms has started discussions with Ecology regarding the management of the water for golf course irrigation and return of at least some of the excess rights to the state. Last year the rights were described as follows:

Patterson Creek surface right = 0.4 cfs

Farm – pulls from a spring flowing to Patterson Creek – agreed not to use due to small stream flow and salmon

Canyon Creek surface right = 2.0 cfs

Spring on edge of ravine = 20 gpm active continually, 0.1 or 0.05 cfs source feeding class 4 system feeding Boeing, Duthie houses and barns.

Study Requirements

Determine the current stage of talks between Ecology and Boeing Farms.

Interagency Agreements

Ecology would need to approve any change in the point of diversion of these rights. It is quite possible that no other change, such as point of use, would be required.

Additional District System Requirements

No improvements beyond those required to provide service to the development of Aldarra Farms will be necessary.

Additional Non-District System Requirements

None.

Estimated Date of Availability (Completion)

Following completion of Tri-County Basin Plan, estimated for planning purposes to occur in 5 years (2003).

Estimated ERUs

The number of ERUs this could represent is unknown at this time. There may be 2.6 cfs available. There are 285 single family lots included in the Aldarra Farms plat proposal and 11.3 ERUs associated with the existing homes and golf course facility.

D2. Issaquah Water Rights

POLICY DECISIONS: Pursue Discussions on Regional Management of the Issaquah Valley Aquifer with Issaquah

Description

Regional management of the Issaquah Valley aquifer with the City of Issaquah could include the isolation of the groundwater and surface water service areas. One alternative would include the City of Issaquah being served entirely by surface water and all of the Issaquah Valley aquifer source be allocated to the District's service area. The corollary could also be proposed, with the District providing groundwater to the City and utilizing surface water within the District's boundaries.

Study Requirements

If pursued, this would require identification of sources and hardware necessary to accomplish the plan.

Interagency Agreements

Ecology approval of transfer of point of use from whichever municipality held the original right to the ultimate user of the right.

Issaquah and/or District would need to agree to give up the use of their right. The District Board has indicated the District will try to stay on groundwater to the greatest extent possible. Issaquah City Council discussions to date have also indicated a strong desire to maximize groundwater use. At this time it does not appear the City of Issaquah would be interested in divesting any of their groundwater rights.

D3. White River Basin Water Rights

POLICY DECISIONS: Pursue acquisition of White River Basin Water Rights and Transfer to the District

Description

As identified in the April 1998 Dames and Moore Report, a private owner is going to stop use of a water right. The current use discharges water to the White River, enhancing the water available for fish. If the District could acquire the water right, it would be managed to continue discharge to the White River as mitigation for potential impacts in the Cedar River basin.

Interagency Agreements

Ecology must approve the interbasin transfer. The Southwest Regional office of the Ecology indicated an interest in the plan, but the Northwest Regional office indicated they would not recommend approval.

E. Reuse

The concept of using reclaimed water to offset or replace potable water demand is one that the District has evaluated. In 1995, the District teamed with Port Blakely Communities to evaluate the potential of using reclaimed water in suitable applications, such as landscape irrigation, commercial/industrial uses and groundwater recharge. Additional potential benefits from the concept were the potential of revenue from reclaimed water sales, deferral of the SE Sammamish Interceptor, deferral of additional water supply facilities, reduction of the annual sewer rate paid to King County (formerly known as Metro), and the inclusion of avoided costs from Metro. The conclusion of the study was that a reuse facility could be beneficial, as well as cost-effective for the District, if the sewer service agreement with King County could be modified to decrease sewer charges, or if King County would share in the costs. In addition, the use of reclaimed water in the Lake Washington drainage basin was not allowed at the time.

Since 1995, a number of changes have occurred that make the potential for using reclaimed water more attractive. First, the reuse standards have been finalized by the Washington State Departments of Health and Ecology. The standards include provisions for using reclaimed water for groundwater recharge and wetlands enhancement. Secondly, Ecology has also recommended that the use of appropriately treated reclaimed water that met the reuse standards could be used for discharge to the Lake Washington drainage basin under certain circumstances. The last significant change is that King County has been granted water rights for reclaimed water produced from its facilities, and is therefore exploring options for the treatment and use of reclaimed water throughout the county. An article from the November 25, 1998 edition of the Eastside Journal referred to a special \$1 million fund set aside by the King County Natural Resources Department for projects promoting the use of recycled water.

The following discussions evaluate the potential for the District to use reclaimed water as a means to procure additional potable water rights and decrease demands on their water system.

E1. Aldarra Farms Package Plant for Golf Course Water Rights

POLICY DECISIONS: Promotion of Reused Water with Aldarra Farms Golf Course Owners and Operation of a Wastewater Treatment Plant within the District.

Description

Aldarra Farms is located in the southeastern portion of the District. The development is proposing to use existing groundwater rights to water a future 18-hole golf course.

It may be possible to negotiate with the owners of Aldarra Farms to transfer their water rights to the District, in exchange for reclaimed water to be used on the golf course. The District would own and operate a small package treatment plant to treat District wastewater and provide reclaimed water to the golf course for irrigation. Typically, it is assumed that an 18-hole golf course will use up to 0.5 mgd during the peak summer months. This rate would require facilities capable of supplying approximately 350 gpm (0.5 mgd) of water during the peak day.

Study Requirements

Promotion of the idea: Discussions need to be held with the owners of Aldarra Farms to determine if they are willing to give up their water rights in exchange for reclaimed water. Prior to implementation of any water reuse project, it is highly recommended that a public education effort be undertaken to inform and educate the public of the proposed project and address any issues that may arise early in the process. Without a meaningful public involvement process, a reuse project can easily become derailed.

An engineering report is required to assess the water quality of the District's wastewater and prepare a design that meets with Ecology's approval for the proposed use of reclaimed water on the golf course. There are other facilities in Washington that now irrigate with reclaimed water, so a precedent has been set, and Ecology is expected to be supportive of the proposal.

Currently, King County is the only designated agency to own and operate a wastewater treatment facility within their service area. Whether that responsibility could be transferred to the District, or whether King County would be required to own and operate the package plant, is an issue to be resolved.

Would the District be able to use those water rights year round, or only during the time that reclaimed water would have been delivered to the golf course?

Interagency Agreements

The District would need to work with Ecology and Aldarra Farms to develop an agreement to transfer groundwater rights in exchange for reclaimed water.

King County would need to be consulted regarding the operation of the plant.

Additional District System Requirements

The District would be required to construct a wastewater treatment plant and distribution system to convey the water to the point of use.

Additional Non-District System Requirements

TBD

Potential ERUs

The number of potential ERUs is dependent on the amount of water rights transferred and the time frame of use. As a high estimate, if the full 500,000 gpd could be assumed as a year round right to the water, then that would be the equivalent of 1,825 ERUs, based on an annual average of 0.3 ac-ft/ERU. This should be considered a maximum potential.

Estimated Date of Water Availability

Package plants for use with golf courses are already in use in the area (Snoqualmie Ridge). The ability of the District to pursue water reuse as a water supply option is likely dependent on the golf course owners' willingness to use the technology. A plant would take an estimated 3 years to design and construct. If a project were started immediately, water rights could be available for transfer in 2002.

Estimated Cost

The costs will vary depending on the amount of distribution system required, where the facility is located, the type of storage used, methodology of solids handling, and manufacturer of package plant facilities. A 0.5 mgd Class A treatment facility is roughly estimated from \$3.5 million to \$5.5 million.

King County's Natural Resources Department has a \$1 million fund for projects that promote the use of recycled water. This fund will be distributed in 1999. The District has made an initial application for this fund, but may want to be aggressive in pursuit of this money, as others are also vying to be chosen for funding.

E2. Beaver Dam Package Plant for Golf Course Water Rights

POLICY DECISIONS: Promotion of Reused Water with Plateau (Beaver Dam) Golf Course Owners and Operation of a Wastewater Treatment Plant within the District.

Description

The Plateau Golf Course is located in the eastern portion of the District. The development is proposing to use existing groundwater rights to water an 18-hole golf course.

This option is virtually identical to 'E1' for Aldarra Farms. There are no outstanding issues known at this time, which would make this option different than the Aldarra Farms option.

Study Requirements

Same as E1.

Interagency Agreements

Same as E1.

Additional District System Requirements

Same as E1.

Additional Non-District System Requirements

Same as E1.

Potential ERUs

Same as E1.

Estimated Date of Water Availability

Same as E1.

Estimated Cost

Same as E1.

E3. Other Irrigation Uses

POLICY DECISIONS: Promotion of Reused Water for irrigation uses within the District, Consider Requiring Use of Reused Water When Available and Operation of a Wastewater Treatment Plant within the District

Description

Assuming that the District is able to establish an operational Class A treatment facility, then the reclaimed water generated could be used for nearly any other irrigation use. In the previous District reuse study (1995, CH2M HILL), irrigation records were evaluated to estimate current irrigation demands within the District's service area. At that time (1992 and 1993), irrigation was estimated to account for nearly 43 percent of the District's total water demand (minus total single-family water use). Irrigation demands in four areas were evaluated and projected out 10 years to estimate the average seasonal and peak day demand. The largest irrigation area, out of the four analyzed, was the Klahanie area (which included Beaver Lake), with a 1994 average seasonal demand of 0.22 mgd and peak day demand of 0.31 mgd. This was projected to more than double in the next 10 years. The second largest area for irrigation demand was estimated to be in the Control Structure area, which included Providence Point and Pine Lake. This area represented nearly two-thirds of the irrigation demand estimated in the Klahanie area.

When analyzing potential irrigation sites, Class A reclaimed water is suitable for irrigation of parks, schools, common areas, cemeteries, and commercial landscape. In some communities, single family landscapes are also irrigated with reclaimed water.

If either the Aldarra Farms and Beaver Dam water rights/reuse projects were to be implemented, it is likely that the District could offset additional peak demands by expanding the reclaimed water irrigation system to include appropriate sites, particularly within the Klahanie area.

The District may consider implementing a resolution that requires reclaimed water to be used for irrigation when such a source is available. Other communities have adopted such measures to 'encourage' customers to make full use of the alternative water source.

Study Requirements

A master plan of the designated area could be developed to determine the largest irrigation user in the area and develop the most effective set of facilities to serve the designated sites.

Prior to implementation of any water reuse project, it is highly recommended that a public education effort be undertaken to inform and educate the public of the proposed project and address any issues that may arise early in the process. Without a meaningful public involvement process, a reuse project can easily become derailed.

Interagency Agreements

If the use of reclaimed water is not made mandatory through District policy, then the District may want to investigate developing agreements with each of the irrigation users to ensure that the water will be used when provided.

An engineering report is required to assess the water quality of the District's wastewater and prepare a design that meets with Ecology's approval for the proposed use of reclaimed water for irrigation.

Currently, King County is the only designated agency to own and operate a wastewater treatment facility within their service area. Whether that responsibility could be transferred to the District, or whether King County would be required to own and operate the package plant, is an issue to be resolved.

Additional District System Requirements

A dedicated distribution system is required for the delivery of reclaimed water. If an irrigation system is already in place that can be completely disconnected from the potable water system, then the existing system can be converted. If that is not the case, then a separate dual irrigation distribution system is required.

Additional Non-District System Requirements

TBD

Potential ERUs

The number of potential ERUs that could be realized with the use of reclaimed water for other irrigation sites is unknown at this time. (Look at Klahanie & Providence Point irrigation meters.)

Estimated Date of Water Availability

The ability of the District to pursue water reuse as a water supply option outside of a package plant is likely dependent on the County's findings in their Water Reuse Technology Assessment project, which is slated to begin in early 1999. The results of that study are estimated to be available in early 2002. If the District follows the County study closely, obtains the water rights, and prepares the engineering report, then the District could potentially have a reuse facility operational in 2004. This water could be available for irrigation use once the treatment plant is operational and the distribution system is installed. It is estimated that this could occur after 2004.

Estimated Cost

The cost will depend on the distribution facilities required.

E4. Other Exchange/Mitigation for Water Rights

POLICY DECISIONS: Pursuing Potential of Groundwater Source Approval by Ecology through Mitigation of Surface Waters by Augmenting Flows Operation of a Wastewater Treatment Plant within the District

Description

Assuming that the District is able to establish an operational Class A treatment facility, then the reclaimed water generated could be used for augmenting stream flows to mitigate for any hydraulic continuity between the District's groundwater wells and the nearby surface

waters. The water quality required for either direct discharge to a surface water or through an injection well would probably be higher than that used for irrigation.

Study Requirements

The level of treatment and quantity of water that could be discharged to surface water sources during different seasons would need to be established.

Prior to implementation of any water reuse project, it is highly recommended that a public education effort be undertaken to inform and educate the public of the proposed project and address any issues that may arise early in the process. Without a meaningful public involvement process, a reuse project can easily become derailed.

Interagency Agreements

The Ecology would need to accept the reused water as mitigation for additional water rights.

An engineering report is required to assess the water quality of the District's wastewater and prepare a design that meets with Ecology's approval for the proposed use of reclaimed water for streamflow augmentation.

Currently, King County is the only designated agency to own and operate a wastewater treatment facility within their service area. Whether that responsibility could be transferred to the District, or whether King County would be required to own and operate the plant, is an issue to be resolved.

Additional District System Requirements

A wastewater treatment plant, and distribution piping.

Additional Non-District System Requirements

TBD

Potential ERUs

The number of potential ERUs that could be realized with the use of reclaimed water for other irrigation sites is unknown at this time. (Well 9's application for 1,608 ac-ft/yr = 5,360 ERUs.)

Estimated Date of Water Availability

The ability of the District to pursue water reuse as a water supply option outside of a package plant is likely dependent on the County's findings in their Water Reuse Technology Assessment project, which is slated to begin in early 1999. The results of that study are estimated to be available in early 2002. If the District follows the County study closely, obtains the water rights, and prepares the engineering report, then the District could potentially have a reuse facility operational in 2004.

In addition, the Tri-County Basin Plan would need to be completed, estimated at 5 years from now, or 2003.

Estimated Cost

The cost will depend on the level of treatment required.

F. New Ground Water Rights

TABLE F-1

New Water Right Applications for Sammamish Plateau Water and Sewer District

Well No.	Certificate Number	Priority Date	Water Rights		
			Inst. (gpm)	Annual (Af/yr)	ERUs (0.3 AF/ERU)
New Rights					
New Rights for 9	G1-26014A	12/24/90	2,000	1,608	Denied
11.1 S	G1-26573	4/22/92	500	400	Denied
15	App Submitted	12/10/97	1600		Pending
15 (supplemental)	App Submitted	12/10/97		1000	Pending

F1. Issaquah Valley Aquifer Water Rights (Well 9)

POLICY DECISIONS: Postpone Potential Acquisition of Rights (Tri-County Basin Plan Completion)

Description

The District has been denied any new groundwater rights in the Issaquah Valley Aquifer, as demonstrated by the Well 9 application. Even seasonally restricted rights were not issued. If the District wants to pursue new groundwater rights from the Issaquah Valley Aquifer it is clear any positive action by the Ecology would be delayed until the Tri-County Basin Plan is completed. Whether or not they would be granted at that point is unknown.

Study Requirements

Past well drilling and testing has shown where water can be found (Well 9). Results of the modeling currently underway by AGI may be required by Ecology to demonstrate the likely recharge and discharge areas for any groundwater to be drawn from the aquifer.

Interagency Agreements

Ecology approval.

Additional District System Requirements

Well 9 is ready for operation.

Additional Non-District System Requirements

None.

Estimated Date of Availability (Completion)

Following completion of Tri-County Basin Plan, estimated for planning purposes to occur in 5 years (2003).

Estimated ERUs

Well 9's application for 1,608 ac-ft/yr = 5,360 ERUs.

F2. Shallow Plateau Aquifer Water Rights (Well 15)***POLICY DECISIONS: Postpone Potential Acquisition of Rights (Tri-County Basin Plan Completion)*****Description**

The District has not been denied any new groundwater rights in the Shallow Plateau Aquifer, but the same general issues that exist in the Issaquah Valley Aquifer are present in this aquifer. One primary difference is the possibility that a portion of this aquifer drains to the Snoqualmie basin. If the District wants to pursue new groundwater rights from the Shallow Plateau Aquifer it is likely any positive action by the Ecology would be delayed until the Tri-County Basin Plan is completed. Whether or not they would be granted at that point is unknown.

Study Requirements

Past well drilling and testing has shown where water can be found (Well 15). Results of the modeling currently underway by AGI may be required by Ecology to demonstrate the likely recharge and discharge areas for any groundwater to be drawn from the aquifer.

Interagency Agreements

Ecology approval.

Additional District System Requirements

Complete development and construction of Well 15.

Additional Non-District System Requirements

None.

Estimated Date of Availability (Completion)

Following completion of Tri-County Basin Plan, estimated for planning purposes to occur in 5 years (2003).

Estimated ERUs

Well 15's application for 1,000 ac-ft/yr is currently for a supplemental right. If this were changed to a new water right it would be equivalent to 3,333 ERUs.

F3. Deep Plateau Aquifer Water Rights

POLICY DECISIONS: Postpone Potential Acquisition of Rights (Tri-County Basin Plan Completion)

Description

The District has been denied any new groundwater rights in the Deep Plateau Aquifer, as demonstrated by the Well 11.1S application. If the District wants to pursue new groundwater rights from the Deep Plateau Aquifer it is likely any positive action by the Ecology would be delayed until the Tri-County Basin Plan is completed. Whether or not they would be granted at that point is unknown.

Study Requirements

Past well drilling and testing has shown where water can be found (Well 11.1S). Results of the modeling currently underway by AGI and the Recharge Study may be required by Ecology to demonstrate the likely recharge and discharge areas for any groundwater to be drawn from the aquifer.

Interagency Agreements

Ecology approval.

Additional District System Requirements

Well 11.1S is almost ready for operation. To fully utilize the deep plateau aquifer (deep and deeper) it is likely that new wells will need to be drilled or old wells rehabilitated.

Additional Non-District System Requirements

None.

Estimated Date of Availability (Completion)

Following completion of Tri-County Basin Plan, estimated for planning purposes to occur in 5 years (2003).

Estimated ERUs

Well 11.1S's application was for 400 ac-ft/yr = 1,333 ERUs.

F4. Snoqualmie Valley Wells Water Rights (Section 5 and __)

POLICY DECISIONS: Move the search for groundwater rights further from the District, and Postpone Potential Acquisition of Rights (Tri-County Basin Plan Completion)

Description

The District has recently directed AGI to look for groundwater sources in the Snoqualmie Valley. If the District pursues new groundwater rights from the Snoqualmie Valley Aquifer it is likely any positive action by the Ecology would be delayed until the Tri-County Basin Plan is completed. Whether or not they would be granted at that point is unknown. The Snoqualmie Valley was chosen for further exploration as that basin has not been closed.

Study Requirements

Test well drilling and testing may be required. Modeling currently underway by AGI may be extended into this area, and other information from the Snoqualmie basin being gathered in conjunction with the North Bend project added as well. This model may be required by Ecology to demonstrate the likely recharge and discharge areas for any groundwater to be drawn from the aquifer.

Interagency Agreements

Ecology approval.

Additional District System Requirements

Wells and pipelines would be required. The pipeline requirements and costs could be significant due to the location of the wells away from the District, and the sensitive areas that might need to be crossed.

Additional Non-District System Requirements

Franchises and easements for pipeline corridors.

Estimated Date of Availability (Completion)

Following completion of Tri-County Basin Plan, estimated for planning purposes to occur in 5 years (2003).

Estimated ERUs

Unknown at this time.

F5. North Bend Aquifer to River to Ground Water Rights (EKCRWA)

POLICY DECISIONS: Support and Continue the North Bend Aquifer Study, Move the search for groundwater rights further from the District, and Postpone Potential Acquisition of Rights (Tri-County Basin Plan Completion)

Description

The District has been involved in the EKCRWA effort to develop the North Bend Aquifer for some time. This effort would be a variation on the proposal to pump the North Bend Aquifer wells to the Snoqualmie River and use the river as a transportation “pipeline” to bring the water to lower reaches of the Snoqualmie River, where it would be diverted as a surface water source. In this option, wells in the vicinity of the Snoqualmie River (in hydraulic continuity) would be drilled and pumped for a groundwater source that would have been mitigated by the North Bend Well’s discharge. If the District pursues these new groundwater rights from the Snoqualmie Valley Aquifer it is likely any positive action by the Ecology would be delayed until the Tri-County Basin Plan is completed. Since the North Bend project is a “Regional” effort, Ecology might give it priority over non-regional applications. Whether or not they would be granted at that point is unknown.

Study Requirements

Continued development of the North Bend Aquifer Project will be required along with test well drilling for a diversion point. Modeling currently underway by AGI may be extended and conjoined with the North Bend study. This model may be required by Ecology to demonstrate the likely recharge and discharge areas for any groundwater to be drawn from the aquifer.

Interagency Agreements

EKCRWA project continuation and approval along with Ecology approval.

Additional District System Requirements

Wells and pipelines would be required. The pipeline requirements and costs could be significant due to the location of the wells away from the District, and the sensitive areas that might need to be crossed.

Additional Non-District System Requirements

Franchises and easements for pipeline corridors.

Estimated Date of Availability (Completion)

Following completion of Tri-County Basin Plan, estimated for planning purposes to occur in 5 years (2003). Completion of the North Bend Project would also be required. This may be another 10 to 15 years.

Estimated ERUs

Unknown at this time.

G. Seattle/Regional Water through South "Issaquah" Pipeline

G1. Blend with Plateau Zone

POLICY DECISIONS: Level of Participation in the "Issaquah" pipeline. Use of blended surface/ground-water sources.

Description

Water supplied through the Issaquah Pipeline would come from the Seattle regional system through the City of Bellevue. The water for the majority of the time would be from Seattle's Cedar River source.

Water supplied through the "Issaquah" Pipeline can be handled in two ways. The following discussion evaluates blending with SPWSD groundwater. Blending of the two sources may result in water quality effects and will require additional treatment.

Study Requirements

Issaquah Pipeline Study Requirements include:

- Prepare Issaquah Pipeline timeline regarding the siting and SEPA.

- Identify the amount of water the District would obtain from the pipeline
- Prepare draft cost sharing options
- Clarify options for joining CWA and regional facilities purchase option

Water Quality Study Requirements include:

- Bench-scale water quality compatibility studies. Water quality studies will help determine the amount and cost of required treatment, such as chlorination and manganese removal.
- District pipeline improvement and treatment facility siting studies and an Environmental Impact Statement or Declaration of Non-Significance are required.

Some initial consideration of the data from the two different waters follows.

The data in Table G.1-1 shows that the surface water has a higher pH than the groundwater, which would indicate that it is less corrosive; however, it also has lower alkalinity and hardness, indicating that it has a lower buffering capacity. Buffering helps to stabilize the corrosive quality of water. The mix of the two sources is likely to make the combined water less corrosive.

The surface water is slightly higher in turbidity, but not significantly. The surface water also generally has lower levels of metals and nutrients than the groundwater.

The most significant parameter is the presence of a chlorine residual in the surface water. Chlorine is an oxidant and therefore will tend to oxidize the metals in the District's groundwater. This blending approach may require additional treatment to remove the manganese. Since the surface water is chlorinated, the groundwater will also need to be chlorinated to be compatible in the distribution system. Without chlorination, the groundwater would tend to dilute the chlorine residual in the surface water and increase the potential for regrowth in the distribution system.

Finally, fluoride is added to the surface water for dental benefits. Although this is not a water quality concern for the District, it may be of interest to District customers.

The water quality of the two sources is summarized in Table G.1-1.

TABLE G.1-1
Water Quality Comparison

Water Quality Parameter	District Groundwater	SPU Surface Water (Cedar)
Turbidity	<0.10-0.37	0.11-0.78
TDS (mg/L)	110-130	ND
Temperature (C)	ND	4.8-21.5
Color (CU)	<5	ND
pH	6.8-7.7	7.1-8.0
Alkalinity (mg/L as CaCO ₃)	76-88	14-26
Hardness (mg/L as CaCO ₃)	62-75	16-27
Iron (mg/L)	<0.05-0.12	0.01-0.06
Manganese (mg/L)	<0.010-0.133	ND

TABLE G.1-1
Water Quality Comparison

Water Quality Parameter	District Groundwater	SPU Surface Water (Cedar)
Lead (mg/L)	<0.002	<0.001
Copper(mg/L)	<0.02	<0.03
Phosphorus (mg/L)	ND	0.004-0.007
Nitrate-N (mg/L)	<0.5-3.9	0.013-0.3
Total Organic Carbon(mg/L)	ND	0.4-1.0
Chlorine Residual (mg/L)	None	1.5 (estimated)
Total Trihalomethanes (mg/L)	ND	<0.01 (at Lake Youngs) 0.015-0.035 (formation potential)
Fluoride (mg/L)	<0.5 (None added).	1.2 (estimated)

*Cedar data from *Cedar Pilot Study Final Report*, January 1996 and *Lake Youngs Reservoir Studies Final Report*, January 1996. ND – No data available from these sources.

Interagency Agreements

The City of Issaquah has adopted an approach of purchasing water from the City of Bellevue. Using this approach would make the District an extension of the service area of Bellevue; outside their City limits and would be subject to conditions that Bellevue must abide by in their contract with Seattle Public Utilities. The District would need to agree to SPU's terms and conditions, which include implementing conservation measures and turning the pipeline over to CWA. A direct agreement with SPU might also be possible.

Agreements still required include but are not limited to:

- Service agreement with Bellevue
- Bellevue requires agreement from Seattle on expanding its service area
- Agreements with developers for cost-sharing
- Agreement with landowners for easements

Additional District System Requirements

Additional treatment and conveyance would likely be required to implement this option.

Additional pipelines, storage facilities, and pumping stations may also be required.

Additional Non-District System Requirements

This option is contingent on the development of the "Issaquah" Pipeline.

Estimated Date of Water Availability

The "Issaquah" pipeline is currently planned for completion in June of 2001 however with the many hurdles in front of the project an on-line date of June 2003 is more realistic. The schedule of 2001 is predicated on the need to meet schedule constraints imposed by the Issaquah Highlands development and City of Issaquah.

Potential Supply (as ERUs)

The present assumption is that the Plateau will use 3500 gpm on the peak day. (Based on Issaquah's initial pipeline sizing assumptions for the District to serve 7000 ERUs at 0.5 gpm/ERU peak day use.) The amount of water necessary could be more or less, depending on what other sources would be used in conjunction with the water delivered through the Issaquah pipeline.

Estimated Cost

The estimated cost of the pipeline without any additional District facilities is \$12,500,000.

Additional costs for District facilities will most likely increase this cost significantly.

G2. Isolate

a. 297/Freegard

POLICY DECISIONS: Use of Surface Water in a Portion of the System – 297/Freegard Area. Level of Participation in the “Issaquah” pipeline.

Description

Water supplied through the Issaquah Pipeline would come from the Seattle regional system through the City of Bellevue. The water for the majority of the time would be from Seattle's Cedar River source.

This discussion concerns isolating a portion of the District's system for use with surface water, while keeping the remainder of the system on only groundwater source. The area designated in this alternative is the 297 zone in the Freegard area. The area is primarily commercial with a limited amount of existing single family residential and new multi-family residential. It is also entirely within the area currently being studied for annexation by the City of Issaquah.

Study Requirements

Issaquah Pipeline Study Requirements include:

- Prepare Issaquah Pipeline timeline regarding the siting and SEPA.
- Identify the amount of water the District would obtain from the pipeline
- Prepare draft cost sharing options
- Clarify options for joining CWA and regional facilities purchase option

Service Area Study Requirements include:

- Definition of the boundary of the area.
- Storage facilities required to provide year-round emergency and standby storage.
- Identify additional transmission and distribution piping required to segregate the District groundwater supply sources in the Freegard area from the distribution system used to deliver the surface water.
- District treatment facility requirements including siting studies and SEPA.

Interagency Agreements

See the G1 Blend with Plateau Zone Section including

Supply agreements from either the City of Bellevue or Seattle Public Utilities.

Agreements with the City and/or Developers for Cost Sharing.

Agreements with landowners for easements.

Additional District System Requirements

Storage, treatment and conveyance systems for the surface water distribution.

Additional transmission and distribution facilities to isolate the groundwater supply system within the Freegard area.

Additional Non-District System Requirements

This option is contingent on the development of the “Issaquah” Pipeline.

Estimated Date of Availability (Completion)

The “Issaquah” pipeline is currently planned for completion in June of 2001 however with the many hurdles in front of the project an on-line date of June 2003 is more realistic.

Development and installation of District facilities to make isolation of the Freegard area possible would need to be identified, permitted, designed and installed. The exact timeframe is unsure at this time as the facilities have not even been identified.

Estimated ERUs

The District currently supplies approximately 330 ERUs, based on annual use rates, to the non-residential customers in the Freegard area. The District also has Developer Extension Agreements for approximately 300 ERUs in the Freegard area. There is additional area that is not included in either of these two categories that is currently under study for identification of potential water use demands.

G2. Isolate (continued)

b. 297/Freegard + 650 South End

POLICY DECISIONS: Use of Surface Water in a Portion of the System – 297/Freegard + 650 South. Level of Participation in the “Issaquah” pipeline.

Description

Water supplied through the Issaquah Pipeline would come from the Seattle regional system through the City of Bellevue. The water for the majority of the time would be from Seattle’s Cedar River source.

This option also concerns isolating a portion of the District’s system for use with surface water while keeping the remainder of the system on only groundwater source. However, the area designated in this alternative is larger, including the 297 zone in the Freegard area as well as the 650 zone in the southern area of the District.

This option is intended to designate an area that could be isolated from the District's groundwater service area, and contain enough ERUs to satisfy the District needs for growth with surface water. (Approximately 5500 ERUS.) Much of the area is within the area currently being studied for annexation by the City of Issaquah.

The boundaries of the surface water area are still being identified by staff. Generally, those areas being considered include Freegard, East Lake Sammamish Parkway south of SE 43rd Way, Providence Point, areas south of SE 42nd Way between Providence Point and Issaquah-Pine Lake Way, Klahanie and areas along Issaquah-Fall City Road south of Klahanie.

Study Requirements

Issaquah Pipeline Study Requirements include:

- Prepare Issaquah Pipeline timeline regarding the siting and SEPA.
- Identify the amount of water the District would obtain from the pipeline
- Prepare draft cost sharing options
- Clarify options for joining CWA and regional facilities purchase option

Service Area Study Requirements include:

- Definition of the boundary of the area to include 5500 ERUs.
- Storage facilities required to provide year-round emergency and standby storage.
- Identify additional transmission and distribution piping necessary to segregate the District groundwater supply sources in the surface water area from the distribution system used to deliver the surface water.
- District treatment facility requirements including siting studies and SEPA.

Interagency Agreements

See the G1 Blend with Plateau Zone Section including:

- Supply agreements from either the City of Bellevue or Seattle Public Utilities.
- Agreements with the City and/or Developers for Cost Sharing.
- Agreements with landowners for easements.

Additional District System Requirements

Storage, treatment and conveyance systems for the surface water distribution.

Additional transmission and distribution facilities to isolate the groundwater supply system within the surface water area.

Additional Non-District System Requirements

This option is contingent on the development of the "Issaquah" Pipeline.

Estimated Date of Availability (Completion)

The "Issaquah" pipeline is currently planned for completion in June of 2001 however with the many hurdles in front of the project an on-line date of June 2003 is more realistic.

Development and installation of District facilities to make isolation of the surface water service area possible would need to be identified, permitted, designed and installed. The exact timeframe is unsure at this time as the facilities have not even been identified.

Estimated ERUs

This option is designed to utilize the existing District groundwater rights for 22975 ERUs plus 565 ac-ft/year of recharge water rights (1800+ ERUs) in the middle and north portions of the Plateau Zone. Surface water from the Seattle/Regional system would be used to make up the 5,500 ERU shortfall in the 30,000 ERU buildout figure.

H. Seattle/Regional Water through North Cascade View Connection

***POLICY DECISIONS:** Pursue development of the north link to the regional system. Use of blended surface/ground-water sources.*

Description

Water supplied through Tolt Pipelines 1 and 2 could be delivered to the District through a connection on the north end of the District. The Cascade View area is within a short distance of the new Tolt Pipeline 2, which bisects the new planned developments on Novelty Hill Road. The water for the majority of the time would be from Seattle's Tolt River source.

Water supplied through Tolt Pipeline can be handled in two ways. The following discussion evaluates blending with SPWSD groundwater. Blending of the two sources may result in water quality effects and will require additional treatment.

Study Requirements

Little to no work has been completed on this option. All decisions normally encountered, which include but are not limited to, use agreements, land rights-of way, service agreements, SEPA, design, are required.

North Link to the Regional System Study Requirements include:

- Prepare options for connection to the north regional system. Identify potential pipeline locations and timelines.
- Identify the amount of water the District would obtain from the pipeline.
- Prepare draft cost options, and possible shared facilities.
- Clarify options for joining CWA.

Water Quality Study Requirements include:

- Bench-scale water quality compatibility studies should be completed prior to making a final decision regarding this issue. Water quality studies will help determine the amount and cost of required treatment, such as chlorinating and manganese removal.

Some initial consideration of the data from the two different waters follows.

The data in Table H.1-1 shows that the surface water has a higher finished water pH than the groundwater which would indicate that it is less corrosive; however, it also has lower alkalinity and hardness, indicating that it has a lower buffering capacity. Buffering helps to stabilize the corrosive quality of water. The mix of the two sources is likely to make the combined water less corrosive.

The surface water is slightly higher in turbidity, but not significantly. However, the a filtration treatment plant is currently being constructed on the Tolt supply which will result in improved water quality, including turbidity, total suspended solids, total organic carbon, and color reduction. The levels of metals and nutrients in the surface water are not a concern for blending with the District's groundwater.

Most significant parameter is the presence of a chlorine residual in the surface water. Chlorine is an oxidant and therefore will tend to oxidize the metals in the District's groundwater. This blending approach may require additional treatment to remove manganese from some of the District's wells. Since the surface water is chlorinated, the groundwater will also need to be chlorinated to be compatible in the distribution system. Without chlorination, the groundwater would tend to dilute the chlorine residual in the surface water and increase the potential for biological regrowth in the distribution system.

Finally, fluoride is added to the surface water for dental benefits. Although this is not a water quality concern for the District, it may be of interest to District customers.

The water quality of the two sources is summarized in Table H.1-1 below.

TABLE H1.1
Water Quality Comparison

Water Quality Parameter	District Groundwater	SPU Surface Water (Tolt)*
Turbidity	<0.10-0.37	0.4-3.8
TDS (mg/L)	110-130	16.5-27
Temperature (C)	ND	4.0-14.0
Color (CU)	<5	9-19
pH	6.8-7.7	6.7-6.9 (source) target 8.0 (finished water)
Alkalinity (mg/L as CaCO ₃)	76-88	4-6
Hardness (mg/L as CaCO ₃)	62-75	8-10
Iron (mg/L)	<0.05-0.12	0.06-0.18
Manganese (mg/L)	<0.010-0.133	0.005-0.014
Lead (mg/L)	<0.002	<0.001
Copper(mg/L)	<0.02	<0.01
Phosphorus (mg/L)	ND	ND
Nitrate-N (mg/L)	<0.5-3.9	0.11-0.25
Total Organic Carbon (mg/L)	ND	1.5-3.0
Chlorine Residual (mg/L)	None	1.5 (estimated)
Total Trihalomethanes (mg/L)	ND	<0.04 (at source) 0.070-0.085 (formation potential)
Fluoride (mg/L)	<0.5 (None added).	1.2 (estimated)

TABLE H1.1
Water Quality Comparison

Water Quality Parameter	District Groundwater	SPU Surface Water (Tolt)*
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*Tolt data from *South Fork Tolt Pilot Study Final Report*, October 1982. Note that a filtration plant is currently under construction on the Tolt source and finished water quality conditions may change for some parameters. The plant also practices corrosion control through pH adjustment. ND – No data available from these sources.

Interagency Agreements

This approach would make the District a purveyor of water supplied by Seattle Public Utilities. The District would need to agree to SPU's terms and conditions, which include implementing conservation measures and possibly turning pipelines over to CWA.

Agreements still required include but are not limited to:

- Purveyor contract with Seattle
- Agreements with developers for cost-sharing
- Agreement with landowners for easements

Additional District System Requirements

Additional treatment and conveyance would likely be required to implement this option.

Additional pipelines, storage facilities, and pumping stations may also be required.

Additional Non-District System Requirements

TBD

Potential Supply (as ERUs)

This option could serve all 7000 ERU's if required.

Estimated Date of Water Availability

The pipeline is not currently planned for the Seattle Public Utilities or the developers of the master planned communities. Many hurdles would be in front of this project an on-line date of between 2005 and 2008 is realistic.

Estimated Cost

TBD

I. North Bend Aquifer to River to Snoqualmie River Treatment Plant

POLICY DECISIONS: *Continue to invest in the EKCRWA. Use of blended surface/ground water sources.*

Description

The East King County Regional Water Association has been pursuing groundwater in the Snoqualmie Aquifer (formerly titled North Bend Aquifer) for use as a regional water supply. Earlier studies and pump tests have indicated that up to 40 mgd could be available from the groundwater source. In 1996, three alternative pipeline routes were evaluated to convey the water from the area of the ?? fork of the Snoqualmie River to eastside utilities.

In 1997, a fourth alternative was presented which would involve pumping water from the aquifer to the Snoqualmie River. Water would then be diverted in the locale of Duvall and treated at a filtration plant before being discharged into a distribution system. Ecology appears to be supportive of this alternative because of the benefits associated with enhancing streamflows in the fall.

In 1998, a work plan was submitted to Ecology for approval of a preliminary permit to conduct additional studies to better determine the viability of the proposed water source. The additional work is estimated to cost approximately one million dollars. The work could begin anytime within the next 3 years.

Currently, the Board is considering how to finance the additional studies and whether to conduct them under the 3-year permit, under the existing water right application, or within a SEPA process.

It is anticipated that it would be 10 to 12 years before the water source is ready for public consumption.

Study Requirements

To better determine the capacity and viability of the Snoqualmie aquifer, additional studies and pump tests are required. The current estimate for the additional work is approximately \$1 million to be conducted within the next 3 years.

A Basin Plan may be required.

The SEPA process still needs to be conducted.

Identify what portion of the Snoqualmie Aquifer supply would be allocated to the District.

This will be a surface water, and as such, would likely require additional treatment when blended with District groundwater, or may require isolation of a portion of the system.

Interagency Agreements

The EKCRWA is comprised of twelve utilities: Cedar River Water and Sewer District, Coal Creek Utility District, Sammamish Plateau Water and Sewer District, Northeast Sammamish Sewer and Water District, King County Water District #119, Covington Water District, and

the Cities of Renton, Snoqualmie, Duvall, Issaquah, Kirkland and Redmond. Concurrence must be reached by all represented utilities before procuring water supply.

Tribal agreement would also be required prior to implementing project.

Ecology would need to issue water rights associated

Additional District System Requirements

Assuming that a filtration plant is constructed near Duvall, the District would need to construct a pipeline and pump station from Duvall, across the Snoqualmie Valley, under the Snoqualmie River, and up to the Plateau to tie the water into their distribution system at the southeast portion of the system. It is possible that the ECRWA may pay a portion of the conveyance costs, depending on the utilities that would benefit from the facilities.

Additional Non-District System Requirements

TBD

Potential ERUs

Varies depending on the District's allotment. It is possible that the source could provide whatever ERU need was remaining after 10 years.

Estimated Date of Water Availability

Approximately 2008-2010.

Estimated Cost

\$4.03 to \$4.69/mgd (Dames & Moore, 1998)

J. Recharge Source Seattle/Regional Water to Groundwater

***POLICY DECISIONS:** Level of Participation in the "Issaquah" pipeline. Use of blended surface/ground-water sources.*

Description

Water supplied through the Issaquah Pipeline would come from the Seattle regional system through the City of Bellevue and could be used as a recharge source of water. To decrease the size of the pipeline, the District could take water during the winter and store it in an aquifer. The Plateau Aquifer is the only aquifer that is currently being studied for recharge potential. The water for the majority of the time would be from Seattle's Cedar River source.

Water supplied through the "Issaquah" Pipeline and stored would have to be blended with the groundwater. See the discussion under "Seattle/Regional Water through South "Issaquah" Pipeline" regarding blending issues. Blending of the two sources may result in water quality effects and will require additional treatment.

Study Requirements

Key study requirements are included under Recharge and Issaquah Pipeline.

Additional studies would be required to determine the compatibility of the surface water and the aquifer matrix.

Interagency Agreements

Interagency agreements required are included under Recharge and Issaquah Pipeline.

Additional District System Requirements

Additional District system requirements are included under Recharge and Issaquah Pipeline.

Additional Non-District System Requirements

Additional Non-District system requirements are included under Recharge and Issaquah Pipeline.

Potential Supply (as ERUs)

TBD.

Estimated Date of Water Availability

The "Issaquah" pipeline is currently planned for completion in June of 2001 however with the many hurdles in front of the project an on-line date of June 2003 is more realistic.

Estimated Cost

The estimated cost of the pipeline without any additional District facilities is \$12,500,000. Additional costs for District facilities will most likely increase this cost significantly.

III. CWA Discussion

Options regarding CWA membership are being determined by District attorney and staff. In addition, several of the options discussed above include regional facilities that might be included in CWA discussions.

IV. Grouping Water Supply Options

In Section II Options Analysis, ten different supply options and sub-options have been discussed. During 1998, the District has been discussing many of these options, and the Board of Commissioners has directed District Staff to work to acquire new source from some of the options. In addition, the District Board of Commissioners has identified that their first choice would be to stay on groundwater, but realized that use of surface water might be necessary.

In recent months groundwater has been referred to as Plan A, and surface water as Plan B. District staff suggests that the use of Plan A and Plan B be dropped to avoid confusion with the water supply options and sub-options identified in this report.

At this time some groupings of Options A through J are presented for consideration. These different groupings recognize that the ultimate water supply may involve a combination of

groundwater and surface water sources. The following groups are just examples of how the different sources could be grouped.

All Groundwater Group

Option	ERUs	
A1	22,975	Existing ERUs
A2	318	Mint Grove + Well 3
B1	710	Assume 3% Conservation
B2	1,500	5% Add'l. Conservation
C1	170	Recharge – Pilot Program
C2	1,700	Recharge – Full 565 ac-ft
E1-2	1,800	Reuse at Golf Course
Fx	1,000	New GW rights
	30,173	TOTAL

Blended Surface Water and Groundwater Groups

Option	ERUs		Option	ERUs	
A1	22,975	Existing ERUs	A1	22,975	Existing ERUs
G1	7,000	Issaquah Pipeline Blended	H	7,000	N CV Connection Blended
	29,975	TOTAL		29,975	TOTAL

Groundwater and Isolated Surface Water for 297 + 650 South Groups

Option	ERUs		Option	ERUs	
A1	22,975	Existing ERUs	A1	22,975	Existing ERUs
	0	No Conservation Required	B1	710	Minimal Conservation 3%
C1	170	Recharge – Pilot Program	C1	170	Recharge – Pilot Program
C2	1,700	Recharge – Full 565 ac-ft	C2	1,700	Recharge – Full 565 ac-ft
G2	5,200	Surface Water 297 + 650S	G2	4,500	Surface Water 297 + 650S
	30,045	TOTAL		30,055	TOTAL

Groundwater and Surface Water Isolated for 297 or Isolated for CV + 550 Groups

Option	ERUs	297 Isolated	Option	ERUs	CV + 550 Isolated
A1	22,975	Existing ERUs	A1	22,975	Existing ERUs
A2	313	Mint Grove + Well 3	A2	313	Mint Grove + Well 3
B2	3,000	Conservation 10%	B2	3,000	Conservation 10%
C1	170	Recharge – Pilot Program	C1	170	Recharge – Pilot Program
C2	1,700	Recharge – Full 565 ac-ft	C2	1,700	Recharge – Full 565 ac-ft
G2	2,000	Surface Water 297	Hx	2,000	Surface Water CV + 550
	30,158	TOTAL		30,158	TOTAL

Future Tasks to Better Define Supply Issues

Groundwater

- Clarify programs in regional conservation plan
- Estimate staff hours required in 1999 and beyond to implement regional conservation plan.
- Complete groundwater model under scope approved 11/16/98
- Investigate legal authority to pump 565 ac-ft of recharge water (water rights and groundwater management zone)
- Develop pumping and piping plan for recharging and recovering 565 ac-ft
- Develop reuse water right transfer conceptual plan with Aldarra Farms and Beaver Dam.
- Monitor King County study on reuse technologies
- Reach agreement with Ecology on conceptual plans

Surface Water

- Prepare Issaquah Pipeline timeline
- Prepare Issaquah Pipeline draft cost sharing options
- Clarify options for joining CWA and regional facilities purchase option
- Respond to Issaquah's position paper on water service to Freegard
- Determine number of ERUs in Issaquah annexation area (Assumes change in service.)
- Develop plan for facility replacement and transfer in Freegard (Assumes change in service.)

ATTACHMENT 03

27 Supply and Storage Options – 10/99

Key to Alternative Source of Supply Combinations

Old Alternative	New Alternative
1.01	1
2.01	2
3.01	3
4.01	4
5.01	5
6.01	6
7.01	7
8.01	8
9.01	9
10.01	10
11.01	11
3.02	12
3.03	13
3.04	14
3.05	15
3.06	16
4.02	17
4.03	18
4.04	19
9.02	20
9.03	21
9.04	22
10.02	23
10.03	24
10.04	25
10.05	26
10.06	27
11.02	28
11.03	29
11.04	30

	Alternative 1.01	Alternative 2.01	Alternative 3.01	Alternative 3.02	Alternative 3.03	Alternative 3.04	Alternative 3.05	Alternative 3.06	Alternative 4.01	Alternative 4.02	Alternative 4.03	Alternative 4.04	Alternative 6.01	Alternative 9.01	Alternative 9.02	Alternative 9.03
	Groundwater	Groundwater	North Connection													
Description of Alternative	Groundwater and Recharge	Groundwater and Reuse	TPL2 - Regional Water Mixing	UH and Surface Water Impoundment	Panhandle Tank with TPL2 Mixing	UHW w/Panhandle Tank and TPL2 Mixing w/Water Right Transfer	UH Tank and TPL2 Mixing	UHW and TPL2 Mixing w/Water Right Transfer	Connection at Well 9 - Regional Water Mixing	Connection at Y - Regional Water Mixing	Connection at Well 9 - Segregated G/W and Mixing Zones	Connection at Y - Segregated G/W and Mixing Zones	Minimize Regional Water Service Area	Connection at Well 9 - Segregated G/W and Segregated R/W	Connection at Y - Segregated G/W and Segregated R/W	Connection at Well 9 - Seg.G/W and Maximized Seg. R/W
Source of Supply	Additional water rights for Wells 9 and 15, ASR	Additional water rights for Wells 9 and 15, Reuse	Regional system	Union Hill Water	Regional system and UHW	Regional system and UHW	Regional system and UHW	Regional system and UHW	Regional system	Regional system	Regional system	Regional system	Regional system, groundwater recharge	Regional system	Regional system	Regional system
Point of Regional Connection	None	None	Tolt Pipeline 2 on Novelty Hill Road	None	Tolt Pipeline 2 on Novelty Hill Road	Tolt Pipeline 2 on Novelty Hill Road	Tolt Pipeline 2 on Novelty Hill Road	Tolt Pipeline 2 on Novelty Hill Road	Issaquah Pipeline near Well 9	Issaquah Highlands system near Y.	Issaquah Pipeline near Well 9	Issaquah Highlands system near Y.	Issaquah Pipeline near Well 9	Issaquah Pipeline near Well 9	Issaquah Highlands system near Y.	Issaquah Pipeline near Well 9
Water Quality																
1. Mixing/ Blending Source Types	N/A	N/A	Yes	Filtration required for surface water impoundment	Yes	Yes	Yes	Yes	Yes	Yes	Yes, separated G/W zone for 550, 475 and 700 zones	Yes, separated G/W zone for 550, 475 and 700 zones	No, isolate a 2825 ERU zone on surface water	No, isolate a 7025 ERU zone on surface water	No, isolate a 7025 ERU zone on surface water	No, isolate a 11,373 ERU zone on surface water
2. Manganese	Existing Situation	Existing Situation	Removal req'd at Well 12. Treatment at other wells	Removal req'd at Well 12. Treatment at other wells	Removal req'd at Well 12. Treatment at other wells	Removal req'd at Well 12. Treatment at other wells	Removal req'd at Well 12. Treatment at other wells	Removal req'd at Well 12. Treatment at other wells	Yes, but likely no removal req'd	Yes, but likely no removal req'd	Yes, in mixing zones, but likely no removal req'd	Yes, in mixing zones, but likely no removal req'd	Existing situation.	Existing situation.	Existing situation.	Existing situation.
3. Fluoride	N/A	N/A	Yes. All areas	Yes. All areas	Yes. All areas	Yes. All areas	Yes. All areas	Yes. All areas	Yes, all areas	Yes, all areas	Yes, in mixing zones	Yes, in mixing zones	Yes, in SW zone	Yes, in SW zone	Yes, in SW zone	Yes, in SW zone
4. Chlorine	N/A	N/A	Yes. All areas	Yes. All areas	Yes. All areas	Yes. All areas	Yes. All areas	Yes. All areas	Yes, all areas	Yes, all areas	Yes, in mixing zones	Yes, in mixing zones	Yes, in SW zone	Yes, in SW zone	Yes, in SW zone	Yes, in SW zone
5. DBP formation potential	N/A	N/A	Current info indicates that MCL will not be exceeded	Impact of S/W impoundment unknown	Current info indicates that MCL will not be exceeded	Current info indicates that MCL will not be exceeded	Current info indicates that MCL will not be exceeded	Current info indicates that MCL will not be exceeded	Long residence time in pipe. DBP testing in progress	Longer residence time than 4.01. DBP test in progress	Long residence time in pipe. DBP testing in progress	Longer residence time than 4.01. DBP test in progress	Long residence time in pipe. DBP testing in progress	Long residence time in pipe. DBP testing in progress	Long residence time in pipe. DBP testing in progress	Long residence time in pipe. DBP testing in progress
Storage	Storage at Section 36	Storage at Section 36	Storage tank at Section 36 and Panhandle Tank north of CV	Purchase share of Union Hill Tank and construct huge storage facility in Section 36.	Purchase share of Union Hill Tank. Storage tank at Section 36 and Panhandle Tank north of CV.	Purchase share of Union Hill Tank. Storage tank at Section 36 and Panhandle Tank north of CV.	Purchase share of Union Hill Tank. Storage tank at Section 36 and no Panhandle Tank north of CV.	Purchase share of Union Hill Tank. Storage tank at Section 36 and no Panhandle Tank north of CV.	Storage at Section 36	Storage at Section 36	Storage at Section 36	Storage at Section 36	Storage at Section 36	Storage at Section 36	Storage at Section 36	Storage at Section 36
Transmission Pipelines	No major pipelines	No major pipelines	TPL2 to Cascade View-Plateau Intertie to Section 36 Tank	Cascade View-Plateau Intertie to Section 36 Tank	TPL2 to Cascade View-Plateau Intertie to Section 36 Tank	TPL2 to Cascade View-Plateau Intertie to Section 36 Tank	TPL2 to Cascade View-Plateau Intertie to Section 36 Tank	TPL2 to Cascade View-Plateau Intertie to Section 36 Tank	Transmission upgrades from 297 Tank to Section 36 Tank	Transmission upgrades from near Y to Section 36 Tank	Transmission upgrades from 297 Tank to Section 36 Tank	Transmission upgrades from near Y to Section 36 Tank	Transmission pipeline 244th to Section 36	Transmission pipeline 244th to Section 36	Transmission pipeline 244th to Section 36	Transmission pipeline 244th to Section 36
Cost																
Implementability	1. Significant potential for lawsuits from developers 2. Moratorium must be extended for a significant number of years 3. Feasibility of ASR to be determined.	1. Significant potential for lawsuits from developers 2. Moratorium must be extended for a significant number of years 3. Reuse projects new to this region.	1. Contract with regional system. 2. Coordination with Redmond and UPD's on Panhandle Tank and pipeline. 3. State approval of an open reservoir with filtration problematic	1. Contract with regional system. 2. Coordination with Redmond and Union Hill on tank and pipeline. 3. State approval of an open reservoir with filtration problematic	1. Contract with regional system. 2. Coordination with Redmond and UPD's on Panhandle Tank and pipeline. 3. Coordination with Union Hill on purchase of tank and water quality issues.	1. Contract with regional system. 2. Coordination with Redmond and UPD's on Panhandle Tank and pipeline. 3. Coordination with Union Hill on purchase of tank and water quality issues. 4. Time required to transfer water rights is significant and outcome unknown	1. Contract with regional system. 2. Coordination with Redmond and UPD's on pipeline. 3. Coordination with Union Hill on purchase of tank and water quality issues. 4. Union Hill tank cannot serve fire flow to CV under isolated conditions.	1. Contract with regional system. 2. Coordination with Redmond and UPD's on pipeline. 3. Coordination with Union Hill on purchase of tank and water quality issues. 4. Time required to transfer water rights is significant and outcome unknown	1. Contract with regional system. 2. Coordination with Issaquah and Issaquah Highlands on pipeline.	1. Contract with regional system. 2. Coordination with Issaquah and Issaquah Highlands on pipeline.	1. Contract with regional system. 2. Coordination with Issaquah and Issaquah Highlands on pipeline.	1. Contract with regional system. 2. Coordination with Issaquah and Issaquah Highlands on pipeline.	1. Contract with regional system. 2. Coordination with Issaquah and Issaquah Highlands on pipeline.	1. Contract with regional system. 2. Coordination with Issaquah and Issaquah Highlands on pipeline.	1. Contract with regional system. 2. Coordination with Issaquah and Issaquah Highlands on pipeline.	1. Contract with regional system. 2. Coordination with Issaquah and Issaquah Highlands on pipeline.
Cascade View	Separate solution required; See Options 11.01 to 11.04	Separate solution required; See Options 11.01 to 11.04	Served predominately surface water in near-term and groundwater in long-term. Intertie with plateau.	Served groundwater. Intertie with plateau.	Served predominately surface water in near-term and groundwater in long-term. Intertie with plateau.	Served predominately surface water in near-term and groundwater in long-term. Intertie with plateau.	Served predominately surface water in near-term and groundwater in long-term. Intertie with plateau.	Served predominately surface water in near-term and groundwater in long-term. Intertie with plateau.	Separate solution required; See Options 11.01 to 11.04	Separate solution required; See Options 11.01 to 11.04	Separate solution required; See Options 11.01 to 11.04	Separate solution required; See Options 11.01 to 11.04	Separate solution required; See Options 11.01 to 11.04	Separate solution required; See Options 11.01 to 11.04	Separate solution required; See Options 11.01 to 11.04	Separate solution required; See Options 11.01 to 11.04

LEGEND: TPL2 = Tolt Pipeline No. 2 (North Regional Connection) UHW = Union Hill Water (North Intertie) G/W = Groundwater SW = Surface Water R/W = Regional Water UPD = Urban Planned Development (Novelty Hill) CV = Cascade View DBP = Disinfection By-Product

	Alternative 9.04	Alternative 10.01	Alternative 10.02	Alternative 10.03	Alternative 10.04	Alternative 10.05	Alternative 10.06	Alternative 11.01	Alternative 11.02	Alternative 11.03	Alternative 11.04
	R/W	North-South Regional (TPL2 and Issaquah Pipeline)						Cascade View Only			
Description of Alternative	Connection at Y - Seg.G/W and Maximized Seg. R/W	Connection at Y w/Well 12 Tank	Connect at Y w/Panhandle Tank w/Water Right Transfer	Connection at Well 9 w/ Union Hill Connection	Connection at Well 9 w/Union Hill Connection w/WR Transfer	Connection at Well 9 w/Water Right Transfer w/o Intertie	Connect at Y w/Panhandle Tank w/Complete Mixing	Ground Storage	Elevated Storage	Union Hill Storage	Panhandle Tank Storage
Source of Supply	Regional system	Regional system	Regional system	Regional system	Regional system	Regional system	Regional system	Groundwater	Groundwater	Groundwater	Regional water from storage.
Point of Regional Connection	Issaquah Highlands system near Y.	Tolt Pipeline 2 on Novelty Hill Road and Issaquah Pipeline at Y	Tolt Pipeline 2 on Novelty Hill Road and Issaquah Pipeline at Y	Tolt Pipeline 2 on Novelty Hill Road and Issaquah Pipeline at Well 9	Tolt Pipeline 2 on Novelty Hill Road and Issaquah Pipeline at Well 9	Tolt Pipeline 2 on Novelty Hill Road and Issaquah Pipeline at Well 9	Tolt Pipeline 2 on Novelty Hill Road and Issaquah Pipeline at Y	None	None	None	Panhandle Tank Storage
Water Quality											
1. Mixing/ Blending Source Types	No, isolate a 11,373 ERU zone on surface water	In CV and 550 zone	In CV and 550 zone	In CV and 550 zone	In CV and 550 zone	In CV and 550 zone	Yes	N/A	N/A	N/A	Yes
2. Manganese	Existing situation.	Removal req'd at Well 12. Treatment at other wells	Removal req'd at Well 12. Treatment at other wells	Removal req'd at Well 12. Treatment at other wells	Removal req'd at Well 12. Treatment at other wells	Removal req'd at Well 12. Treatment at other wells	Removal req'd at Well 12. Treatment at other wells	Existing situation.	Existing situation.	Existing situation.	Yes. Removal req'd at Well 12
3. Fluoride	Yes, in S/W zone	Yes, in mixing zones	Yes, in mixing zones	Yes, in mixing zones	Yes, in mixing zones	Yes, in mixing zones	Yes, in all areas	N/A	N/A	N/A	Yes.
4. Chlorine	Yes, in S/W zone	Yes, in mixing zones	Yes, in mixing zones	Yes, in mixing zones	Yes, in mixing zones	Yes, in mixing zones	Yes, in all areas	N/A	N/A	N/A	Yes.
5. DBP formation potential	Long residence times in pipe. DBP testing in progress	Long residence times in south. DBP testing in progress	Long residence times in south. DBP testing in progress	Long residence times in south. DBP testing in progress	Long residence times in south. DBP testing in progress	Long residence times in south. DBP testing in progress	Long residence times in south. DBP testing in progress	N/A	N/A	N/A	Current info indicates that MCL will not be exceeded
Storage	Storage at Section 36	Storage at Section 36 and Panhandle Tank	Storage at Section 36 and Panhandle Tank	Storage at Section 36, Union Hill Tank, and Panhandle Tank	Storage at Section 36, Union Hill Tank, and Panhandle Tank	Storage at Section 36, Union Hill Tank, and Panhandle Tank	Storage at Section 36 and Panhandle Tank	Pump station at Well 13 site and ground storage at Well 12 site	Pump station at Well 13 site and elevated storage at Well 12 site	Pump station at Well 12 and 13 sites and connection to Union Hill Tank	Pump station at Well 12 and 13 sites and connection to Panhandle Tank
Transmission Pipelines	Transmission pipeline 244th to Section 36	Transmission pipeline to Tolt Pipeline 2 and CV-Plateau Intertie	Transmission pipeline to Tolt Pipeline 2 and CV-Plateau Intertie	Transmission pipeline in Union Hill to CV and CV-Plateau Intertie	Transmission pipeline in Union Hill to CV and CV-Plateau Intertie	Transmission pipeline in Union Hill to CV. No CV-Plateau Intertie	Transmission pipeline to Tolt Pipeline 2 and CV-Plateau Intertie	None	None	None	None
Cost											
Implementability	1. Contract with regional system. 2. Coordination with Issaquah and Issaquah Highlands on pipeline. 3. Coordination with Redmond and UPD's on Panhandle Tank and pipeline. 4. Time required to transfer water rights is significant and outcome unknown.	1. Contract with regional system. 2. Coordination with Issaquah and Issaquah Highlands on pipeline. 3. Coordination with Redmond and UPD's on Panhandle Tank and pipeline. 4. Time required to transfer water rights is significant and outcome unknown.	1. Contract with regional system. 2. Coordination with Issaquah and Issaquah Highlands on pipeline. 3. Coordination with Redmond and UPD's on Panhandle Tank and pipeline. 4. Time required to transfer water rights is significant and outcome unknown.	1. Contract with regional system. 2. Coordination with Issaquah and Issaquah Highlands on pipeline. 3. Coordination with Redmond and Union Hill on tank and pipeline. 4. Time required to transfer water rights is significant and outcome unknown.	1. Contract with regional system. 2. Coordination with Issaquah and Issaquah Highlands on pipeline. 3. Coordination with Redmond and Union Hill on tank and pipeline. 4. Time required to transfer water rights is significant and outcome unknown.	1. Contract with regional system. 2. Coordination with Issaquah and Issaquah Highlands on pipeline. 3. Coordination with Redmond and Union Hill on tank and pipeline. 4. Time required to transfer water rights is significant and outcome unknown.	1. Contract with regional system. 2. Coordination with Issaquah and Issaquah Highlands on pipeline. 3. Coordination with Redmond and UPD's on Panhandle Tank and pipeline. 4. Time required to transfer water rights is significant and outcome unknown.			1. Coordination with Redmond and Union Hill on tank and pipeline.	1. Coordination with Redmond and UPD's on Panhandle Tank and pipeline.
Cascade View	Separate solution required; See Options 11.01 to 11.04							Isolated zone	Isolated zone	Isolated zone	Isolated zone

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