CHAPTER 12
SERVICE STRATEGY OPTIONS

INTRODUCTION

The four service strategies developed in the RWSP are each designed to provide adequate capacity to collect and treat the region's wastewater for the next 30 years and beyond. The total volume of wastewater that the service strategies are designed to accommodate has been estimated based on the population projections contained in the King County Comprehensive Plan, and the assumption that current county-wide policies for growth management, level-of-service standards, and compliance with state and federal water quality regulations will continue to be applied. The potential long-term environmental impacts of the service strategies are discussed in Chapters 5 through 8 of this document.

While the service strategies represent four clear options for the future of wastewater treatment in King County, the RWSP also envisions some ways in which the strategies might be modified to provide improved cost control, operational efficiencies, regional water quality benefits, or other advantages. These service strategy options, described more fully in Chapter 4 of the RWSP, are not full-fledged alternatives in themselves, but are potential options for increasing the flexibility of the four service strategies. While some of the service strategy options would have few or no adverse environmental impacts, a number do have implications for the natural or built environment. This chapter briefly describes the service strategy options identified in the plan and provides an overview of the types of environmental impacts that might result from their implementation. Because the service strategy options are conceptual in nature, the discussion of their impacts here is designed only to provide the public and decisionmakers with a broad sense of their environmental implications. Full programmatic or project-specific analysis would occur at the time individual options were incorporated into the plan or facilities were proposed for construction.

Each option is presented according to one of five categories representing the major elements of a comprehensive wastewater strategy, including: 1) Treatment; 2) Conveyance; 3) Combined Sewer Overflows; 4) Biosolids; and 5) Water Reuse. A sixth category, "Other" contains two options that are independent of these categories.

ANALYSIS OF SERVICE STRATEGY OPTIONS

TREATMENT

The three options included under the treatment category include: 1) negotiating to lower treatment requirements for wastewater discharged from the East and North Treatment Plants; 2) operating the treatment plants at their maximum capacity to delay construction of additional wastewater treatment facilities, and 3) planning, designing, and constructing new facilities to meet five year increments of growth of wastewater flow and solids instead of ten-year increments. All three options provide cost savings, but may result in less treatment of wastewater, increase the risk of treatment plant upsets and sewer back-ups, and non-compliance.

Service Strategy Option 4A: Redefine Secondary Treatment

The four service strategies were developed to comply with all applicable federal, state, and local regulations, including the requirement that all wastewater treatment plants provide secondary treatment (85 percent removal of BOD and TSS to less than 30 mg/L of each) before discharge. This option proposes designing treatment facilities at the North Treatment Plant and any new treatment facilities at the East Treatment Plant to provide advanced primary treatment when flows are discharged to marine waters. Advanced primary treatment would be defined as adding chemicals such as alum and polymers to enhance physical settling of primary treatment. At the East Treatment Plant flows from the old secondary treatment units would be blended with those from the new advanced primary units before discharge. Disinfection of treated effluent with chlorine before discharge to surface waters may be eliminated.

This service strategy option would result in changes to the effluent stream in several ways. Enhanced primary treatment using sand filtration technology could actually result in lower TSS and better organism removal, for example, reducing water quality impacts from these constituents. Higher soluble BOD levels would be present in the effluent, as well as higher levels of bacteria if disinfection with chlorine is eliminated causing somewhat greater adverse impacts to water quality. Studies would need to be conducted to evaluate the significance of these higher levels of BOD and bacteria for marine discharges. Positive environmental impacts could include smaller treatment plant footprints and associated land impacts and a reduction in the use of chlorine.

Existing state and federal regulations requiring secondary treatment and chlorination would need to be modified before this option could be implemented.

Service Strategy Option 4B: Rerate Plant Capacities

A full description of this service strategy option is included in the companion document to this EIS, the Regional Wastewater Services Plan. The West and East Treatment Plants could be rerated by applying less-conservative design criteria; the plants could be operated nearer to their design limits. Systemwide capacity expansions would be delayed.

Rerating the treatment plants would increase the potential for violating effluent permit limits because of the chance of increased BOD and TSS concentrations in discharges. Those increased concentrations could reduce water quality and have adverse impacts on biological resources and environmental health. There would be an increased risk of plant malfunctions, which could lead to violations of effluent permit limits and adverse water quality and biological resource impacts. Operating the West Treatment Plant closer to design limits would need to be studied for its consistency with the 1991 West Point Settlement Agreement’s pollution discharge limits.

Service Strategy Option 4C: Build in Smaller Increments

The schedule for completion of the new facilities described in each of the four service strategies is based on accommodating 10-year increments of growth in wastewater flow and solids. It also assumes that design and other pre-construction activities begin in time to complete each facility when it is needed. This option involves planning, designing and constructing new facilities to accommodate five-year increments of growth in wastewater flow and solids instead of 10-year increments. A planning schedule would be developed that would accommodate a higher than anticipated growth rate, but then, delay actual construction to correspond to the actual growth experienced through the completion of design.

Building in smaller increments could result in reduced impacts for each construction project, but the impacts would be spread over a longer period of time. For example, there would be fewer trucks hauling construction materials for each project, but the hauling would occur over a greater number of years. In addition, in the event of a sudden large growth surge, the wastewater system would be less able to accommodate and treat the new flows, potentially resulting in sewer overflows and resulting adverse impacts to water quality. Biological resources and environmental health could also be adversely affected. The effects on the latter could take the form of potential adverse health effects to those who consumed large quantities of marine or freshwater animals, to those who came into contact with water receiving higher pollutant loadings or to those who came into contact with sewage from overflows.

CONVEYANCE

The four options included under the conveyance category include: 1) designing the wastewater system to handle five-year instead of twenty-year storms; 2) continuing to size new pipes to handle a twenty-year storm, but wait until existing pipes reach capacity before constructing new pipes; 3) discharging treated wastewater to the Green/Duwamish River from the East Treatment Plant under peak winter flow conditions; and 4) removing the I/I program from the four service strategies.

Service Strategy Option 4D: Decrease Conveyance Design Standard

All facilities in the four service strategies are sized to accommodate the peak flows generated by a storm of the intensity our region experiences approximately once every 20 years (the current design standard). In addition, new facilities are scheduled to be in place when predictions indicate the peak flow will exceed existing capacity. Under this option, all facilities would be designed to accommodate a once every five years storm. This design storm standard results in smaller, less expensive facilities but decreases the amount of I/I that can be conveyed and increases the risk of overflows from the sanitary sewer system following heavy storms. For example, instead of having sewer overflows, flooding and back-ups once every 20 years, there would be a higher likelihood of these occurring once every 5 years. This option could be implemented with all four service strategies.

The primary benefit associated with using a five-year storm design standard is a reduction in the length, size, and relative costs for construction of trunk and interceptor sewer parallel and replacement projects. Service Strategy 1 would have the greatest cost reduction because it has the most conveyance improvements.The distribution of sanitary sewer overflows varies substantially from drainage basin to drainage basin. This unequal distribution results in some areas receiving a lower level of service than others.

Sewer overflows could reduce the quality of surface waters if the overflows occured in proximity to water bodies. Reduced water quality could, in turn, adversely affect biological resources. Adverse impacts on environmental health could also result. These could include potential adverse health effects to those who consumed large quantities of freshwater animals, to those who came into contact with water receiving higher pollutant loadings or to those who came into contact with sewage from overflows. The significance of these environmental impacts and potential for detrimental human health effects would need to be evaluated. The experience of other jurisdictions in developing similar design standards will be a valuable resource for information to help make these evaluations. Benefits of this option would result from delaying and reducing the magnitude of construction impacts.

Figure 12-1 shows 44 locations where a King County trunk and interceptor are near the ground surface. Flows in excess of the pipe capacity will likely result in sanitary sewer overflows nearby. These overflows could have an average of a 20 percent chance of occurring in any one year if the 5-year peak-flow design criteria is used and a 5 percent chance of occurring in any one year if the 20-year peak-flow design criteria is used.

Service Strategy Option 4E: Decrease Conveyance Design Standard

This option is similar to 4D because new pipes would not be constructed until existing pipes showed reached capacity in a 5-year storm. However, the option differs from 4D in that conveyance pipes would be designed to accommodate the current 20-year design storm standard instead of a 5-year standard. Like 4D, both options differ from the four service strategies in which new facilities are constructed when predictions indicate peak flows will exceed available capacity. This option could be implemented with all four service strategies.

Implementation of this option increases the risk of overflows, backups, and flooding from 5-year storms during that period of time when pipes are beginning to reach their capacity. However, the risk of overflows, backups, and flooding is less than for 4D because pipes in this option are constructed to meet the 20-year design storm standard. As with option 4D, the distribution of sanitary sewer overflows varies substantially from drainage basin to drainage basin so that areas where capacity had been identified as inadequate in 5-year storms, but where installation of new pipes had not yet occurred, will experience more sewer overflows and problems.

Environmental impacts related to Option 4E would be similar to 4D, although the potential for detrimental human health effects would be somewhat less.

Service Strategy Option 4F: Discharge to the Duwamish River

Currently all four service strategies provide marine discharge of all treated effluent. This option includes discharge of treated effluent to the Green/Duwamish Rivers through an existing, but no longer used, outfall at the East Treatment Plant. Prior to the completion of the East Area effluent transfer system (ETS) in 1987, the effluent treated at the East Treatment Plant was discharged to the Green/Duwamish River year round.

This option calls for periodic discharge of peak winter flow to the river. During these events, most of the East Treatment Plant effluent would still be discharged through the ETS to Puget Sound. Unlike the previous year-round discharge to the river, proposed discharges would primarily occur during correspondingly high river flows when maximum dilution would occur.

Environmental impacts to water resources and biological resources would be likely from implementation of this option. Secondary effluent discharges contain nutrients, metals, organics, TSS, and fecal coliform bacteria, as described in Chapter 5 of this EIS. Preliminary information on this option suggests that adverse water quality impacts would be modest; discharges would occur only at peak flows, so they would likely be greatly diluted by high river flows. As a result, the potential for human contact with effluent discharge during or shortly after storm events would be low. The risk of adverse impacts to human health from this option would be commensurate with the extent of water quality degradation.

The greatest potential for adverse impacts would occur from strong early fall storms, which can cause peak plant flows prior to substantial increases in the flows in the river. The probability of this occurring is very low since a separated collection system would not experience peak flows until well into the wet weather season when river flow is also higher. Also, since this option calls for diverting only peak plant flow for discharge to the Green/Duwamish River during high river flows, period of low flow mixing should be limited.

Additional study would be needed before implementing this option. Better understanding of the loadings, volumes, frequency of discharges, and success of the I/I reduction program is needed. The county is currently conducting a Water Quality Assessment that may help answer some of these questions; results are expected in 1998.

This option would require revisions to the East Plant’s permit conditions, which currently prohibit any discharges on a regular basis from the existing outfall to the Green/Duwamish Rivers.

Service Strategy Option 4G: No Inflow/Infiltration Program

Each service strategy was developed assuming an I/I reduction program to achieve the most cost-effective reduction in I/I from the local agencies. While recent experience both nationally and locally supports the cost-effectiveness of the I/I reduction program, much of the early experience with I/I reduction was less successful. If the I/I program was not implemented, or was unsuccessful in reducing I/I, additional pipes in the East Service Area would need to come online sooner or be larger in order to accommodate all I/I that would occur without an I/I reduction program. This option would change the relative difference in cost between the service strategies.

The environmental impacts of building additional facilities would include increased levels of the construction impacts already identified in Chapter 11 of this DEIS. These impacts include traffic disruption, noise, dust, and increased traffic from trucks hauling excavated materials. In addition, impacts from implementation of the I/I program would be avoided by this option. These impacts would be caused either by temporary construction impacts in affected areas (e.g., traffic, landscaping disruption), or effects on groundwater and surface water runoff.

COMBINED SEWER OVERFLOWS (CSO)

This option requires approval by the Washington State Department of Ecology and revisions to the Washington Administrative Code (WAC). It entails that smaller CSO facilities be constructed, which lowers wastewater system costs, but increases the amount of CSO discharge to area waterbodies over what is allowed presently under the WAC.

Service Strategy Option 4H: Reduce CSO Control Goal

All four service strategies are based on the assumption that all King County CSOs will eventually be controlled to one untreated overflow per year as prescribed in state code. This option sets the ultimate goal to match the federal requirement (U.S. Environmental Protection Agency) of four to six untreated overflows per year for each CSO location and could be applied to any of the four service strategies.The environmental impacts of adopting the EPA policy would include increased pollutant discharge levels. Receiving-water bodies include Puget Sound off of West Seattle, Elliott Bay, the Ship Canal, and the Duwamish River. The total overflow volumes would be approximately 33 percent higher per year under this option than with any of the service strategies (170 mg/year compared to the one-per-year volume of 127 mg/year). Total pollutant removal would be somewhat lower during larger storm events. Total suspended solids (TSS) removal would be approximately 3 percent less than with any of the service strategies. The long-term implications of these intermittent discharges on water quality and aquatic habitat are being studied.

The Water Quality Assessment will provide information about the significance of a reduced CSO standard to protect water quality and public health.

BIOSOLIDS

Currently, King County's solids are processed using anaerobic digesters, which produce a Class B biosolids product that is transported to farms and forests for fertilizer. While producing a quality product suitable for land application, anaerobic digestion has inherent drawbacks. These include odor, bulky digesters, truck traffic, and product market limitations. The purpose of this option is to explore alternative technologies to anaerobic digestion in order to enhance the solids handling process in King County. This section will present information about eight alternative technologies, along with a comparison of limitations, or tradeoffs of each technology as compared with anaerobic digestion. This information is intended to help citizens prioritize the tradeoffs so that further research and testing on biosolids technologies can occur.

Service Strategy Option 4I: Alternative Biosolids Technologies and Recycling

This option presents a range of technologies that could be used at any of existing treatment plants, and could be included in any of the service strategies. In addition, regardless of which technology is ultimately used, King County will explore ways to increase efficiencies, recycle locally, generate revenue, and reduce costs through the development of projects that compost or mix biosolids and other waste products.

The alternative biosolids technologies include a combination of existing and new approaches that represent a wide range of processes for producing both Class A (treated to reduce pathogens below detectable levels) and Class B (treated to reduce pathogens to levels safe for land application) biosolids. Each biosolids technology alternative is described briefly below, followed by a comparison of the tradeoffs of each technology and a general discussion of the environmental considerations of the technologies as a group.

Dual Digestion: Dual digestion is a two step digestion process using two sets of digesters. The first set of digesters use high temperature aerobic digestion assisted with high purity air or oxygen. The second set uses medium temperature anaerobic digester (the same as in existing King County digesters) to stabilize wastewater solids. toThe heat generated during the aerobic process raises the temperature of the solids to 60 degrees centigrade (about 140 degrees Fahrenheit), high enough to achieve considerable pathogen kill and produce a Class A biosolids cake at 20 percent solids and 80 percent water. This technology would require the construction of additional aerobic digesters and heat exchangers, thus expanding the current plant footprint.

Long-term Storage & Drying: King County has been investigating low cost, low technology methods of producing a Class A product. One such method is long term storage and air drying. Long-term storage consists of dedicating quantities of biosolids to “sit” for up to three years. Air drying is accomplished by applying thin layers of biosolids and turning them frequently. Testing determines when the biosolids meet the pathogen requirements for a Class A product. This process would occur off-site from the treatment plant, thus requiring additional land area. Possible locations include agricultural lands in Eastern Washington. This option would not reduce the number of digesters needed nor the number of truck trips for hauling biosolids.

Thermal Drying: Thermal drying is the process of using heat to remove the water from thickened or partially dewatered solids. Thermal drying can achieve a dry product with solids content up to 95 percent, and can achieve a Class A level of pathogen reduction. The extent to which the product is dried is dependent primarily upon its ultimate end use or market. Thermal drying could reduce the size of a plant’s footprint and number of truck trips but would increase odors.

Composting: Composting is defined as a biological decomposition process or series of processes which produces a stabilized end product satisfying EPA’s 503 Regulations for Class A biosolids composting. Biosolids alone are generally too wet and consolidated to allow development of the proper conditions for composting. A bulking material, such as sawdust, is required to develop aerobic conditions and high energy agitation may be necessary for physical breakdown of the material. Composting would not eliminate any digesters or reduce truck trips and would require an off-site composting facility.

Thermophilic Digestion: Thermophilic anaerobic digestion is similar to the existing anaerobic process currently used. The difference is that thermophilic digesters use microorganisms that digest wastes most effectively at higher temperatures, resulting in shorter holding times and ultimately fewer digesters.   Thermophilic digestion is capable of producing a Class A biosolids product while reducing the plant footprint and reduce the number of truck trips. Odors associated with this process are unknown.

VerTad: The VerTad process is being pilot tested at the East Treatment Plant.   The process uses a 350-foot vertical underground shaft acting as an aerobic thermophilic digester increasing volatile solids reduction and producing a Class A biosolids product. Because most of the digester is below ground, this process, if successful, could replace conventional anaerobic digesters and reduce truck trips. Impacts associated with odor are unknown.

Anoxic Gas Flotation: Anoxic Gas Floatation is an enhancement to existing digesters. This process involves separating and thickening the biosolids after digestion using methane gas floatation and then returning the thickened solids back to the digester. This results in a reduction in the amount of biosolids produced and truck trips required. This technology minimizes the number of digesters required in the future. Since this technology uses the anaerobic digestion process, it is assumed to produce a Class B biosolids product.

Digesters & Drying (Centridry): This process is another thermal drying technology that uses high speed centrifuges and heat to dry the biosolids to 60 percent solids and 40 percent water content (the current process yields about 20 percent solids/80 percent water content). Solids concentration of up to 90 percent can be reached by modifying operating procedures. Pilot testing of this process began in April 1997. It is anticipated that a Class B product will be produced.

It is important to note that no one biosolids technology can minimize negative impacts such as odor, truck trips, noise, and footprint, and maximize positive attributes such as low cost, high quality, and high marketability. Each technology has associated tradeoffs. Table 12-1 compares the tradeoffs for each technology against a baseline scenario of anaerobic digestion. Tradeoffs include product class (A or B), footprint (amount of land required for the process), truck trips, odor, noise, reliability of the process, rate impacts, and product marketability.

Table 12-1
Comparison of Biosolids Technologies against anaerobic digestion

Biosolids Technology	Product Class	Footprint	Truck Trips	Odor	Noise	Reliability	Rate Impacts	Markets
Dual Digestion[1]	A	>	nc	>	nc	nc	>	>
Long-term Storage & Drying[1, 2]	A	nc	nc	off site	nc	u	nc	>
Thermal Drying[1]	A	<	<	>	nc	u	>	u
Composting[1]	A	nc	nc	off site	---	nc	>	nc
Thermophilic Digestion[1 2]	A	<	<	u	nc	u	>	>
VerTad[2]	A	<	<	u	nc	u	>	u
Anoxic Gas [1,2]	B	<	<	u	nc	u	u	nc
Digesters & Drying (Centridry)[1, 2]	B	<	<	u	nc	u	>	nc

1 requires the use of digesters.

2 process not tested at full scale

> = greater impact than existing condition

< = less impact than existing condition

nc = no change from existing condition

u = unknown impact

Environmental Considerations

All of the technologies except Anoxic Gas Floatation and possibly VerTad require additional land for the structures. Dual digestion requires the largest amount of additional space. Odor will occur with every technology, though in varying degrees. Thermal drying and thermophilic digestion are known to create a greater level of odor than the other technologies. Odor control will be necessary for any of the processes. There also may be environmental concerns if the biosolids product is too dry and blows away easily. The product may have to be reformed into a product that is easier to apply and less likely to form dust clouds.

WATER REUSE

Any of the service strategies can supplement regional water supply by providing reclaimed water for direct, non-potable uses like irrigation and industrial processes. The following three options provide additional opportunities to supplement regional water supply through the development of indirect potable reclaimed water. The concept of indirect potable reuse involves discharging highly treated (e.g., tertiary) reclaimed water into a large body of water such as Lake Washington. This waterbody would act as a reservoir, supplementing water supply for lock operation, stream flow for fisheries, and withdrawal for treatment as drinking water. The concept of indirect potable provides a greater number of benefits than direct non-potable reuse, but also raises many issues related to receiving water quality, public health, public acceptance, water resources management, and institutional arrangements. This concept also requires a high level of coordination with regional water supply planning efforts. One of the primary potential benefits of making a large scale indirect potable reclaimed water supply available, is the avoided environmental impacts that occur with developing new upstream water supplies.

Three options are included under the water reuse category: 1) discharging treated wastewater to operate the Hiram Chittenden Locks; 2) building two medium-sized advanced treatment plants on the east side for discharge into Lake Washington and Lake Sammamish; and 3) building the North Treatment Plant initially as a reclaimed water facility for discharge in Lake Washington. These options are summarized below along with environmental considerations for each. Finally, in order to develop these options, King County is pursuing rights to the water it reclaims and will collaborate on water supply planning with the region's water purveyors to bring this new source to the region in an economical way.

Service Strategy Option 4J: Discharge at Hiram Chittenden Locks

This option would supplement flows in the Lake Washington Ship Canal with treated wastewater. The implementation involves conveying secondary-treated effluent from the West Treatment Plant to a proposed reclamation facility located in the Ballard-Interbay area. Here, the effluent would undergo additional advanced treatment prior to discharge upstream of the Hiram Chittenden Locks into the Lake Washington Ship Canal. This option could be implemented as part of any of the four service strategies.

On an average summer day, approximately 300 million gallons of water from Lake Washington is channeled down the Ship Canal and through the Hiram Chittenden Locks. The proposed reclamation plant at Ballard could discharge between 30 and 60 million gallons of reclaimed water to the Ship Canal daily. (See Figure 12-2). The supplemental flows would "free up" some water in Lake Washington for other uses, such as additional potable water withdrawal, without lowering the summer lake elevation. The discharge would occur over the four to six month summer period, coincident with seasonal peak water supply demand.

Beneficial environmental impacts could include saltwater intrusion control, enhanced fish migration, and replacement of potable water supply. The option would most likely target the summer period for the discharge, coincident with salt water intrusion management concerns, low lake levels, and seasonal peak water demand. The potential 30- to 60-mgd discharge would help control the summertime intrusion of salt water through the locks during the boating season, and could facilitate both salmon and boater passage as well. The discharge would represent 10 to 20 percent of the estimated 300 mgd existing Ship Canal average flow through the locks from Lake Washington.

The option could indirectly help with regional water supply concerns, typically most serious during the late summer and early fall. If water withdrawals commensurate with the effluent volumes were allowed from Lake Washington, the option would, in effect, enhance the capacity of the region's potable water supply system without the need to develop new supply reservoirs in the Cascades. Reservoir construction and upstream water withdrawals would be delayed or avoided along with their associated environmental impacts, preserving existing stream flows for fish, wildlife and other beneficial uses. It could also allow more flexible and efficient management of existing regional water supply facilities upstream on the Cedar River for both water supply and fishery enhancement purposes.

Finally, Puget Sound water quality impacts would be generally beneficial, because 30 to 60 mgd of discharge from the West Treatment Plant would receive advanced treatment, replacing the discharge of an equivalent volume currently receiving secondary treatment and discharge via the outfall off West Point. However, the water quality impacts of the change in location of discharge, into the nearshore marine waters of Shilshole Bay, would need further study, for instance, to determine nitrogen loadings in this embayment and impacts on fish migration. Potential negative environmental impacts include the possible reduction of water quality in waters receiving reclaimed water discharge. Sufficient levels of treatment would be required to ensure there is no significant impairment of beneficial receiving water uses, such as salmon migration, aesthetics, human health and recreation, and others. There might also be environmental impacts associated with the construction and operation of the reclamation facilities, including land use impacts.

At this time, discharge of an effluent product, even treated to an advanced level, is not permitted in the Lake Washington drainage basin. The State is reevaluating this, but has not yet promulgated a revision. Such a revision may still require rigorous effluent treatment levels and facility redundancy requirements as part of permit conditions to provide assurance of dependable high quality facility performance. The discharge of even a highly treated wastewater effluent to Lake

Washington or other fresh waters is counter to long time wastewater management policy and existing state pollution control regulations. There may also be public concerns regarding the advisability of changing this policy, regardless of technical assurances of acceptable environmental protection.

Service Strategy Option 4K:Discharge to Lake Washington/Sammamish

This service strategy option, which would apply to Service Strategy 2 and Service Strategy 3, is described as an opportunity to supplement the region's potable water supply by locally treating wastewater for uses such as irrigation, groundwater recharge, freshwater flow augmentation, and wetlands improvements. This would conserve potable water currently used for these purposes. Two medium-sized multi-purpose wastewater treatment plants could be constructed on the east side of the Lake Washington drainage basin to meet the wastewater needs of local communities.

One plant would have a capacity of 12 mgd and another plant would be built in two phases--first at 35 mgd capacity, and later expanded to 58 mgd. The construction of these two plants, instead of a North Treatment Plant, would eliminate the need for a tunnel, a marine outfall, piping improvements, and a pump station.

These plants would produce an effluent which could be used for nonpotable purposes such as landscape irrigation and could also indirectly supplement local potable water supplies by discharging highly treated wastewater to Lake Sammamish, the Sammamish River, or to Lake Washington. The option would avoid the adverse impacts of wastewater discharges at a new location in Puget Sound.One environmental benefit of "indirectly" adding potable water supply to the Lake Washington drainage basin is to minimize the development of potable water supply sources upstream in the western Cascade drainage basins. This would preserve existing stream flows for fish, wildlife, and other beneficial uses. In addition, the surplus volume of water beyond what is recovered for potable water supply could augment potential lake outflow. This would support a number of other summer volume-dependent benefits, such as fish passage through the locks, containment of saltwater intrusion into the Ship Canal and Lake Union, maintenance of a stable summer lake elevation, and efficient management of existing regional water supply facilities in the Cedar River watershed. Another environmental benefit is reduced discharge of pollutants to Puget Sound.

Treated effluent would need to be discharged to groundwater or to surface waters in the Lake Washington drainage basin during periods when the demand for reclaimed water was low. Adverse impacts to water resources could occur if the reclaimed water was not treated sufficiently. Groundwater recharge regulations are being developed by the state with adoption scheduled in 1997. These regulations will set water quality standards. Currently, discharge of reclaimed water into the Lake Washington drainage basin is prohibited. Potential negative environmental impacts include the possible reduction of water quality in waters receiving reclaimed water discharge. Sufficient levels of treatment would be required to ensure there is no significant impairment of beneficial receiving water uses, such as salmon migration, aesthetics, human health and recreation, and others. There might also be environmental impacts associated with the construction and operation of the treatment plants or reclamation facilities, including land use impacts.

At this time, discharge of an effluent product, even treated to an advanced level, is not permitted in the Lake Washington drainage basin. The State is reevaluating this, but has not yet promulgated a revision. Such a revision may still require rigorous effluent treatment levels and facility redundancy requirements as part of permit conditions to provide assurance of dependable high quality facility performance. The discharge of even a highly treated wastewater effluent to Lake Washington or other fresh waters is counter to long time wastewater management policy and existing state pollution control regulations. There may also be public concerns regarding the advisability of changing this policy, regardless of technical assurances of acceptable environmental protection.

Service Strategy Option 4L: North Treatment Plant Discharge to Lake Washington

This service strategy option, which would apply to Service Strategy 2 and Service Strategy 3, calls for the construction of the North Treatment Plant as an advanced wastewater treatment plant producing an effluent that could be reused for non-potable purposes, discharged to groundwater to replenish the aquifer, or discharged to Lake Washington during periods of low or no reclaimed water demand.

This service strategy option has the benefit of delaying or eliminating the need for an effluent conveyance line and marine outfall, along with their capital costs. From an environmental perspective, the option would delay or avoid the adverse impacts of wastewater discharges at a new location in Puget Sound. It would also have the beneficial environmental impacts associated with delaying the construction of additional water supply facilities upstream, to the extent that the reclaimed water produced by the plant substituted for current uses of potable water.

Treated effluent would need to be discharged to groundwater or to surface waters in the Lake Washington drainage basin during periods when the demand for reclaimed water was low. Adverse impacts to water resources could occur if the reclaimed water was not treated sufficiently. Groundwater recharge regulations are being developed by the state with adoption scheduled in 1997. These regulations will set water quality standards. Currently, discharge of reclaimed water into the Lake Washington drainage basin is prohibited.

This option involves building and operating the North Treatment Plant initially as a small advanced wastewater reclamation facility.The reclamation facility would be brought online in 2005 as a 0.5-mgd demonstration facility and would be later expanded to 7.5 mgd by 2018 for Service Strategy 2 and by 2010 for Service Strategy 3. The 35-mgd North Treatment Plant, the tunnel, and the marine outfall construction as described in the two service strategies could be delayed five or more years.

One environmental benefit of “indirectly” adding potable water supply to Lake Washington is to minimize the development of potable water supply sources upstream in the western Cascade drainage basins. This would preserve existing stream flows for fish, wildlife, and other beneficial uses. In addition, the surplus volume of water beyond what is recovered for potable water supply could augment potential lake outflow. This would support a number of other summer volume-dependent benefits, such as fish passage through the locks, containment of saltwater intrusion into the Ship Canal and Lake Union, maintenance of a stable summer lake elevation, and efficient management of existing regional water supply facilities in the Cedar River watershed. Another environmental benefit is reduced discharge of pollutants to Puget Sound.

Potential negative environmental impacts include the possible reduction of water quality in waters receiving reclaimed water discharge. Sufficient levels of treatment would be required to ensure there is no significant impairment of beneficial receiving water uses, such as salmon migration, aesthetics, human health and recreation, and others. There might also be environmental impacts associated with the construction and operation of the treatment plants or reclamation facilities, including land use impacts.

At this time, discharge of an effluent product, even treated to an advanced level, is not permitted in the Lake Washington drainage basin. The State is reevaluating this, but has not yet promulgated a revision. Such a revision may still require rigorous effluent treatment levels and facility redundancy requirements as part of permit conditions to provide assurance of dependable high quality facility performance. The discharge of even a highly treated wastewater effluent to Lake Washington or other fresh waters is counter to long time wastewater management policy and existing state pollution control regulations. There may also be public concerns regarding the advisability of changing this policy, regardless of technical assurances of acceptable environmental protection.

OTHER

The last category contains two options. The first involves developing alternataive programs that substitute capital sewer utility projects with other types of projects to improve water quality. The second offers incentives to communities to accept wastewater facilities at the front end of siting wastewater treatment facilties as opposed to mitigating the impacts of wastewater facilities after they have been sited and constructed.

Service Strategy Option 4M: Implement Pollutant Source Trading

This service strategy option would introduce a new process to compare county expenditures across all water quality capital projects. The expenditures would be looked on as “investments” in the region’s water quality, and those projects with the best water quality, sediment quality, or habitat improvement “return” on the investment dollar would be favored during the prioritization process. The program could be used, for example, to fund a stormwater control project or to purchase critical upstream habitat instead of funding a sewer utility project if it was determined that greater water quality benefits would accrue. Such a point-nonpoint trading program has the potential for substantial cost savings, because it sets the stage for focusing funding on projects that have the greatest water quality benefits to waterways. It could also be tailored to those waterways most in need of restoration or protection.

Difficulties to be overcome before such a tradeoff program could be implemented include developing a methodology to compare different water quality investments on an “apples-to-apples” basis; collecting a reliable database that accurately categorizes the county’s water, aquatic, and other biological resources; and revising regulations that would not currently permit the program. There is no existing methodology to compare, on a water quality or "value" basis, such alternative projects as the purchase of riparian/wildlife habitat and a capital project that reduces discharge at a CSO outfall to one event per year. While the potential to improve the return on each dollar of water quality investment is great, the difficulty of quantifying potential tradeoffs could delay program implementation.

One risk of a point/non-point source trading program is that there is no certainty regarding future regulatory requirements and constraints, and full implementation of wastewater projects to meet current regulations could be required after funds are already spent on offsetting water, sediment and habitat improvement projects. A point/non-point source trading program could potentially provide greater environmental benefits to area receiving waters than would be realized through the construction of additional capital facilities by the sewer utility. It could also reduce the construction and operating impacts associated with those facilities.

At this time, there is no legal basis for point/non-point trading, which is inconsistent with provisions of state and federal laws, existing contracts, and the King County Charter. The King County Charter currently limits the expenditure of sewer revenues for non-wastewater projects, even if the projects would achieve the same purpose as a wastewater project. However, there is nationwide interest in investigating effluent trading within watersheds. The EPA recently published a document entitled EPA, Office of Water, Watershed Approach Framework (June 1996).

Implementing this option would involve renegotiating existing contracts with the 35 component sewage agencies.

Service Strategy Option 4N: Offer Siting Incentives

The typical method for selecting sites for major wastewater facilities such as a treatment plant or a large CSO facility is to: 1) identify as many sites as possible which meet the physical requirements for the facility, 2) solicit public input, and 3) work with the surrounding communities to develop the appropriate mitigation measures. This option suggests an alternative method of providing incentives to communities to participate in the process of siting wastewater facilities, especially treatment plants, within their jurisdictions. This compensatory mitigation could occur prior to facility site selection, easing the siting process for both King County and the potential host community by initiating a positive dialogue. This option could be implemented with all four service strategies.

This service strategy option would be designed to facilitate the often-controversial process of siting a major new wastewater facility.

An incentive program in and of itself would not have direct environmental consequences. It would influence the siting of new facilities, but the siting, construction and operation of any wastewater facilities would be subject to environmental review under the requirements of the State Environmental Policy Act (SEPA). Any significant adverse environmental impacts would be identified at that time along with appropriate mitigating measures. Projects proposed by the host community would also be subject to SEPA environmental review.