
CHAPTER 1

SUMMARY

PROPOSAL AND OBJECTIVES

King County is proposing a sewer comprehensive plan for the regional wastewater service area for the next 40 years. This plan, the Regional Wastewater Services Plan (RWSP), evaluates several means of providing wastewater treatment and related services to this rapidly growing region during that time. These services consist mainly of improvements related to wastewater treatment and conveyance (pipes), combined sewer overflow (CSO) control, and biosolids management. The RWSP also considers opportunities for water reuse. The adopted plan will amend the county's Water Pollution Abatement Plan, which is the sewer comprehensive plan for the King County system.

The primary objective of the RWSP is to help the public and decision-makers guide King County toward a long-term wastewater management strategy to protect water quality and public health until 2030 and beyond. With the exception of some service strategy options, the RWSP is intended to meet all existing applicable regulatory requirements. The RWSP seeks to meet these objectives in as cost-effective a manner as possible.

The Draft RWSP, issued in May 1997, identified four representative alternatives to meet its objectives. These are termed Service Strategies. Each Service Strategy consists mainly of a system of wastewater treatment plants, conveyance facilities, and CSO control facilities that will meet the region's increasing need for wastewater services over the life of the RWSP. The location and size of those treatment plants vary, as do the associated facilities necessary to convey wastewater for treatment and to discharge treated effluent. Each service strategy also includes a representative option for processing and recycling biosolids, a water reuse program, and a program for reducing the infiltration and inflow of groundwater and stormwater into the wastewater conveyance system.

The service strategies fall into two basic groups according to the treatment plants they include. Service Strategies 1 (SS1) and 4 (SS4) include expanding only the County's two existing treatment plants. Service Strategies 2 (SS2) and 3 (SS3) add a new North Treatment Plant and expand one or both of the existing plants (East and West). SS1 expands both the West and East Treatment Plants, while requiring the greatest increases in existing conveyance line capacities.¹ SS4 similarly expands both plants, but calls for

¹Because this document makes repeated references to components of the existing and proposed wastewater treatment system such as the West Point Treatment Plant, and the East Section Reclamation Plant at Renton, a standardized naming convention was adopted as presented below.

Actual Name	Standardized Name
The West Point Treatment Plant	The West Treatment Plant
The West Division Service Area	The West Service Area
The East Section Reclamation Plant at Renton	The East Treatment Plant
The East Division Service Area	The East Service Area

construction of a series of large storage and conveyance tunnels north and west of Lake Washington. These tunnels connect to both plants. SS2 and SS3 both include construction of a North Treatment Plant in north King or south Snohomish County. Key differences between these two strategies are the size of the plant and the expansion of the existing West Treatment Plant under SS2, but not under SS3. Under both SS2 and SS3, the North Plant would treat wastewater flows from the area north and east of Lake Washington (expected to be one of the region's fastest growing areas) and discharge them through a new outfall in north King or south Snohomish County. Construction of this plant would reduce the need to increase the combined capacity of the two existing plants and their associated conveyance facilities.

In addition to the four basic service strategies, the Draft RWSP examined a variety of options that could be pursued to modify one or more of the service strategies to achieve particular objectives.

Three documents were issued for review in May 1997. The Draft Environmental Impact Statement (DEIS), the revised text of which is repeated here, provided an analysis of environmental impacts associated with proposals included in the RWSP. It is a companion to the Draft Plan. The third document is the Draft RWSP Financing Plan, which provided detailed information about cost assumptions and projections.

PURPOSE AND NEED FOR THE PROJECT

King County has planned for necessary wastewater capacity improvements since 1958, when the regional wastewater treatment system was established. Since then, the 1958 Water Pollution Abatement Plan has been amended several times to provide facilities needed to avoid wastewater overflows. Amendments made in the 1980s resulted in upgrading the West Service Area system to provide secondary treatment (but not adding treatment capacity) and expanding capacity at the East Treatment Plant to 115 mgd.

Through our current planning, we project that King County's wastewater system will run out of capacity in about 10 years, and some components are already at capacity as evidenced by recent overflows during storms. If population growth and economic development continue at projected rates, and new wastewater facilities are not in place as planned, there will be a number of adverse impacts on public health and water quality. These impacts could reduce the quality of life the region has thus far enjoyed.

Given that it can take up to 10 years to site, permit, design, and construct major wastewater facilities, decisions about future wastewater management must be made very soon.

This long-range plan is not intended to be an exact blueprint for construction. Instead, it is a guide or a road map for decision-makers to evaluate the potential results of various service strategy options. Although the plan will ultimately include dates when it is anticipated that new facilities will be needed, King County will track both regional growth and wastewater flows to make sure that appropriate facilities are built at the right time.

More specific discussions of needs in the major sectors of the wastewater system follow. Categories include wastewater treatment and conveyance, CSO control, biosolids management, and water reuse.

Wastewater Treatment and Conveyance

When current construction activities at the East Treatment Plant are completed, the average wet weather flow (AWWF) treatment capacity of the King County system (consisting of the combined capacity of the West and East Treatment Plants) will be 248 million gallons per day (mgd). Based on current projections, an additional 35 mgd system capacity will be needed by 2030. Planned capacity increases would add 38 mgd to system capacity before that year, bringing this capacity to 286 mgd. Additional planned capacity increases beginning in 2030 would add 36 more mgd, bringing system capacity to 322 mgd by the year 2040. The RWSP identifies the facilities needed to provide this capacity.

The Draft Plan and EIS were based on an earlier set of projections. Based on those projections, an additional 57 mgd system capacity would be needed by 2030 (bringing total capacity to 305 mgd), and 146 more mgd would be needed by the time the urban growth area is built out in about 2050 (bringing total capacity to 394 mgd).

Combined Sewer Overflow Control

CSOs occur during wet weather when combined sewers which collect both sanitary sewage and stormwater runoff overflow into the closest surface water body. They occur when the flows in the system exceed the capacity of the wastewater collection system to convey the dilute wastewater to facilities for treatment. Remedies for this situation include providing temporary storage, or storage and treatment for excess flows.

The RWSP includes CSO facilities needed to reach the state mandate of one overflow event per outfall per year. CSO levels in the King County system will have to be reduced 85 percent from 1981 to 1983 (baseline) levels to reach this goal.

Biosolids Management

Biosolids is a term for treated wastewater solids of high enough quality for reuse in the environment (e.g., as a fertilizer). More wastewater from a growing population and the recent addition of secondary treatment facilities at the West Treatment Plant will produce a substantial increase in biosolids volumes in the service area. Current projections are for biosolids volumes to nearly double between now and 2030.

This increase in solids will require facilities to process the raw sludge coming from the primary and secondary treatment phases into biosolids. Additional end users will have to be identified to reuse the biosolids. Biosolids processing facilities and end uses for the additional material are identified in the RWSP.

Water Reuse

The rising demand for water and concerns related to recent summers of drought caused King County to conduct a study of the potential demand for reclaimed water (King County, 1995). Because of the region's expected population growth in the next 30 years, regional water supply agencies have focused their long-term planning on a broad range of strategies to meet future water demands. Among the alternatives for additional non-potable (i.e., not drinkable) water supply is the wastewater from King County's sewage treatment plants. Treated effluent is suitable for a range of nonpotable uses such as irrigation, heating and cooling, and industrial processes. The King County study estimates the potential market for, and economic feasibility of, supplying reclaimed water to potential customers. The study also supports the other three system elements of the RWSP (wastewater treatment and conveyance, combined sewer overflow, and biosolids) because it provides data that could be useful to those making decisions on the locations of future treatment plants and pump stations that might also serve as sources of reclaimed water.

There is also the opportunity to investigate discharging highly treated reclaimed water to surface waters allowing water to be withdrawn elsewhere as a water supply source. Highly treated reclaimed water could also be used to recharge depleted groundwater. Both of these uses of reclaimed water would require changes in state laws.

SCOPE OF THIS FEIS AND FUTURE ENVIRONMENTAL REVIEW

This FEIS has been prepared pursuant to the State Environmental Policy Act (SEPA) (Chapter 43.21C Revised Code of Washington [RCW]), the SEPA rules (Washington Administrative Code [WAC] 197-11) and King County's SEPA procedures (King County Code [KCC] 20.44). This FEIS addresses the probable significant adverse environmental impacts and mitigation measures associated with implementing the RWSP service strategies under consideration and with other proposed service strategy options. This FEIS is a "programmatic" document, with the level of detail needed to support a Metropolitan King County Council decision on the comprehensive plan amendment. The programmatic EIS is the first step of a "phased review" as provided for in SEPA (WAC 197-11-060[5]). As projects included in the RWSP approach implementation, appropriate project-level environmental review will be conducted.

PUBLIC AND AGENCY REVIEW

King County conducted the SEPA scoping process in the fall of 1994. A SEPA Determination of Significance and scoping document was issued on September 1, 1994,

as required by SEPA. A legal notice of the scoping effort was published in the Seattle Times and other local newspapers on that date. Approximately 2,000 people received a copy of the scoping document. The public review and comment period started on September 1 and ended on October 15, 1994.

Six scoping open houses were held during September 1994 in King County. Two were held in downtown Seattle, and one each was held in the Georgetown area, Renton, Auburn, and Bothell. The scoping open houses were formatted to allow the public an opportunity to ask questions of King County staff and examine exhibits and handouts. King County received 69 written comments: 17 from government agencies, 7 from private organizations, and 45 from citizens.

The draft EIS was issued to provide environmental information to the public and agencies and to solicit comments on the proposals and issues discussed in the RWSP. During the 90-day public review period, King County held public meetings and public hearings to receive comments on the RWSP and the draft EIS.

This Final EIS is intended to complete the environmental process for a Comprehensive Water Pollution Abatement Plan amendment. Part I presents the Executive's Preferred Plan and its environmental impacts, as well as a discussion of planning assumptions that have changed in the year since the draft RWSP was issued. Part II includes the entire text of the Draft EIS, revised in response to public comments. In the chapters that follow, revised text is shown in italics.

NOTE: The flow volumes and service strategy descriptions in Part II are as originally presented in the Draft Plan and EIS, and therefore do not reflect revised assumptions for flow volumes and facility size. Part I details those changes. The impacts of the revised system strategies, including the EPP, are of the same or a lesser magnitude than the analysis presented in Part II, presenting a worse-case analysis of impacts.

AREAS OF CONTROVERSY AND ISSUES TO BE RESOLVED

Inter-County Cooperation

King County met with neighboring cities and wastewater districts to evaluate the potential for flow transfers between the County and nearby utilities that might benefit both parties. Tacoma and Pierce County appear to provide options to receive and treat flows from the King County system. The costs of constructing and operating a transfer system to Pierce County would have to be compared to the benefits related to the reduction in both East Treatment Plant expansion and conveyance expansion in the southern service area. To know if such a flow transfer would be cost-effective for King County, the full cost of building and operating the conveyance system, plus paying another entity for treatment and discharge, would have to be evaluated. Additionally, the impacts of the transfer system and discharge to south Puget Sound would have to be evaluated.

Shared treatment plants between counties may provide for cost-efficient wastewater treatment for all parties. As part of the RWSP, King County is working with south Snohomish County wastewater service providers to assess interest and mutual benefits that could be realized from cooperatively siting and operating a treatment plant.

Ability to Obtain Permits for West Point Treatment Plant Expansion

When the West Treatment Plant was upgraded to provide secondary treatment, there was a lengthy, complex, and controversial planning and permitting process before the City of Seattle and other regulatory agencies granted approval. The treatment plant is located in a single-family residential zone, and partially in the shoreline zone. This requires Shoreline Substantial Development and Council Conditional Use permits. Such permits are based on a finding that there is no feasible alternative to locating the treatment plant in a residential zone or shoreline location. The City Council made such a determination with respect to the upgrade of the West Treatment Plant to secondary treatment. In large part, this determination reflected the substantial cost difference between upgrading the West Treatment Plant and any alternative that avoided a shoreline location. Alternatives considered included a new treatment plant in the Duwamish industrial area or in the Interbay area. Either alternative would have required construction of an entirely new treatment plant and substantial additional costs to construct new collection system pipelines to direct flows to the new plant and a new outfall to Puget Sound.

The City of Seattle's permit process was conducted in two phases: plan-level and project-level reviews. The plan-level permit was issued after a finding that no feasible alternative to the West Point site existed, and it included a number of conditions relating to environmental impact reduction. The plan-level zoning and shoreline permits were appealed through the courts and the Shorelines Hearing Board by a coalition of groups and individuals opposed to the West Treatment Plant upgrade. The courts and the Shoreline Hearings Board decided to support the 1991 Settlement Agreement that was reached with the coalition to avoid appeal of that permit and other key permits and approvals.

The Settlement Agreement required that Metro contribute additional funds to a community impact fund that had been established in the plan-level permit decision. In addition, Metro agreed to several conditions, including pursuing an applied wastewater treatment program to explore technologies that could reduce the plant footprint and an agreement that any future expansions would not expand the plant footprint beyond the permitted 32 acres or increase pollutant loadings discharged to Puget Sound beyond the level permitted for a 133-mgd plant.

Expansion of the West Treatment Plant under the RWSP would require the same two-phase permitting process and have to meet the same feasibility tests as the upgrade to secondary treatment. It would also have to adhere to the terms of the 1991 Settlement Agreement.

The City of Seattle plan-level permit for the West Point secondary treatment upgrade is included as an appendix to this EIS, bound separately as Appendix K. The 1991

Settlement Agreement and City of Seattle project-level permit are bound into this volume as Appendix I and Appendix J, respectively.

Changes to Environmental Regulations

Regulations governing King County's wastewater treatment and conveyance facilities may change over time. In the early 1980s, for example, Metro was required to add secondary treatment to all of its Puget Sound treatment plant service areas, which, at that time, discharged primary-treated wastewater. Most of the facilities needed to implement the secondary treatment requirement began operating in 1995.

Steps taken by the federal government under the Endangered Species Act (ESA) could also affect King County's wastewater programs. In February 1998, the National Marine Fisheries Service proposed listing the Puget Sound Chinook salmon as a threatened species under the ESA. King County is working in cooperation with Pierce and Snohomish Counties and local governments to develop a response to the listing that will allow the area to thrive economically while enhancing and improving salmon habitat. The Executive's Preferred Plan provides the flexibility to modify our facilities and programs to address changing conditions. For example, the EPP would allow production and use of reclaimed water to augment regional water supplies, thereby benefiting salmon streams by avoiding additional withdrawals for drinking water. (The County will conduct detailed studies to determine the feasibility of discharging highly treated reclaimed water to Lake Washington and the Ship Canal for the purpose of protecting in-stream flows.) As the ESA response is developed, King County will coordinate with federal, state, and local agencies including the National Marine Fisheries Service, tribal governments, and citizens to ensure our wastewater facilities will benefit salmon restoration programs in Puget Sound.

New requirements, policies, or initiatives at the state or federal levels have the continued potential to affect allowable pollutant discharge levels from existing and future treatment facilities. Watershed planning, for example, is one federal and state initiative that could affect allowable pollutant discharges to the region's waters by designating "total maximum daily loading" of pollutants to each body of water from all sources. The changing regulatory environment is addressed when a wastewater utility such as King County negotiates its federal National Pollutant Discharge Elimination System (NPDES) permit every 5 years. Existing facilities and plans for new facilities will be modified, as needed, to remain in compliance with regulatory requirements.

Sites for New Treatment Plants

Two service strategies discussed in this final EIS include a new (third) secondary treatment plant in the North End. Service strategy options also address developing treatment plants on the Eastside to provide reclaimed water to augment water supplies. Sites have not been identified for any of these facilities. Unlike the 1985-86 secondary planning effort, which identified several representative sites for a third plant, the RWSP will take a broader look at siting a new plant or plants. This effort has advanced only far enough to

develop planning-level cost estimates for comparison purposes. A concerted site selection process and accompanying environmental review will proceed only if County staff are directed to move forward on one of the strategies or options that calls for a new plant.

Water Conservation

The Seattle Water Department's Water Supply Program includes three levels of water conservation to reduce commercial and domestic water use. Each of these levels are designed to reduce regional demands on water supply particularly during late summer and early fall months. This focus on reducing water usage during July, August and September does not match up with wastewater capacity needs which are most critical in late fall and winter months of October, November, December and January. As a result, water conservation has a minimal effect on the sizing and phasing of new wastewater facilities which are based on peak wet weather flows and solids loadings. The timing and sizing for conveyance and for the liquid portions of the treatment process are by far more influenced by stormwater and ground water during wet weather months than any foreseen conservation activities. In planning for the region's wastewater facilities we have and will continue to evaluate any potential benefits derived from conservation efforts. However, since storm weather and ground water factors play the predominant role in sizing wastewater facilities it is unlikely that conservation efforts will significantly alter currently projected facilities needs.

Practicability of Water Reuse

Increasing difficulties in developing new traditional sources of water supply make using reclaimed water as a potential water supply an increasingly viable option. Developing new water sources is a complex and lengthy process. Diverting surface water from mountain lakes or streams may decrease flows in important fish streams. Water rights from the state for new surface and groundwater sources may be difficult to obtain. To determine if large-scale effluent reuse is feasible, however, the costs and adverse impacts of developing new water sources must be weighed against the costs and impacts of developing infrastructure to treat and distribute reclaimed water to replace potable water for uses for which drinking water quality is not required.

Service Strategy Options

Some of the service strategy options listed later in this chapter involve unresolved environmental issues. These include conveyance and treatment of water other than sewage (inflow and infiltration), CSO control requirements and East Treatment Plant effluent discharge alternatives. These service strategy options, most of which are not included in the EPP, and their unresolved environmental issues, are discussed in detail in Chapter 12 of this FEIS and in Chapter 4 of the draft RWSP.

SUMMARY OF SERVICE STRATEGIES

This section summarizes the four service strategies as presented in the Draft Plan and EIS. Elements common to all of the service strategies are identified first, followed by a listing of the defining features of each service strategy. More detailed descriptions of the service strategies are provided in Chapter 3 of this part of the FEIS and in the draft RWSP.

Elements Common to All Service Strategies

Ongoing Projects

King County is currently in the process of planning, designing, and constructing several projects that were called for in previous comprehensive plan updates. These include the current expansion at the East Treatment Plant, as well as conveyance capacity improvements such as the North Creek diversion, the South Interceptor parallel, the Wilburton siphon, the Mill Creek relief sewer, and the Swamp Creek interceptor extension. These conveyance improvements are needed to handle increasing wastewater volumes from the basins they serve, no matter which service strategy is adopted. Several CSO control projects are also being planned or designed as a result of previous plans and commitments. These include Denny Way, Henderson/Martin Luther King, North Beach, Brandon, Michigan and Kingdome/Industrial. Site-specific impacts of these projects have been or will be evaluated in project-specific environmental review documents and are not discussed in this FEIS.

Common Facilities and Programs

Under the current plan, several future projects will be required regardless of the system strategy adopted by the King County Council. For example, sections of the Eastside and Bothell-Woodinville interceptors will have to have parallel pipelines constructed.

Expansion of the East Treatment Plant is proposed under any of the service strategies, although the capacity and timing differs among them. Major trunk improvements are also common to all the service strategies, as well as several CSO facilities.

All service strategies include an inflow and infiltration (I/I) component. The level of I/I control, as well as the timing required to achieve it, is included under each service strategy.

The more definitive of the facilities and programs described in this chapter are described more fully in Chapter 3 of this part of the FEIS and in the draft RWSP. Their potential environmental impacts are discussed in Chapters 5 through 8 of this part of the FEIS.

Appendix E lists trunk sewer improvements common to all strategies according to the decade in which need is anticipated under current population and flow estimates.

Biosolids Management

Many options for managing biosolids were evaluated. One of the alternatives, the current system of land application of Class B biosolids, was chosen as the base case and was used in the cost model to demonstrate the biosolids component of the wastewater plan. The County's current biosolids recycling program and its potential environmental impacts are discussed in Chapter 10 of this part of the FEIS. Alternative biosolids recycling methods and their potential environmental impacts are discussed in Chapter 12.

Potential for Water Reuse

The use of reclaimed water to supplement water supply is of interest to a number of community members and local elected officials. While present costs for the provision of reclaimed water generally exceed those for development of new potable supply, some reuse service proposals are economically viable and are in the process of being implemented, with several others potentially viable in the near term. Examples of potential applications of reclaimed water include wastewater treatment plant process water, landscape irrigation, and industrial heating and cooling. Chapter 9 of this part of the FEIS discusses the potential environmental impacts of using reclaimed water for treatment plant process water and landscape irrigation. Several of the service strategy options discussed in Chapter 12 would involve large scale uses of reclaimed water.

Service Strategy Defining Features

NOTE: Changes resulting from revision of the strategies are shown in italics.

Service Strategy 1 (SS1)

- Maintain the existing two-treatment-plant system (West and East Treatment Plants).
- Expand the East Treatment Plant capacity by 2010, with subsequent expansions required at the East and West Treatment Plants. (*Revised Strategy: Expand East Plant capacity by 2013, with subsequent expansions required at the East and West Treatment Plants.*)
- Parallel the Kenmore Interceptor by 2010.
- Parallel two-thirds of the Eastside Interceptor by 2035 to carry flows to the East Treatment Plant. (*Revised Strategy: Only parallel two short sections of Eastside Interceptor.*)
- Include a full-scale I&I reduction program. (*Revised Strategy: Implement aggressive incentive-based I/I control program involving cost sharing and surcharges.*)

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- Store CSOs along the Lake Union Ship Canal in large, underground storage tanks, and convey them to the West Treatment Plant after peak flows subside.
 - Store CSOs south of the Lake Union Ship Canal on-site and/or provide treatment at CSO locations.
 - Produce Class B Biosolids using anaerobic digestion at both plants pending analysis of other technologies.
 - Produce Class A reclaimed water at both treatment plants.

Service Strategy 2 (SS2)

- Create a three-treatment-plant system (comprised of West Treatment Plant, the East Treatment Plant, and a new North Treatment Plant).
- Expand the capacity at the West Treatment Plant to 159 mgd by 2010. (*Revised Strategy: Expand capacity at the West Plant to 159 mgd by 2013*)
- Construct a new North Treatment Plant in north King or south Snohomish County by 2018. (*Revised Strategy: Construct new North Plant by 2024*)
- Expand the East and North Treatment Plants by 2023 and 2032, respectively. (*Revised Strategy: Expand East Plant by 2029; no expansion of North Plant.*)
- Parallel the Kenmore Interceptor by 2003. (*Revised Strategy: Parallel the Kenmore Interceptor by 2009.*)
- Construct a conveyance system to carry influent to the North Treatment Plant and an outfall from the North Treatment Plant to Puget Sound by 2018. (*Revised Strategy: Construct North Plant conveyance system and outfall by 2024*)
- Include a small-scale I&I reduction program. (*Revised Strategy: Implement aggressive incentive-based I/I control program involving cost sharing and surcharges.*)
- Store CSOs along the Lake Union Ship Canal in large underground storage tanks for conveyance to the West Treatment Plant after peak flows subside.
- Store CSOs south of the Lake Union Ship Canal on-site and/or provide treatment at CSO locations.
- Produce Class B biosolids using anaerobic digestion at all three plants pending analysis of other technologies.
- Produce Class A reclaimed water at all three plants.

Service Strategy 3 (SS3) (Basis for EPP)

- Create a three-treatment-plant system (West Treatment Plant, East Treatment Plant, and new North Treatment Plant).
- Construct a new North Treatment Plant to accommodate 35 mgd by 2010. *(Revised Strategy: Construct new North Plant to accommodate 18 mgd by 2010.)*
- Expand both the East and the North Treatment Plants by 2020 and 2030, respectively; no expansion is required at the West Treatment Plant.
- Construct a conveyance system to carry influent to the new North Treatment Plant and an outfall from this plant to Puget Sound by 2010.
- Initiate a smaller scale I&I reduction program. *(Revised Strategy: Implement aggressive incentive-based I/I control program involving cost sharing and surcharges.)*
- Store CSOs along the Lake Union Ship Canal in underground storage tanks for conveyance to the West Treatment Plant after peak flows subside.
- Store CSOs south of the Lake Union Ship Canal on-site and/or provide treatment at CSO locations.
- Produce Class B biosolids by using anaerobic digestion at all three plants pending analysis of other technologies.
- Produce Class A reclaimed water at all three plants.

Service Strategy 4 (SS4)

- Maintain the existing two-treatment-plant system (West and East Treatment Plants).
- Expand the treatment capacity at the West Treatment Plant by 2010. *(Revised Strategy: Expand the West Plant by 2013)*
- Expand the treatment capacity at East Treatment Plant in 2020, 2030, and 2040. *(Revised Strategy: Expand treatment capacity at East Plant in 2024 and 2037)*
- Construct an 18-mile-long deep tunnel in phases from the Kenmore Pump Station to the Duwamish Pump Station for wastewater conveyance and CSO storage. *(Revised Strategy: Construct a 15-mile-long deep tunnel in phases.)*
- Include a full-scale I&I reduction program. *(Revised Strategy: Implement aggressive incentive-based I/I control program involving cost sharing and surcharges.)*

- Produce Class B biosolids by using anaerobic digestion at both plants pending analysis of other technologies.
- Produce Class A reclaimed water at both treatment plants.

SERVICE STRATEGY OPTIONS

A number of alternative ideas for meeting stated planning objectives were discussed in the Draft RWSP. These Service Strategy Options are fully described in the draft plan. They consist of measures designed to reduce costs, increase efficiencies, or optimize operations in six categories: treatment, conveyance, CSOs, biosolids, water reuse, and other issues. The options are listed by category in Table 1-1. The options are discussed in greater detail in Chapter 12 of this part of the Final EIS and Chapter 4 of the Draft RWSP. The potential environmental impacts of the options are discussed in Chapter 12 of this part of the FEIS.

NOTE: Options included for further study in the EPP are shown in bold.

Table 1-1: SERVICE STRATEGY OPTIONS	
TREATMENT	
4A	<i>Redefine Secondary Treatment: Negotiate to change the treatment requirements for wastewater effluent discharges</i>
4B	<i>Re-rate Plant Capacities: Increase the amount of wastewater treated at the East and West Treatment Plants without expanding existing facilities</i>
4C	<i>Build in Smaller Increments: Delay construction of facilities until they are actually needed, instead of planning and constructing facilities well ahead</i>
CONVEYANCE	
4D	<i>Decrease Conveyance Design Standard: Design the system to handle a 5-year storm instead of a 20-year storm</i>
4E	<i>Decrease Conveyance Design Standard: Continue to size new pipes to handle a 20-year storm, but wait until existing pipes reach capacity during 5-year storm flows before constructing new pipes</i>
4F	Discharge to the Duwamish: Discharge a portion of peak winter flows from the East Treatment Plant directly to the Green/Duwamish River
4G	<i>No I/I Program: Build additional facilities instead of implementing an I/I control program</i>
COMBINED SEWER OVERFLOW	
4H	<i>Reduce CSO Control Goal: Negotiate to increase the number of allowed CSO events from the state requirement of 1 event per CSO location per year to the federal requirement of 4-6 events per CSO location per year</i>
BIOSOLIDS	
4I	Alternative Biosolids Technologies: Alternatives to the existing biosolids processing technology (anaerobic digestion).
WATER REUSE	
4J	Discharge at Hiram Chittenden Locks: Discharge reclaimed water from the West Treatment Plant at locks to allow withdrawal from Lake Washington for water supply.
4K	Discharge to Lake Washington/Sammamish: Build two Eastside plants with advanced treatment to postpone/minimize expansion of the existing conveyance system, and allow withdrawal from lakes for water supply.
4L	North Treatment Plant Discharge to Lake Washington: Build the North Treatment Plant

	initially as an advanced treatment facility to postpone construction of marine outfall and allow additional withdrawal from Lake Washington for water supply.
OTHER	
4M	<i>Implement Pollutant Source Trading: Substitute wastewater treatment facility upgrades with non-wastewater projects that would better improve water quality.</i>
4N	Offer siting partnerships: Work with communities to develop mitigation measures that are appropriate to the community in which facilities are located.

SUMMARY OF IMPACTS AND MITIGATION MEASURES

Service Strategies

Long-term Operational Impacts

Long-term impacts of the service strategies involve their operation and primarily affect water quality, biological resources, environmental health, and land use. Detailed discussions of these impacts are found in Chapters 5 through 10 and Chapter 12 of this part of the FEIS.

The effluent discharge point is a critical siting decision, because effluent should be diluted and transported out to the ocean fairly quickly to avoid concentration of pollutants in central Puget Sound. Discharges to the upper layer of Puget Sound are considered best by oceanographers, because currents there move northward to the open ocean. The West Treatment Plant outfall discharges to the upper layer. The Duwamish outfall for the East Treatment Plant is located in the lower layer of water, at 600 feet. Although dilution is adequate to meet discharge permit requirements, the currents move more slowly in a southward direction before mixing into the upper layer and moving out of the Sound. Oceanographers believe that constituents of the effluent from the Duwamish outfall remain and accumulate in the Sound, along with effluent from other outfalls. A new outfall associated with a new North Treatment Plant would be sited north of the outfall for the West Treatment Plant. In final siting of the new North Treatment Plant outfall, one objective would be to direct effluent to the upper water layer.

All the service strategies increase the volume of effluent discharged from the East Treatment Plant outfall off Duwamish Head because the East Treatment Plant would be expanded under all strategies. Of the four strategies, SS1 and SS4 would discharge the greatest volume of effluent from the East Treatment plant outfall into the southward-moving lower layer off Duwamish Head. SS2 and SS3 redirect a portion of the effluent that would otherwise be discharged from the Duwamish Head outfall to a new outfall associated with a North Treatment Plant. To the extent that final siting of this outfall directs effluent to the upper water layer and northward, these strategies would be preferable from a water-quality perspective. SS1, SS2, and SS4 also increase the discharge from West Point, where the flushing is good.

Under all strategies, the CSO program will be designed to meet water quality and public health standards in area waters. Project priorities will address first those areas with highest potential for public contact with combined sewage. SS4, however, will eliminate all

CSOs from the Duwamish River and Elliott Bay, storing and transporting those flows to the East and West Treatment Plants for treatment and discharge from marine outfalls. Overall, this strategy would discharge the lowest total volume of pollutants to these waters.

Since most of the wastewater system is buried, people are not usually aware of it, except in extreme conditions, or when it is under repair. Odors can be released from the underground conveyance system in certain conditions, as well as from the treatment plants. King County has an odor control program aimed at identifying and treating those odor sources that are most likely to reach residential neighborhoods and other areas sensitive to odors.

Treatment plants have substantial above-ground structures and are typically industrial in appearance and type of operation. If surrounding land uses are not compatible, landscaping and architectural treatments are needed to blend the treatment plant with surrounding areas. The East Treatment Plant is located on land zoned for a treatment plant and is surrounded by an undeveloped buffer, followed by business park and industrial land uses. The West Treatment Plant is located in a single-family zone surrounded by Discovery Park. No site has been identified for the potential new North Treatment Plant; wherever it is located, however, it will probably require buffering or other means to make it compatible with surrounding uses. Compatibility with nearby land uses would be a high priority in selecting a new treatment plant site and design.

Truck traffic to and from treatment plants is also a long-term, operational activity. In the case of the East Treatment Plant, trucks quickly access the regional transportation system from the plant. West Treatment Plant traffic travels through the Armed Forces housing area and Discovery Park before entering Government Way, a commercial and residential street. Treatment plant-related truck traffic to a new North Treatment Plant would be a new impact to the area. King County is seeking ways to reduce truck traffic by evaluating alternative methods to process solids from the treatment process, thus reducing the volume.

The end products of the wastewater treatment process, reclaimed water and biosolids, can be beneficially recycled without adverse impacts provided that regulations regarding product quality and application methods are followed.

Short-term Construction Impacts

Short-term impacts are those caused by construction of facilities and are typically experienced in a local area for the duration of construction. The service strategies may differ somewhat in their short-term impacts, because facility construction would take place in different areas. Appropriate mitigation measures for these impacts would be taken whichever service strategy were implemented. A more detailed discussion of probable construction impacts is provided in Chapter 11 of this part of the FEIS.

Impacts of construction at the treatment plants would be experienced locally for up to 5 years for each expansion phase, during which many separate, but coordinated, activities

would occur simultaneously. Construction would entail large-scale earth movement and hauling of concrete and equipment. Construction noise, dust, and traffic would occur around the treatment plant sites.

While conveyance construction impacts are much shorter in duration in any one area, the facilities would be located close to homes and businesses, so impacts would be experienced by many more people. Installation of pipes and pumping stations requires noisy excavation, usually in or near streets. Projects located in streets, and trucks hauling soils and equipment, may disrupt traffic. Access to residential and business properties is sometimes interrupted for short periods. These impacts are mitigated by proper construction management, but cannot be avoided entirely. Pipelines that are not located in streets are often built along water bodies. In such cases, wildlife habitat, including wetlands, may be affected. Stream crossings cause temporary impacts to water quality and aquatic life and have to be timed to avoid salmonid migration periods.

New pumping stations and CSO storage/treatment facilities take up to 18 months to build. They involve typical construction impacts such as noise, dust, and traffic.

Conveyance pipelines are built a length at a time, so impacts at any one location are usually only experienced for a few weeks. Tunnels concentrate impacts at one end point, the working portal. This is where all soils are removed, and truck traffic and workers move to and from the working portal. Depending on the size and length of the tunnel, the portal can be active for a year or more, impacting the surrounding area with noise, dust, and truck traffic.

Infiltration and inflow control involves such measures as installing a plastic liner in existing sewer pipes, replacing broken pipes, and disconnecting roof drains on individual residential and commercial buildings from the sanitary sewer system. This causes traffic disruption and noise and interferes with paving and landscaping on private property. Pipe lining, which is the least intrusive method, involves installing a sewer bypass pipe aboveground and elevated noise levels for about a week in one place. Noise reduction measures would be taken as needed. After construction, areas would be restored.

Service Strategy Option Impacts

The service strategy options listed earlier in this chapter have been developed to explore opportunities to minimize costs of the wastewater system and to provide new opportunities for coordination with other utilities, such as water supply.

Several service strategy options would constitute a change from current, more conservative, policies under which the County wastewater system is managed. They could allow for more frequent and greater discharges of wastewater pollutants from the County wastewater system. Such policies would not be implemented without technical studies to demonstrate no significant environmental harm or risk to public health.

Other policies call for reuse of treated wastewater to augment the water supply. Two would involve discharges of treated wastewater to the Lake Washington system. This would increase pollutant loadings to this freshwater system. To minimize these impacts, additional treatment steps would be added to achieve greater pollutant removals before discharge. Advanced technical studies would be conducted to demonstrate no long-term significant adverse impacts from implementing these policies.

POLICIES AND REGULATIONS

The quality of effluent discharged from King County's treatment facilities is governed by a number of federal and state laws in place to protect the quality of the region's water. The most important are the Federal Clean Water Act, the Washington Water Pollution Control Act, and the NPDES permit program.

RELATIONSHIP TO LAND USE PLANNING UNDER GROWTH MANAGEMENT ACT

In order to carry out its mission of providing wastewater treatment facilities to protect public health and prevent water pollution, King County must meet the requirements of the Washington State Growth Management Act (GMA). The GMA, passed in 1990 and subsequently amended, is a significant new factor affecting King County decisions. This legislation directs urban and fast-growing counties in the state to develop comprehensive growth management plans that define urban growth boundaries to ensure that facilities and services needed to sustain growth are in place when required.

In complying with the GMA, King County's facility planning must be consistent with other regional planning efforts so that its regional wastewater treatment and conveyance infrastructure is in place when development occurs. King County's wastewater planning must comply with the GMA requirements that cities and counties coordinate and adopt mutually supporting plans for capital facilities and utilities. The GMA further requires that capital facilities planning include an inventory of existing facilities and a forecast of future needs for such facilities. The RWSP uses subarea demographic forecasts prepared and adopted by the Puget Sound Regional Council (PSRC) to determine the impact of regional growth on King County's existing wastewater conveyance and treatment facilities and to plan future facilities to accommodate that growth. Additionally, the RWSP implements the King County Comprehensive Plan (KCCP), as it assumes all new development in the urban area will have sewers.