

# Regional Wastewater Services Plan

2006 Comprehensive Review and Annual Report  
 September 2007



Regional Wastewater Services Plan (RWSP)

# 2006 Comprehensive Review and Annual Report

September 2007



**King County**

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# Executive Summary

The Regional Wastewater Services Plan (RWSP) outlines a number of important projects, programs, and policies for King County to implement through 2030 to continue to protect public health and water quality and ensure sufficient wastewater capacity to meet future growth needs. In adopting the RWSP in 1999, the Metropolitan King County Council recognized the importance of reviewing implementation of the RWSP on a regular basis. As a result, the council adopted specific RWSP reporting policies in March 2006 that call for regular reviews and reports associated with implementing the RWSP.<sup>1</sup>

The Wastewater Treatment Division (WTD) of the King County Department of Natural Resources and Parks (DNRP) has prepared the *RWSP 2006 Comprehensive Review and Annual Report* in accordance with the RWSP reporting policies. It presents a comprehensive review of RWSP policy implementation from 2004 through 2006, and includes all elements of the RWSP annual report for the year 2006. This is the second comprehensive review report since adoption of the RWSP. The first comprehensive review, *2004 RWSP Update*, focused on RWSP policy implementation from 1999 through 2003.<sup>2</sup>

The RWSP includes 13 sets of policies. The policies provide direction on projects and programs to ensure that King County continues to provide high quality wastewater treatment services and that facilities are in place when needed to meet wastewater capacity needs through 2030. The 13 sets of policies are as follows:

- Treatment Plant
- Conveyance
- Infiltration and Inflow
- Combined Sewer Overflow Control
- Biosolids
- Water Reuse
- Wastewater Services Planning
- Water Quality Protection
- Wastewater Planning
- Environmental Mitigation
- Public Involvement
- Financial
- Reporting

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<sup>1</sup> The Metropolitan King County Council adopted specific RWSP reporting policies in May 2006 via Ordinance 15384. The RWSP comprehensive review reporting policies are provided in Chapter 1 of this report.

<sup>2</sup> RWSP annual reports and comprehensive review reports are available on the RWSP library Web site at <http://dnr.metrokc.gov/wtd/rwsp/library.htm>

The *RWSP 2006 Comprehensive Review and Annual Report* confirms that the RWSP policies continue to be effective and provide important guidance to King County in its role as a regional clean-water agency. Highlights of RWSP policy implementation in 2004–2006 and other elements of the report are provided in this executive summary. The following sections provide a brief description of the RWSP policies and policy implementation highlights in 2004–2006.

## Treatment Plant Policies

The RWSP treatment plant policies are intended to guide King County in providing wastewater treatment at its existing plants and in expanding treatment capacity through the year 2030. The policies call for building the Brightwater Treatment Plant to meet the wastewater capacity needs of the northern portion of the county's wastewater service area. The policies include direction on meeting the county's odor control goal to prevent and control nuisance odor occurrences. They also include guidance on producing and using reclaimed water at the county's existing and future treatment plants.

## Treatment Plant Projects

Major efforts on three treatment plant projects—Brightwater Treatment Plant, Vashon Treatment Plant, and Carnation Treatment Plant—were under way in 2004–2006.

- **Brightwater Treatment Plant.** King County is building the Brightwater Treatment Plant, the county's third regional treatment plant, to meet the region's wastewater capacity needs in the northern portion of the county's wastewater service area. The Brightwater plant is on schedule for completion in 2010. Activities in 2004 focused on completing predesign, applying for permits, and continuing to involve stakeholders and the public in the Brightwater design and permitting process. In 2005, the project team continued its permitting, design, and stakeholder involvement activities in addition to other activities such as purchasing properties and negotiating mitigation agreements. In 2006, final design was completed and construction began on the treatment plant.
- **Vashon Treatment Plant.** In 1999, King County assumed ownership and operation of the Vashon Treatment Plant. In 2004, construction began on major upgrades to increase capacity and enhance the facility's backup systems to ensure that the facility meets or exceeds permit limits. Construction of the plant upgrades was complete and startup activities began in fall 2006.
- **Carnation Treatment Plant.** The City of Carnation decided to replace on-site septic systems with a new wastewater treatment facility and collection system to better protect public health and the environment, achieve the city's comprehensive plan goals, and maintain and enhance community livability. The city is designing and building the local wastewater collection system, and contracted with King County to design, build, operate, and maintain a new treatment plant and associated discharge facilities. In 2006, final design was completed and construction began on the treatment plant. The project is scheduled for completion in 2008.

## Preventing and Controlling Odors

RWSP Treatment Plant Policy (TPP)-4 calls for the county's existing treatment facilities to meet the odor control levels that are considered best in the country for existing treatment facilities of a similar size. New regional treatment facilities are to be constructed with odor control systems that are designed to meet the odor prevention level that reflects the best in the country for new facilities of similar size. The policy also calls for development of a comprehensive odor control and prevention monitoring program.

In accordance with these policies odor control improvements are under way at the West Point and South treatment plants. Brightwater's odor control system is being designed to meet the odor control level for new regional treatment plants and ensure there are no detectable odors from the Brightwater Treatment Plant. In addition, WTD completed the *Odor and H<sub>2</sub>S Corrosion Control Plan* in 2006; it describes the odor control and prevention monitoring program's goals and strategic approach to reducing or preventing odors and corrosion of the county's wastewater facilities.

## Producing and Using Reclaimed Water at Existing and Future Plants

The RWSP treatment plant policies direct the county to continue and to explore opportunities for expanded use of reclaimed water at existing plants and at all new treatment facilities. Reclaimed water is produced at the West Point and South plants for on-site landscaping and in-plant processes. Some of the reclaimed water produced at South plant is distributed off-site as an irrigation source for nearby sports fields at Fort Dent Park, a wetland plant nursery, and habitat restoration efforts.

The county's future Brightwater and Carnation treatment plants will use membrane bioreactor technology (MBR), which will result in treated wastewater that is seven to ten times cleaner than typical secondary treated wastewater. These facilities are being planned to produce and use reclaimed water for in-plant and off-site purposes.

## Conveyance Policies

The RWSP conveyance policies are intended to guide King County on how to accomplish major improvements to the regional wastewater conveyance system through 2030 and beyond, including building and upgrading the pipes and pump stations associated with the Brightwater Treatment Plant. The policies call for the county to use the 20-year peak flow storm as the design standard for its separated wastewater system to avoid sanitary sewer overflows and ensure there is sufficient capacity in the regional conveyance system to accommodate planned growth.

### Conveyance System Improvement Program Update

Work began in 2005 to update the conveyance system improvement (CSI) program. WTD worked closely with the component agencies and the Metropolitan Water Pollution Abatement Advisory Committee (MWPAAC) to complete the update in 2007.<sup>3</sup> The update identifies 33 CSI projects to meet capacity needs through 2050; 24 of these projects are planned through the RWSP planning horizon of 2030.<sup>4</sup> All 33 projects are in addition to the RWSP projects that are completed or that are in design or construction.

### Brightwater Conveyance

Brightwater conveyance is being built to convey untreated wastewater (influent) to and treated wastewater (effluent) from the Brightwater Treatment Plant to a marine outfall for discharge to Puget Sound. The conveyance system consists of approximately 14 miles of pipelines to be constructed in underground tunnels in north King County. Activities in 2004 and 2005 focused on predesign, permitting, land acquisition, initiation of final design, and negotiation of mitigation agreements. Brightwater conveyance construction began in 2006 and is on schedule for completion in 2010.

### RWSP Conveyance Projects in Design or Construction

RWSP conveyance projects in design during 2006 include the Bellevue Pump Station Upgrade, Kent/Auburn Conveyance System Improvements, North Creek Interceptor Improvements, and Black Diamond Storage. RWSP conveyance projects in construction in 2006 include the Fairwood Interceptor Sewer, Juanita Bay Pump Station Replacement, Pacific Pump Station Replacement, and Hidden Lake Pump Station and Sewer Improvements.

### Infiltration and Inflow Policies

The RWSP infiltration and inflow (I/I) policies provide direction to King County on working with the component agencies to reduce the amount of I/I that flows into local systems in order to reduce the impact of I/I on the county's regional wastewater system.<sup>5</sup> The policies call for conducting I/I pilot rehabilitation programs, developing conveyance design standards, and performing other actions to meet RWSP I/I reduction goals.

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<sup>3</sup> MWPAAC advises the King County Council and Executive on matters related to reducing water pollution. It was created by state law (RCW 35.58.210) and consists of representatives from cities and local sewer utilities that operate sewer systems in King County.

<sup>4</sup> RWSP Wastewater Planning Policy (WWPP)-4 calls for facility sizing to take into account the need to accommodate build-out population. By 2050, the regional wastewater service area is projected to be fully built out and all sewerable portions of the service area will be connected into the wastewater system. Therefore, new conveyance facilities are designed to convey the 20-year peak flow event projected to occur in 2050.

<sup>5</sup> I/I is clean stormwater and groundwater that enter the sewer system through cracked pipes, leaky manholes, or improperly connected storm drains, down spouts, and sump pumps.

A significant effort of WTD's I/I program in 2005 was the completion of a joint county/component agency comprehensive six-year study of I/I in the portions of the regional wastewater service area served by separated sewers. Based on the results of the study, the King County Council approved the *Executive's Recommended Regional Infiltration and Inflow Control Program* in May 2006.<sup>6</sup>

A key component of the recommended I/I control program is the selection and implementation of two or three "initial" I/I reduction projects to test planning assumptions on a larger scale and gain more information about costs. WTD and MWPAAC worked together to select four projects to undergo further evaluation through sewer system evaluation survey (SSES) work and predesign, which is expected to be complete in fall 2008. Upon completion of this work, WTD and MWPAAC will then select the two to three most feasible initial I/I projects for construction.

## Combined Sewer Overflow Control Policies

The RWSP combined sewer overflow control policies call for the control of all county combined sewer overflows (CSOs) by 2030.<sup>7</sup> The policies also call for development of a long-range sediment management strategy to prioritize cleanup of contaminated sediments at specific CSO locations.

### CSO Control Program

Combined sewers, which carry both wastewater and clean stormwater, exist in many parts of older cities across the nation, including Seattle. To protect treatment plants and avoid sewer backups into homes, businesses, and streets, combined sewers in Seattle sometimes overflow at specific locations (CSOs) into Puget Sound, the Duwamish Waterway, Elliott Bay, Lake Union, the Lake Washington Ship Canal, and Lake Washington. Although the wastewater in CSOs is greatly diluted by stormwater, CSOs may be harmful to public health and aquatic life because they can carry chemicals and disease-causing pathogens.

A major accomplishment during 2004–2006 was construction of two projects that were under way prior to RWSP adoption: the Mercer/Elliott West CSO and Henderson/Norfolk CSO control systems.<sup>8</sup> Both systems were brought online in 2005.

Another achievement was completion of the first CSO control program review in early 2006.<sup>9</sup> The CSO program review concluded that based on information accumulated since RWSP adoption, the priorities set for CSO control projects in the RWSP remain sound.

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<sup>6</sup> The *Executive's Recommended Regional Infiltration and Inflow Control Program* is available on the Web at <http://dnr.metrokc.gov/wtd/i-i/library/ExecRec/report.htm>

<sup>7</sup> The Washington State Department of Ecology (Ecology) regulates the level of CSO control based on the number of untreated CSO events that occur in a year. Ecology defines "the greatest reasonable reduction" in CSOs (RCW 90.48) as being "control of each CSO in such a way that an average of one untreated discharge may occur per year" (WAC 173-245-020).

<sup>8</sup> These systems were formerly called the Denny Way/Lake Union and Henderson/MLK/Norfolk CSO control projects.

In 2006, predesign and public involvement began on the four highest priority CSO control projects along Puget Sound beaches—Murray and Barton in West Seattle, Magnolia along north Elliott Bay, and North Beach near Carkeek Park.

## Sediment Management Activities

King County is responsible for cleaning up sediment contamination related to CSOs under the federal Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) and the state Model Toxics Control Act (MTCA).<sup>10</sup>

To meet RWSP policies, WTD is carrying out a sediment management plan developed in the late 1990s to remediate sediments near CSO outfalls that are contaminated with a variety of heavy metals, phthalates, polychlorinated biphenyls (PCBs), and hydrocarbons.<sup>11</sup> Most of the contamination is from the first half of the 20th century. Work on three projects is under way—cleanup of the Denny Way and Hanford/Lander CSOs and development of a prediction model.

WTD is partnering with the City of Seattle, the Port of Seattle, and the Boeing Company under a consent agreement with EPA and Ecology to prepare a remedial investigation and feasibility study for the Lower Duwamish Waterway Superfund Site. The county is participating in two early action sites—the Diagonal/Duwamish CSO/Storm Drain and Slip 4 CSO—to clean up portions of the waterway earlier than required. In 2006, EPA approved a cleanup plan for Slip 4 CSO sediments. Sediments with the highest contamination will be removed, and the remaining sediments will be capped.

## Biosolids Policies

RWSP biosolids policies focus on the beneficial use of wastewater solids. The policies provide guidance on continuing to produce and market Class B biosolids while evaluating alternative technologies that have the potential to produce the highest quality marketable biosolids, including Class A biosolids and require King County to produce biosolids in accordance with federal, state, and local regulations.<sup>12,13</sup> They also provide guidance on minimizing noise and odor impacts and on using digester gas for energy generation.

King County has been recycling biosolids for more than 30 years. The county's biosolids are used in agriculture and forestry, and as an ingredient in compost. One hundred percent of King County's biosolids were recycled in 2004–2006.

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<sup>9</sup> The CSO control program review is available on the Web at <http://dnr.metrokc.gov/wtd/cso/library.htm#plans>

<sup>10</sup> CERCLA is commonly known as Superfund.

<sup>11</sup> The sediment management plan is available on the Web at <http://dnr.metrokc.gov/WTD/sediment/library.htm>

<sup>12</sup> Class B biosolids refer to biosolids that have been treated to significantly reduce pathogens to levels that are safe for beneficial use in land application. Federal and state regulations require site management and access restrictions when biosolids of this quality are land applied.

<sup>13</sup> Class A biosolids refer to biosolids that have been treated to reduce pathogens to below detectable levels. Federal and state regulations require this level of quality for biosolids that are sold or given away in a bag or other container, or applied to lawns or home gardens.



The digester gas that is a byproduct of the solids treatment process can be used as fuel and converted to electricity and heat for treatment plant use. Both the West Point and South plants recover this gas to generate electricity and heat for treatment plant processes; it has been used to power engines, boilers, and turbines. Some of the gas produced at South plant is sold to Puget Sound Energy for distribution in its natural gas system. In 2004–2006, in cooperation with the U.S. Environmental Protection Agency and FuelCell Energy, Inc., King County sponsored the world's largest fuel cell demonstration project using digester gas at South plant.<sup>14</sup>

## Water Reuse Policies

RWSP water reuse policies provide guidance to King County on the development and implementation of its reclaimed water program. The policies also provide direction on pursuing the use of reclaimed and preparing a reclaimed water feasibility study.

Producing and using reclaimed water can help reduce the volume of treated effluent discharged to Puget Sound. Reclaimed water is wastewater that is treated to such a high level it can be used safely and effectively for nondrinking purposes such as landscape and agricultural irrigation, heating and cooling, industrial processing, wetland enhancement, and helping to reduce withdrawals from streams and groundwater.

King County has been safely producing and using reclaimed water at South plant in Renton and West Point plant in Seattle since 1997. When operational, reclaimed water from the Carnation Treatment Plant will be used to enhance a wetland in the Chinook Bend Natural Area. The Brightwater reclaimed water “backbone” is being built in conjunction with the Brightwater conveyance tunnels. The backbone will be able provide up to 7 million gallons per day (mgd) of reclaimed water beginning in 2011. Design of the backbone was completed in 2006.

RWSP Water Reuse Policy (WRP)-2 was amended via Ordinance 15602, which was adopted by the King County Council in September 2006. The amended policy replaced the directive for a reclaimed water work program—that was submitted in December 2000—with the directive for preparation of a reclaimed water feasibility study by December 2007. WTD is proceeding with the work of the feasibility study to meet the December 2007 deadline.

## Wastewater Services Policies

The RWSP wastewater services policies are intended to guide King County in providing wastewater services to its customers and in operating and maintaining its system. The policies call for the county to construct, operate, and maintain its regional wastewater system to prevent sewage overflows, protect public health and the environment, comply with regulations, and improve services in a fiscally responsible manner. The policies recognize the region's investment in the regional wastewater system and the importance of ongoing maintenance and repair to

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<sup>14</sup> A fuel cell is a device that chemically combines hydrogen and oxygen to make electrical energy without combustion. Fuel cells can operate on a variety of fuels including natural gas, methanol, ethanol, landfill methane, coal gas, digester gas, propane, gasoline, and pure hydrogen.

protect this investment. To that end, the policies direct the county to establish and implement an asset management program to ensure continued reliability of the system's infrastructure.

Implementation of the RWSP ensures that adequate wastewater capacity will be available when needed. WTD's forecasting and demand-modeling capabilities, in-field flow monitoring, and ongoing facility inspections provide essential information to identify and address capacity, operational, and maintenance needs.

WTD is developing a formal and detailed asset management plan to optimize the useful life of the county's wastewater facilities and is expected to be complete by the end of 2007. The plan will include information on best management practices for all assets and refine the long-range capital replacement program to best predict which assets will need to be replaced, when they will need to be replaced, and a corresponding budget.

## Water Quality Protection Policies

The RWSP water quality protection policies guide King County in identifying and resolving regional water quality issues, protecting public and environmental health, and protecting the public's investment in wastewater facilities and water resource management. The policies recognize that research and analysis are required and will be used to evaluate water quality of water bodies in WTD's wastewater service area.

In addition, RWSP water quality protection policy (WQPP)-5 specifies that the King County Executive implement a comprehensive water quality monitoring program of streams and water bodies that are or could be impacted by the wastewater system and that the executive submit summary reports and comprehensive reviews of this information to the King County Council as outlined in K.C.C. 28.86.165.<sup>15</sup> In general, monitoring activities in 2006 found that the quality of marine and fresh waters in King County is good.<sup>16</sup>

WTD routinely samples its effluent and the quality of the water near treatment plant and CSO outfalls. The county's treatment plants and associated facilities continue to be in compliance with the terms and conditions of their National Pollutant Discharge Elimination System (NPDES) permits.<sup>17</sup> Both West Point plant and South plant received the National Association of Clean Water Agencies (NACWA) Platinum Peak Performance Award for operating five consecutive years with no permit exceptions.

King County's Trouble Call Program investigates water quality complaints, including wastewater overflows and leaks, in the greater King County wastewater service area. Services include taking samples and implementing emergency responses such as notifying public health

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<sup>15</sup> In September 2006, the King County Council adopted Ordinance 15384, which amended this policy to include information and results of the water quality monitoring program in RWSP annual reports instead of as a separate report.

<sup>16</sup> Monitoring activities and results for 2004 and 2005 are available on the Web at <http://dnr.metrokc.gov/wtd/rwsp/library.htm#WQReports>; the 2006 results are provided in Appendix O of this report

<sup>17</sup> NPDES permits are issued by Ecology and set limits on the quality and quantity of effluent (treated wastewater) discharged from point sources such as treatment plants, CSOs, and industrial facilities.

agencies and posting signs. The program responded to about 110 incidents each year for the years 2004–2006. In 2004 and 2005, nine of the incidents were WTD-related. In 2006, 24 incidents were WTD-related, primarily because of the Barton Force Main breaks and the December windstorm.

The Industrial Waste Program (IWP) regulates industrial wastewater discharged into the King County wastewater system. The purpose of these activities is to ensure that industries treat wastewater for harmful substances before discharging the wastewater to sewers. This program protects surface water and biosolids quality, the environment, public health, and the wastewater system and its workers. In 2006, 128 permits and 302 industrial waste discharge authorizations were in effect and 376 inspections were conducted.

## Wastewater Planning Policies

To protect public health and water quality, it is essential to plan wastewater facilities before they are needed. The RWSP wastewater planning policies are intended to guide King County in its long-term comprehensive planning to meet the regional wastewater needs of the county's service area. The policies direct the county to make a long-term assessment of wastewater needs when planning for future wastewater systems and to take into account full build-out when considering the sizing of facilities. The policies are also intended to ensure that the conditions and assumptions that guide the implementation of the RWSP are routinely reviewed.

There have been no updates made to the population and flow projections that were presented in the *2004 RWSP Update* because no new Puget Sound Regional Council (PSRC) population forecasts by traffic analysis zone (TAZ) data were available in 2004–2006. RWSP key planning assumptions used to determine flow projections and facility sizing have not changed since the publication of the 2004 update. They are as follows:

- **Extent of Eventual Service Area.** The assumed extent of the planning area is the sewerable areas within Urban Growth Areas of King, Snohomish, and Pierce counties where King County WTD has sewage disposal contracts.
- **Future Population.** PSRC 2003 TAZ data, which is forecasted out to 2030, is allocated to sewer basins to determine future flow projections. The maximum wastewater system service area population is a straight line extrapolation of the growth rate between 2020 and 2030 out to 2050.
- **Water Conservation.** WTD continues to assume a 10 percent reduction in per day water consumption between 2000 and 2010, with no additional reduction after 2010.
- **Septic Conversion.** The current planning assumption is that 90 percent of the unsewered area (in year 2000) with potential for sewers will be sewered by 2030 and that 100 percent of this area will be sewered by 2050.
- **Infiltration/Inflow (I/I) Degradation.** WTD assumes that I/I degradation starting in 2000 would be 7 percent per decade, with a limit of 28 percent over a 40-year period; for new construction, the degradation assumption of 7 percent per decade will start after the decade of construction, to a maximum of 28 percent.

- **Design Standard.** The 20-year peak flow storm in 2050 is used as the design standard for the separated regional conveyance system.
- **Planning Horizon.** The year 2050 is used to represent the projected date that the regional wastewater service area will be fully built out and all sewerable portions of the service area will be connected into the wastewater system.

WTD will continue to review and analyze future information that could affect RWSP planning assumptions and make adjustments, if needed, to flow projections and facility needs and sizing.

## Environmental Mitigation Policies

The RWSP environmental mitigation policies are intended to guide King County in developing mitigation measures for environmental impacts from the construction and operation of its regional wastewater facilities. The policies recognize that construction and operation of these essential facilities can cause impacts to nearby neighbors and confirm the county's pledge to be a good neighbor. The policies also reinforce the county's responsibility to conduct environmental reviews consistent with the State Environmental Policy Act (SEPA) and to carry out mitigation measures to address the specific impacts identified in an environmental review.

WTD environmental planners prepare or oversee preparation of SEPA documents, such as determinations of non-significance (DNS) and environmental impact statements (EIS). WTD issued 28 wastewater facilities-related SEPA documents in 2004–2006.

WTD works with local jurisdictions, affected residents and businesses, and permitting and regulatory agencies during the planning, environmental review, design, and construction of its projects to develop mitigation measures and ensure its facilities are good neighbors.

## Public Involvement Policies

The RWSP public involvement policies are intended to guide King County in maintaining public information and education programs and to engage the public and component agencies in the planning, designing, and operating decisions that affect them. The policies direct the county to involve public officials and citizens of affected jurisdictions early and actively in the planning and decision-making process for wastewater capital projects. They include direction on disseminating information and providing education on the status, needs, and potential future of the region's water resources.

WTD conducts a variety of ongoing general public information and outreach activities in support of the county's wastewater programs and the needs and potential future of the region's water resources. These include a speaker's bureau; tours of the county's wastewater treatment facilities; informational booths at community fairs, festivals, and other events; and an annual water quality survey.

WTD's public involvement group conducts activities to ensure there is a high level of public engagement in WTD's projects. Through these efforts, community members have the

opportunity to be involved in and influence decisions associated with the location, design, and mitigation of WTD's projects. Community members helped influence the design of the Carnation Treatment Plant, Hidden Lake Pump Station, and Juanita Pump Station in 2004–2006. In 2004, a series of meetings were held around the Brightwater Treatment Plant and portal areas to update community members on design and mitigation issues and to solicit their ideas and feedback. Many of the suggestions from those meetings were incorporated into the systemwide mitigation package for Brightwater, which was completed in December 2005.

## Financial Policies

The RWSP financial policies are intended to guide King County on the long-term financing of its wastewater capital program and preserve the financial security and bonding capacity for the wastewater system. The policies provide direction used in establishing annual sewer rates and capacity charges and the allocation of the wastewater system costs between existing and new customers.

RWSP Financial Policy (FP)-15 provides direction on meeting the costs of constructing and operating the county's wastewater system. The policy calls for existing customers to pay a monthly sewer rate to cover the portion of the existing and expanded system that serves existing customers. To ensure that "growth pays for growth", new customers are to pay costs associated with the portion of the existing system that serves new customers and costs associated with expanding the system to serve new customers. King County continues to follow the direction provided in RWSP FP-15 to determine the annual sewer rate and capacity charge.

## RWSP Cost Estimates

RWSP reporting policies call for including in the RWSP annual reports an update of anticipated RWSP costs through the year 2030.

Planning-level cost estimates are based on generic facility concepts. Specific details of a project such as location, technologies, and environmental impacts and potential mitigation of such impacts are determined later during project predesign. The accuracy of a project's cost estimate will increase as the project progresses through the project life cycle. Costs for projects in planning can have a rough order-of-magnitude estimate in the range of - 50 to +100 percent.<sup>18,19</sup> By the time a project enters the construction phase, estimates typically narrow to a range of -10 to + 15 percent.

The 2006 cost estimate for implementing the projects and programs associated with the RWSP through 2030 is approximately \$3.14 billion, an increase of about \$98 million from the 2005 cost estimate. Almost one-third of the total 2006 RWSP cost estimate represents planning-level costs. Cost increases are attributed to new projects identified during the process to update the

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<sup>18</sup> Project Management Institute's *A Guide to the Project Management Body of Knowledge*, third edition, 2004

<sup>19</sup> Order-of-magnitude estimates are estimates without detailed engineering data, they are often referred to as "ball park" estimates.

conveyance system improvement program, rising inflation and construction costs, and modifications to projects.

## Reporting Policies

The reporting policies were added to the RWSP via King County Council adoption of Ordinance 15384 in March 2006. Adding a reporting policies section to the RWSP and the King County Code (28.86.165) eliminated redundancies in reporting requirements that were previously included in several RWSP policies, adjusted the due dates to reflect the availability of information, and consolidated the reporting requirements into fewer, but more comprehensive reports.

The reporting policies call for the King County Executive to review the implementation of the RWSP on a regular basis and submit specific reports to the King County Council and the Regional Water Quality Committee. The *RWSP 2006 Comprehensive Review and Annual Report* is presented in accordance with the policy direction for RWSP comprehensive reviews.

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## Chapter 1

# Introduction

The Regional Wastewater Services Plan (RWSP) 2006 Comprehensive Review and Annual Report is presented in response to the RWSP reporting policies outlined in Ordinance 15384 and King County Code 28.86.165.<sup>1</sup> Each chapter in this report describes a specific set of RWSP policies and how the policies were implemented in 2004–2006. Elements of the RWSP 2006 annual report, such as progress on RWSP projects in design or construction, are also included as appropriate.

The major topics of each chapter are as follows:

- Chapter 2 provides details on implementation of the RWSP treatment plant policies and information on design or construction activities in 2006 associated with the Brightwater, Carnation, and Vashon treatment plants.
- Chapter 3 provides details on implementation of the RWSP conveyance policies and includes information on activities in 2006 associated with Brightwater conveyance and other RWSP conveyance improvement projects in design or construction.
- Chapter 4 provides details on implementation of the RWSP infiltration and inflow (I/I) policies. It also describes the efforts in 2006 to implement the *Executive's Recommended I/I Control Program*.
- Chapter 5 provides details on implementation of the RWSP combined sewer overflow (CSO) control policies, including efforts to improve water quality in the Lower Duwamish Waterway and the activities associated with the county's Sediment Management Program.
- Chapter 6 provides details on implementation of the RWSP biosolids policies.
- Chapter 7 provides details on implementation of the RWSP water reuse policies.
- Chapter 8 provides details on implementation of the RWSP wastewater services policies.
- Chapter 9 provides details on implementation of the RWSP water quality protection policies. It also provides information on programs that support King County's water quality management efforts.
- Chapter 10 provides details on implementation of the RWSP wastewater planning policies and includes information on the planning assumptions used to determine flow projections and facility sizing.

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<sup>1</sup> RWSP annual reports and comprehensive reviews are available on the Web at <http://dnr.metrokc.gov/wtd/rwsp/library.htm>

- Chapter 11 provides details on implementation of the RWSP environmental mitigation policies.
- Chapter 12 provides details on implementation of the RWSP public involvement policies.
- Chapter 13 provides details on implementation of the RWSP financial policies. The chapter also includes information on sewer rate projections and provides an update of the RWSP cost estimates through 2030.
- Chapter 14 provides details on implementation of the RWSP reporting policies.

The remainder of this chapter describes King County's wastewater treatment system and the RWSP.

## 1.1 King County's Wastewater Treatment System

King County protects water quality and public health in the central Puget Sound region by providing high quality and effective treatment to wastewater collected from 17 cities, 16 local sewer utilities, and 1 Indian Tribe. The county's Wastewater Treatment Division (WTD) serves about 1.4 million people, including most urban areas of King County and parts of south Snohomish County and northeast Pierce County.

King County's wastewater system (Figure 1-1) includes two large regional treatment plants (the West Point plant in the City of Seattle and the South plant in the City of Renton), one small treatment plant on Vashon Island, one community septic system (Beulah Park and Cove on Vashon Island), four combined sewer overflow (CSO) treatment facilities (Alki, Carkeek, Mercer/Elliott West, and Henderson/Norfolk—all in the City of Seattle), over 335 miles of pipes, 19 regulator stations, 42 pump stations, and 38 CSO outfalls. Construction on two new treatment plants began in 2006: the Brightwater Treatment Plant, the system's third regional plant, scheduled for completion in 2010, and a smaller local treatment plant in the City of Carnation, scheduled for completion in 2008.

Visit WTD's Web site for more information on projects and programs:

<http://dnr.metrokc.gov/wtd/>



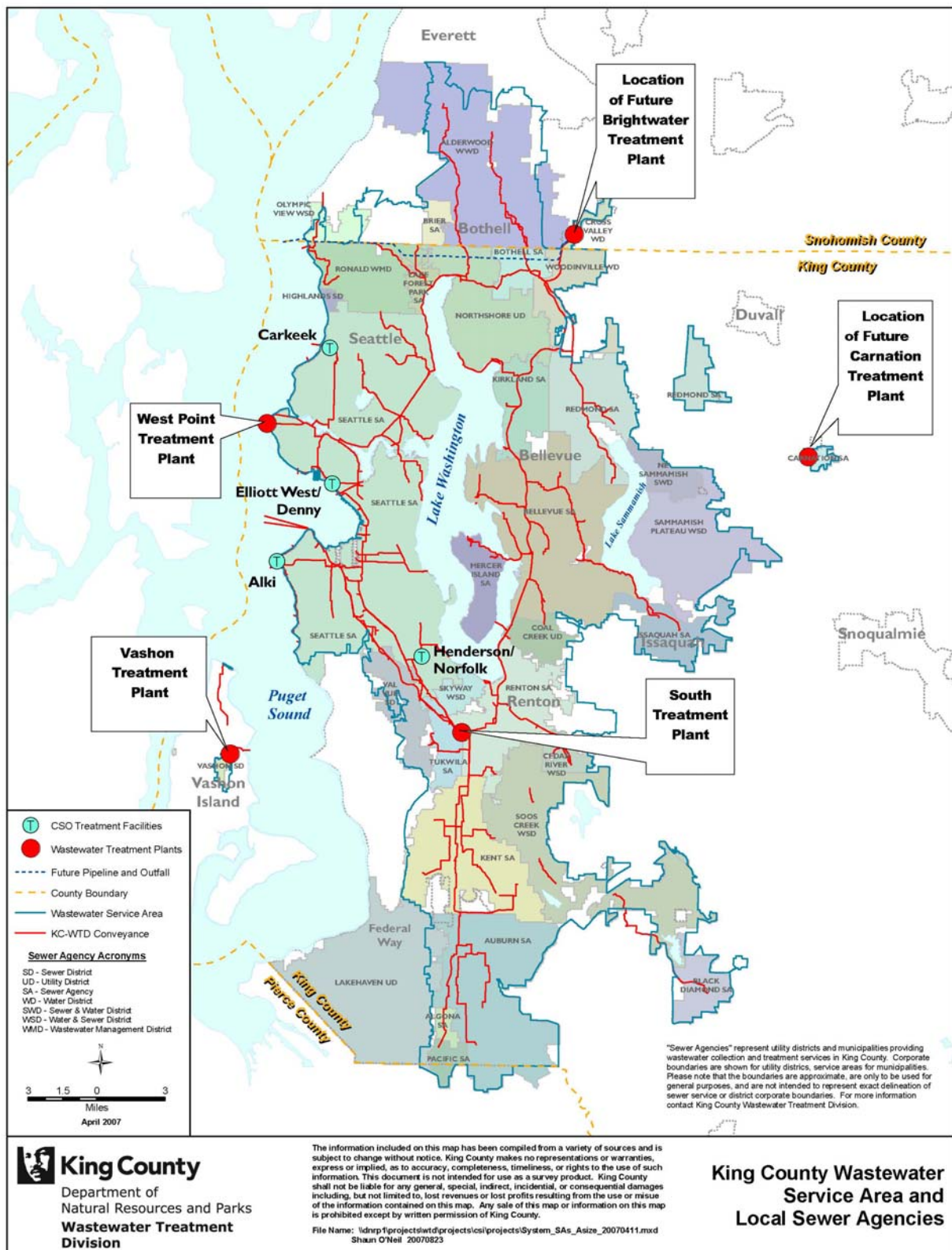


Figure 1-1. King County Wastewater Service Area and Facilities

## 1.2 Regional Wastewater Services Plan

In the 1990s, wastewater flow estimates based on projected population growth estimates in King County's wastewater service area indicated that King County's regional wastewater treatment system would run out of capacity by 2010. To ensure the continuation of high quality and effective wastewater treatment services in the future, the county carried out an intensive planning effort, involving numerous elected officials, representatives from local sewer agencies, organizations, and individuals from around the region. The RWSP resulted from this effort and was adopted by the Metropolitan King County Council in November 1999, via Ordinance 13680.

The RWSP outlines a number of important projects, programs, and policies for King County to implement through 2030 (Figure 1-2). The RWSP calls for building a new treatment plant, now known as "Brightwater," to accommodate growth in the northern portion of the wastewater service area. The plan also calls for improvements to the county's regional conveyance system to meet the 20-year peak flow storm design standard and accommodate increased flows; improvements to reduce existing and future levels of infiltration and inflow (clean groundwater and stormwater) into local collection systems; and improvements to control CSOs so that an average of no more than one untreated discharge occurs per year at each CSO site by 2030.<sup>2</sup>

The RWSP also identifies the need to expand the South plant in Renton by 2029 to handle projected increased wastewater flows in the southern and eastern portions of the county's wastewater service area.

### **RWSP Comprehensive Review Reporting Policies**

The policies below were established via adoption of Ordinance 15384. They guide the preparation of the RWSP comprehensive reviews.

*B.1 The executive shall submit a written report to council and RWQC that provides a comprehensive review of the RWSP. The report will review the following:*

- a. assumptions on the rate and location of growth, the rate of septic conversions and the effectiveness of water conservation efforts;*
- b. phasing and size of facilities; and*
- c. effectiveness of RWSP policies implementation, for infiltration and inflow reduction, water reuse, biosolids, CSO abatement, water quality protection, environmental mitigation and public involvement;*

*2. The next comprehensive regional wastewater services plan review is due in September 2007. Subsequent reports will be prepared every three to five years as established by the council and RWQC following their review of the current report. The specific due date will be based upon the availability of necessary information, the completion of key milestones, and the time needed to collect and analyze data. The executive may recommend policy changes based on the findings of the report and other information from changing regulations, new technologies or emerging or relevant factors;*

*3. The comprehensive regional wastewater services plan review will include all elements of the RWSP annual report, replacing it for that year.*

<sup>2</sup> The Washington State Department of Ecology (Ecology) regulates the level of CSO control based on the number of untreated CSO events that occur in a year. Ecology defines "the greatest reasonable reduction" in CSOs (RCW 90.48) as being "control of each CSO in such a way that an average of one untreated discharge may occur per year" (WAC 173-245-020).



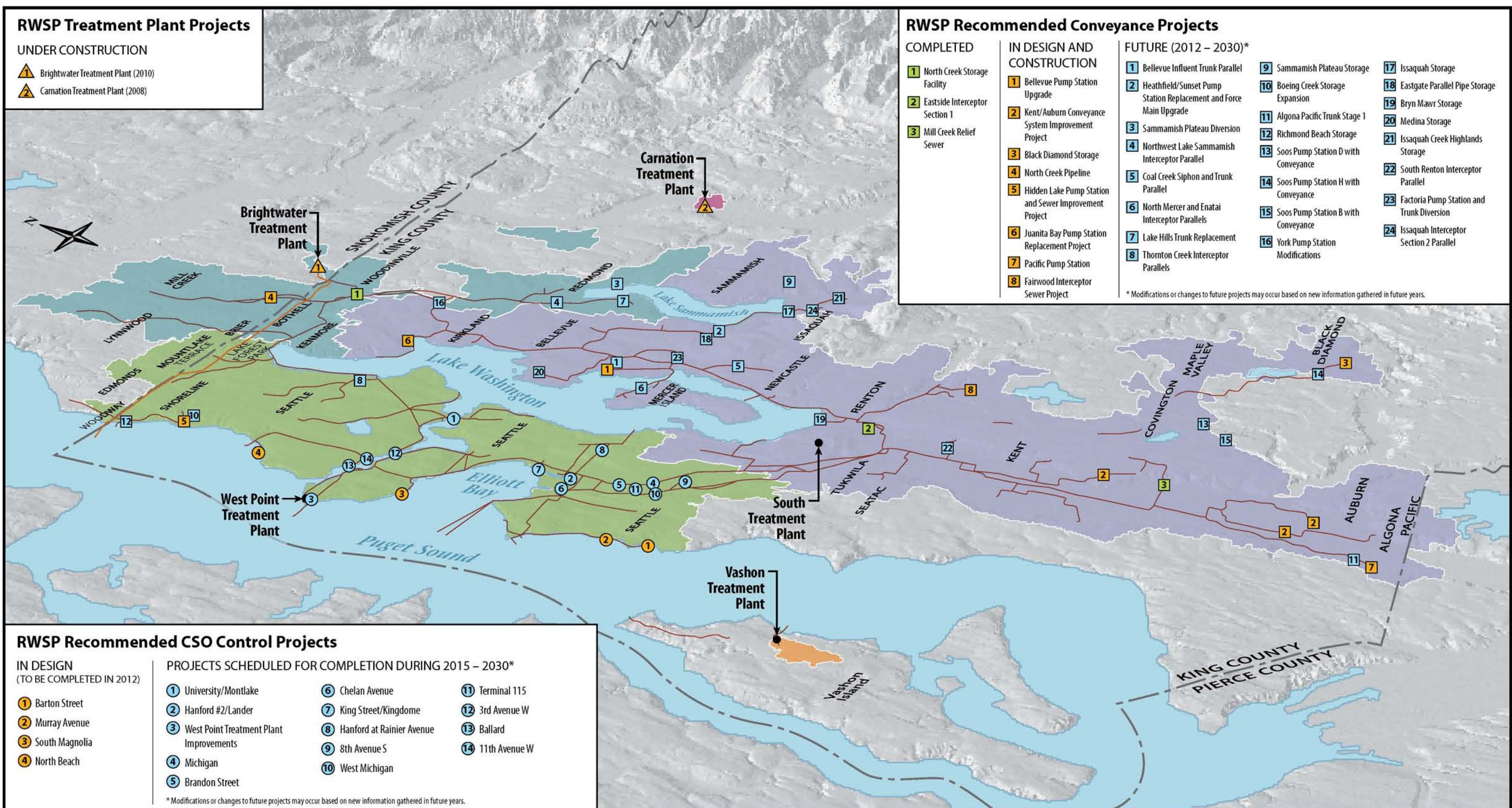


Figure 1-2.  
**Regional Wastewater Services  
Plan Projects and Service Areas  
(1999-2030)** As Revised December 2006





The RWSP recognizes the value of wastewater. WTD's vision of creating resources from wastewater aligns with the RWSP policies that call for the beneficial use of biosolids and expanded production and use of reclaimed water.

Ordinance 13680 was codified in the King County Code (KCC) as Chapter 28.86. Amendments to Ordinance 13680 and the KCC Chapter 28.86 have been made since the RWSP's adoption.

The ordinances adopting amendments to the RWSP and KCC Chapter 28.86 are as follows:

- Ordinance 14219 was adopted by the King County Council in October 2001 and updated the RWSP financial policies
- Ordinance 14712 was adopted by the King County Council in July 2003; this ordinance amended the RWSP treatment plant policies to include new odor control policies for the county's existing and future wastewater facilities
- Ordinance 15384 was adopted by the King County Council in March 2006 and added a new section on reporting policies
- Ordinance 15602 was adopted by the King County Council in September 2006 and deleted RWSP policies that were fully implemented, added additional requirements for reports or studies, and clarified existing policy language; these amendments resulted from the Regional Water Quality Committee's review of the *2004 RWSP Update*

Visit the RWSP Web site for more information on this regional plan:

<http://dnr.metrokc.gov/wtd/rwsp/rwsp.htm>

The entire contents of the *RWSP 2006 Comprehensive Review and Annual Report* are available on the Web at: <http://dnr.metrokc.gov/wtd/rwsp/library.htm>



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## Chapter 2

# Treatment Plant Policies

The RWSP treatment plant policies are intended to guide King County in providing wastewater treatment at its existing plants and in expanding treatment capacity through the year 2030. The treatment plant policies include direction on providing secondary treatment and treatment beyond that level to meet water quality standards and other water quality, reclaimed water, or regulatory goals. The policies call for building the Brightwater Treatment Plant to meet the wastewater capacity needs of the northern portion of the county's wastewater service area, expanding the South Treatment Plant to meet future capacity needs in east and south King County, and reserving capacity at the West Point Treatment Plant to handle future needs associated with flows from Seattle and efforts to control combined sewer overflows. The policies also provide direction on complying with the West Point Settlement Agreement, meeting the county's odor control goal to prevent and control nuisance odor occurrences, and producing and using reclaimed water at its existing and future treatment plants.

This chapter provides an overview on implementation of the RWSP treatment plant policies from 2004 through 2006. In accordance with RWSP reporting policies, this chapter includes a summary of the activities carried out in 2006 related to construction of the Brightwater, Carnation, and Vashon treatment plants. The chapter concludes with summary information on King County Council adopted amendments to the RWSP treatment plant policies.

The complete text of all the treatment plant policies, including information on policy amendments and a summary of how each policy was implemented in 2004–2006, is provided in Appendix A.

## 2.1 Implementation of Treatment Plant Policies from 2004 through 2006

This section provides information on the activities, programs, and projects carried out in 2004–2006 to implement RWSP treatment plant policies.

### 2.1.1 Meeting Treatment Level Requirements and Goals

The RWSP treatment plant policies include direction to provide secondary treatment and consider treatment beyond that level to meet water quality standards and other water quality, reclaimed water, or regulatory goals.

The county's regional wastewater treatment plants, South plant in Renton and West Point plant in Seattle, continue to function as activated sludge secondary treatment plants. The South plant

has provided secondary treatment since its construction in 1965 and West Point plant has been providing secondary treatment since 1996.

In 1999, King County assumed ownership and operation of the Vashon Treatment Plant, which is an oxidation ditch secondary treatment plant. In 2004, construction began on major upgrades to increase capacity and enhance the facility's backup systems to ensure the facility meets or exceeds permit limits. Construction on the plant upgrades was complete in fall 2006. More details on the Vashon upgrade activities in 2006 are provided later on in this chapter.

Reclaimed water is produced at the West Point and South plants for on-site landscaping and in-plant processes. Some of the reclaimed water produced at South plant is distributed off-site as an irrigation source for nearby sports fields at the City of Tukwila's Fort Dent Park, a wetland plant nursery, and habitat restoration efforts. Reclaimed water will be produced at the future Brightwater and Carnation treatment plants. The county will be using membrane bioreactor technology (MBR) at these plants, which will result in treated wastewater that is seven to ten times cleaner than typical secondary treated wastewater. MBR systems can produce Class A reclaimed water, which meets strict standards of the Washington State Departments of Ecology and Health for use in non-drinking purposes.<sup>1</sup> Information on implementing RWSP water reuse policies is provided in Chapter 7.

### 2.1.2 Meeting Treatment Capacity Needs at Existing and Future Facilities

The RWSP provides policy guidance to ensure the county meets wastewater capacity needs through 2030 and beyond. The treatment plant policies call for the construction of the Brightwater Treatment Plant, future expansion of the South Treatment Plant, and reservation of capacity at the West Point Treatment Plant in the event of higher than anticipated population growth or needs associated with the combined sewer overflow control program.

#### **Brightwater Treatment Plant**

King County is building the Brightwater Treatment Plant, the county's third regional treatment plant, to meet the region's wastewater capacity needs in the northern portion of the county's wastewater service area. The Brightwater plant is on schedule for completion in 2010. Activities in 2004 focused on completing predesign, applying for permits, organizing staff to carry out the design and construction phases of the project, and continuing to involve stakeholders and the public in the Brightwater design and permitting process. In 2005, the project team continued its permitting, design, and stakeholder involvement activities in addition to other activities such as purchasing properties and negotiating mitigation agreements. In 2006, final design was completed and construction began on the treatment plant. More details on the Brightwater Treatment Plant activities in 2006 are provided later on in this chapter. Details on the 2004 and

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<sup>1</sup> "Class A Reclaimed Water" is reclaimed water that, at a minimum, is at all times an oxidized, coagulated, filtered, and disinfected wastewater. Allowed end uses of Class A reclaimed water are irrigation of food and non-food crops and irrigation of open access areas, such as parks. The water could also be used for industrial cooling and process water and other non-drinking-water (non-potable) uses.



2005 activities were documented in the 2004 and 2005 RWSP annual reports.<sup>2</sup> Information on Brightwater conveyance is provided in Chapter 3.<sup>3</sup>

### **Carnation Treatment Plant**

In 2002, the King County Council amended the *Comprehensive Water Pollution Abatement Plan* and added the City of Carnation to the county's wastewater service area. The City of Carnation decided to replace on-site septic systems with a new wastewater treatment facility and collection system to better protect public health and the environment, achieve the city's comprehensive plan goals, and maintain and enhance community livability. The city will design and build the local wastewater collection system and has contracted with King County to design, build, operate, and maintain a new treatment plant and associated discharge facilities.

Activities in 2004 focused on preparing and completing the Carnation plant Final Environmental Impact Statement and selecting the treatment plant site. The focus in 2005 was on design and permitting activities, completion of a facilities plan for submittal to the Washington State Department of Ecology (Ecology), and progress on discharge options. In 2006, final design was completed and construction began on the treatment plant. The project is scheduled for completion in 2008. More details on the Carnation plant activities in 2006 are provided later on in this chapter. Details on the 2005 activities were documented in the *RWSP 2005 Annual Report*.

### **South Treatment Plant**

To meet the projected growth in the southern and eastern portion of the wastewater service area, the RWSP calls for expanding the South Treatment Plant in 2029. The *2004 RWSP Update* noted that the South plant expansion may need to be accelerated to 2023 and that re-rating the plant to maximize the use of existing facilities was being evaluated. (Facility re-rating is the practice of evaluating a facility or unit treatment process to determine if it is possible to operate the facility at a higher capacity than the original design capacity and includes identifying needed capital improvements such as pumps, pipes, or odor control facilities.) A South plant capacity and re-rating evaluation was completed in 2004. Updated population projections (2003 Puget Sound Regional Council forecast by traffic analysis zones) and a 10 percent water conservation assumption by 2010 were then applied to update flow projections to South plant. Based on these projections and available capacity at South plant, taking into account the online date for Brightwater, it is projected that South plant will have capacity until 2023, at which point re-rating of unit processes could be implemented to provide additional capacity instead of doing a major expansion at that time. Expansion would then occur in 2029 as originally planned.

The county will continue to review future updated population projections and water conservation assumptions. Based on future information, the projected dates for re-rating or expansion of South plant could change.

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<sup>2</sup> RWSP annual reports are available on the RWSP library Web site at <http://dnr.metrokc.gov/wtd/rwsp/library.htm>

<sup>3</sup> The Brightwater conveyance system includes the pipes and facilities that bring influent to the Brightwater plant and effluent from the plant to a marine outfall for discharge to Puget Sound. The system consists of approximately 14 miles of pipelines to be constructed in underground tunnels in north King County.

### 2.1.3 Complying with West Point Settlement Agreement

RWSP Treatment Plant Policy (TPP)-3 reconfirms the county's commitment to the West Point Settlement Agreement that was established in 1991. A significant provision of the agreement was completed in March 2006, when the King County Council approved Ordinance 15391, authorizing payment of \$5.3 million to the City of Seattle in satisfaction of Section 1(d) of the agreement. This section requires the county to investigate alternative technologies that have the potential to remove digesters from the West Point Treatment Plant site, and if no alternatives could be implemented by December 31, 2005, King County agreed to pay an amount established via the agreement to the City of Seattle for deposit in the city's Shoreline Park Improvement Fund.

In December 2000, after a thorough process to assess technologies, the Applied Wastewater Technologies Citizens Advisory Committee, consisting of settlement agreement parties and other stakeholders concluded that an appropriate technology to replace the digesters at the West Point plant is not currently available. Therefore, the digesters could not feasibly be removed. The county concurred with this assessment. As a result, in accordance with Motion 11288, which was approved by the King County Council in September 2001, the King County Executive convened a West Point Citizens Advisory Committee (WPCAC) to develop recommendations for improvements to Discovery Park under the terms of the West Point Settlement Agreement.

The WPCAC finalized a recommended project list in May 2005, and in accordance with Ordinance 15391, King County and the City of Seattle signed a memorandum of agreement (MOA) in March 2006 regarding the transfer and expenditure of the funds. The MOA confirmed that the funds would be used exclusively for improvements to Discovery Park consistent with the Discovery Park Master Plan as directed by the Settlement Agreement. The MOA also directs the City of Seattle to establish a Citizens Oversight Committee to review progress made on the expenditure of the funds.

### 2.1.4 Preventing and Controlling Odors

RWSP TPP-4 provides guidance to prevent and control nuisance odor occurrences at the county's regional treatment plants and associated conveyance facilities. The direction provided in TPP-4 was established in 2003 via King County Council adoption of Ordinance 14712. The ordinance includes retrofitting existing treatment and conveyance facilities in a phased manner to control the most significant potential odor sources first. The goal is for the county's existing treatment facilities to meet the odor control levels that are considered best in the country for existing treatment facilities of a similar size. The policy also calls for new regional treatment facilities to be constructed with odor control systems that are designed to meet the odor prevention level that reflects the best in the country for new facilities of similar size. In addition, the policy calls for development of a comprehensive odor control and prevention monitoring program.

This section provides information on implementation of TPP-4 and the status of the odor prevention program in 2006. In accordance with RWSP reporting policies, the summary of odor complaints in 2006 is provided in Appendix N.

## Phased Retrofit of the West Point and South Treatment Plants

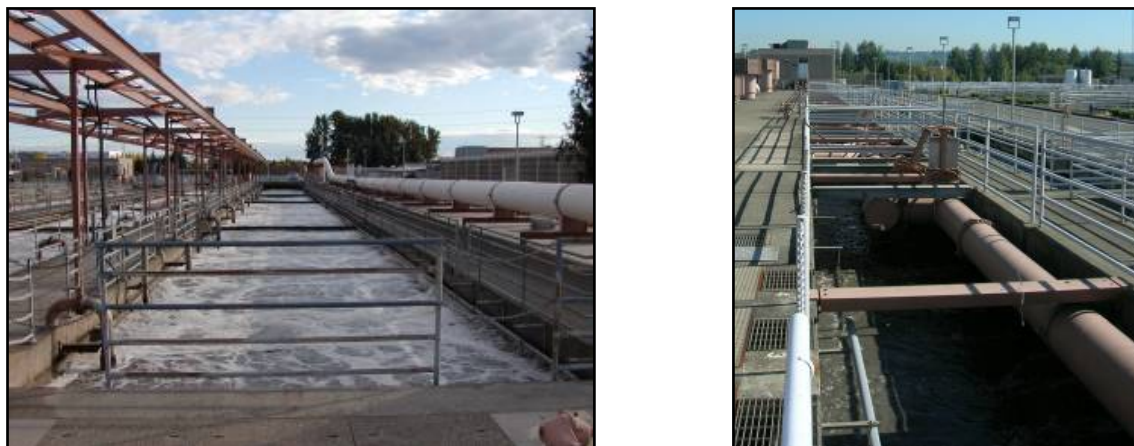
The odor control policies in TPP-4 include implementation of phased improvements at the West Point and South treatment plants to control the most significant potential odor sources first, monitor improvement effectiveness, determine if additional improvements are required, and plan and implement additional improvements if necessary. To meet this direction, the Wastewater Treatment Division (WTD) implemented projects at both plants.

At the West Point plant, improvements include covering the division channel and modifications to the odor scrubber system (Figure 2-1). The improvements to the division channel ventilation system were completed in 2005. As a result of these improvements, fugitive odor emissions (odors that escape collection and treatment systems) have been reduced. Modifications to the odor scrubber system were completed in early 2007. WTD will evaluate the effects of these improvements through 2008 to determine if they meet the odor control goal for existing facilities.



**Figure 2-1. Primary Process Odor Scrubbers at West Point Treatment Plant**

At South plant, WTD has completed final design of covers for each first pass of the four aeration basins and of covers for the return activated sludge channel (Figure 2-2). Installation of the covers began in 2006 and is expected to be complete by the end of 2007. Because the aeration basins need to be taken out of service while the covers are installed, delays in the project schedule are possible. The amount of time that the aeration basins can be off-line depends on wet-weather flow volumes.



**Figure 2-2. Aeration Basin and Returned Activated Sludge Channel at South Treatment Plant**

### **Conveyance System Odor Control Improvements**

RWSP TPP-4 calls for retrofitting conveyance facilities that pose nuisance odor problems with odor prevention systems as soon as such odors occur, subject to technical and financial feasibility. Table 2-1 lists the projects that are under way or planned to improve odor problems in the county's existing conveyance system. The table also includes information on the type of control technology planned and anticipated completion dates.

**Table 2-1. Conveyance System Upgrades with Odor Control Components**

<b>Facility</b>	<b>Odor Control Technology</b>	<b>Anticipated Completion Date</b>
Hidden Lake Pump Station	Carbon bed odor scrubber & chemical injection	4th quarter 2008
Kenmore Lakeline	Carbon bed odor scrubber & chemical injection	4th quarter 2008
Lake City Regulator Station	Replacement of phoenix/carbon scrubber with bioscrubber	4th quarter 2009
University Regulator Station	Carbon bed odor scrubber	3rd quarter 2007
Interbay Pump Station	Carbon bed odor scrubber	4th quarter 2010
King Street Regulator Station Odor Control	Carbon bed odor scrubber	4th quarter 2008
53rd Avenue Pump Station	Carbon bed odor scrubber	3rd quarter 2008
Juanita Bay Pump Station	Carbon bed odor scrubber & chemical injection	2nd quarter 2008
Kirkland Pump Station	Carbon bed odor scrubber	4th quarter 2009
Bellevue Pump Station	Carbon bed odor scrubber & chemical injection	4th quarter 2008
Eastside Interceptor	Chemical (nitrate) injection	4th quarter 2007
Soos Creek Pump Station & Pipeline	Carbon bed odor scrubber & chemical injection	4th quarter 2020

## Brightwater Odor Control

RWSP TPP-4 directs the county to construct odor control systems for new regional treatment plants that are designed to meet the “best in the country for new facilities” level, described in Attachment A to Ordinance 14712.<sup>4</sup> Brightwater’s odor control system is being designed to meet this level and ensure there are no detectable odors from the Brightwater Treatment Plant.

To remove odors, air will be collected from the covered process units, enclosed buildings, and loading areas and then routed to the odor control systems. All treatment process units will be covered and buildings that house the headworks and solids handling equipment will be fully enclosed.<sup>5</sup> Odors from these facilities will be absorbed and neutralized through a multistage treatment process that includes the use of biological, chemical, and carbon odor scrubbers.

In June 2005, WTD convened a peer panel of national odor control experts to review Brightwater’s proposed odor control system and to comment on odor control alternatives that had been generated during value engineering workshops. Panelists concurred that the odor control system will meet the goal of no detectable odors at the property line and offered recommendations to reduce costs of the system without compromising this goal.

## Comprehensive Odor Control and Prevention Monitoring Program

In December 2006, WTD completed the *Odor and H<sub>2</sub>S Corrosion Control Plan*. This plan describes the odor control and prevention monitoring program’s goals and strategic approach to reducing or preventing odors and corrosion of the county’s wastewater facilities. It also identifies points in the system where odor or corrosion problems are occurring, describes the source of the problems, and provides information on projects that are under way to address these problems. The plan will be updated as necessary.

WTD carries out ongoing efforts to control odors and corrosion in the wastewater system. Staff routinely monitors and inspects the existing system to identify problems, determine the source, analyze the cause, and develop solutions to the problems. Tracking, reviewing, and responding to odor complaints is a key component in identifying and determining the source of an odor problem. People can report an odor problem 24 hours per day via the South plant’s or West Point plant’s odor control hotlines. In addition, a sign with a telephone number to report problems or complaints is posted at each pump station, regulator station, and combined sewer overflow treatment plant. Information about how to report an odor problem is also available on the King County Web site at <http://dnr.metrokc.gov/wtd/odorcontrol/complaints.htm>. The goal is for a staff member to respond within two hours of receiving a complaint. A record is kept of all odor complaints and investigations as well as any corrective actions taken or needed.

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<sup>4</sup> Ordinance 14712 and accompanying attachment is available on the King County Council’s legislation site at <http://mkcclegisearch.metrokc.gov/detailreport/?key=4469>

<sup>5</sup> Headworks refer to the facilities where wastewater enters a wastewater treatment plant.

## Near Facility Neighbor Surveys

The RWSP calls for the use of near facility neighbor surveys as part of the efforts to monitor, control, and prevent odors. Surveys of businesses and residents that are near neighbors of the South and West Point plants are carried out on an annual basis. The survey asks several questions relating to awareness and impacts of the treatment plant, such as noise, traffic, and odors, and on whether the plants are good neighbors. Survey respondents have the opportunity to provide specific suggestions on how county facilities can be a better neighbor. The surveys provide important information to WTD on neighbor's issues and concerns as well as important feedback on how the division is meeting its goals to be a good neighbor and control and prevent odors.

The 2006 near neighbor survey found that 77 percent of Magnolia residents said they do not experience negative impacts from the treatment plant; about 89 percent of Magnolia businesses said they do not experience noticeable impacts. Residents and neighbors said the two top priorities for the plant should be exploring new methods of odor control and responding to complaints within 24 hours. These are the same items listed as the two top priorities in previous years' surveys.

Regarding South plant, the survey found that 73 percent of Renton residents said they do not experience negative impacts from the treatment plant; about 86 percent of Renton businesses said they do not experience negative impacts. Residents and businesses said that the two top priorities for the plant should be exploring new methods of odor control and responding to complaints within 24 hours. Awareness of the wastewater treatment plant has strongly increased among Renton businesses. Furthermore, the percentage of both businesses and residents in Renton saying that King County has been a good neighbor has increased from previous years' surveys.

For more information on King County's Odor Control Program, visit the program's Web site at <http://dnr.metrokc.gov/wtd/odorcontrol/>

## 2.2 2006 Annual Report Activities of Treatment Plant Projects in Design and Construction

The RWSP reporting policies require the RWSP comprehensive review to include all elements of the RWSP annual report, replacing the annual report for the years that the comprehensive review report is produced. The RWSP annual report provides information on RWSP capital projects in design and construction. This section meets the 2006 annual report requirements for the Brightwater, Vashon, and Carnation treatment plants.



### 2.2.1 Brightwater Treatment Plant

The RWSP calls for the construction of a new regional wastewater treatment plant and conveyance system in the northern portion of King County's wastewater service area, which includes portions of north King and south Snohomish counties, by the year 2010. The locations of the Brightwater facilities are shown in Figure 2-3.

The Brightwater plant will be built in Snohomish County on a site just north of the City of Woodinville. It will have an initial capacity to treat an average of 36 million gallons per day (mgd) of wastewater, with room for a planned expansion in 2040 to 54 mgd. In addition to the treatment plant, the Brightwater system includes approximately 14 miles of conveyance pipelines to be constructed in underground tunnels in north King County. The pipelines will convey untreated wastewater (influent) to the plant and treated wastewater (effluent) from the plant for discharge through an outfall in Puget Sound. The tunnel will be constructed in three segments (east, central, and west) as shown in Figure 2-3.

This section focuses on the activities and accomplishments in 2006 related to construction of the Brightwater Treatment Plant. Information on the activities and accomplishments in 2006 related to the construction of Brightwater conveyance is provided in Chapter 3.

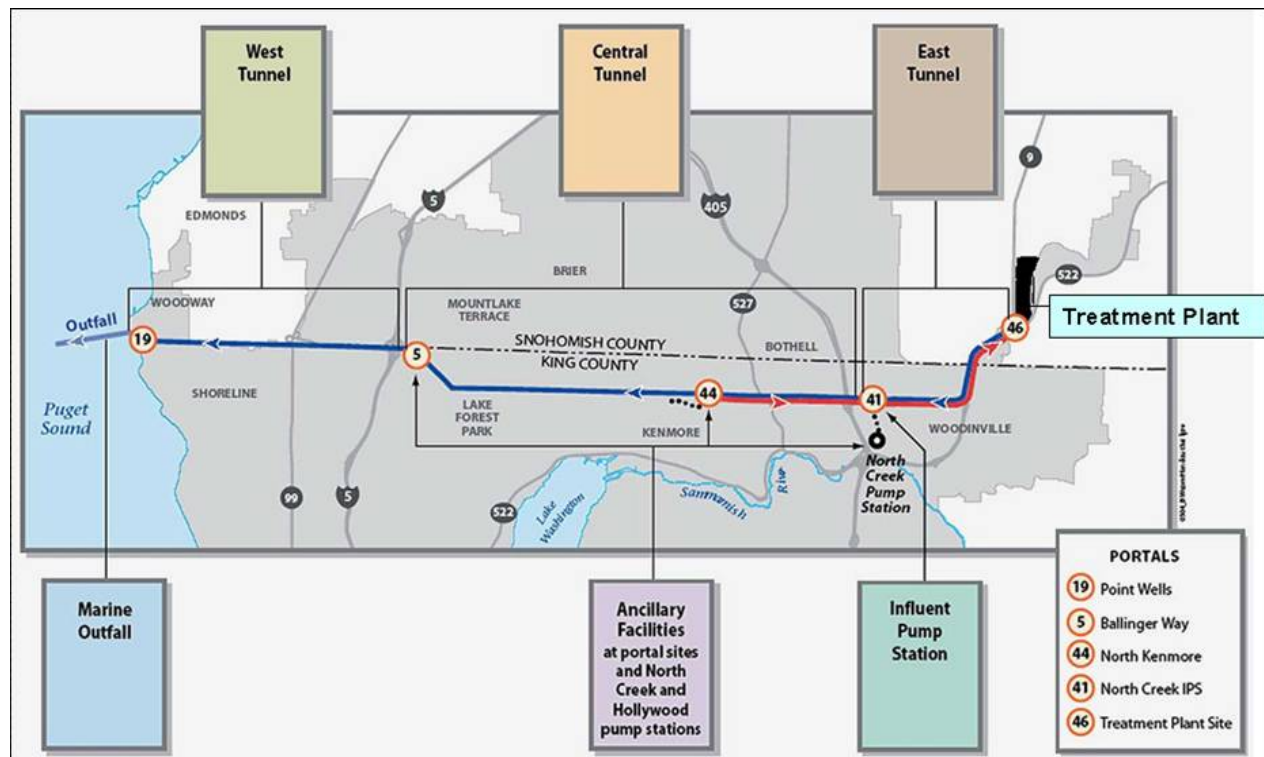


Figure 2-3. Components of the Brightwater System

## Overview of 2006 Accomplishments

King County made substantial progress on the Brightwater project in 2006. The project is on schedule for completion in 2010. Highlights of Brightwater Treatment Plant milestones achieved in 2006 are as follows:

- **Activities related to Development and Mitigation Agreements with Snohomish County.** In accordance with the Development Agreement with Snohomish County that was established in December 2005, King County excavated seismic trenches in June, July, and August 2006 to assess whether there are earthquake faults at the proposed locations of two chemical storage buildings at the Brightwater Treatment Plant site. Results of this investigation indicated no evidence of active faults. In December 2006, Snohomish County issued a letter to King County accepting the seismic trenching and design reports, acknowledging that King County satisfied the seismic investigation and construction standards of the Development Agreement, and concluded that assumptions and design parameters for the treatment plant site are in compliance with 2003 International Building Codes.

The Snohomish County mitigation agreement authorized payments in exchange for a predictable timeline of permit approvals, with the first payment to be made 60 days following the resolution of all appeals associated with the Snohomish County Binding Site Plan Permit. In November 2006, King County delivered the first payment of \$33.5 million in mitigation funding to Snohomish County. This funding will be spent on park projects, pedestrian and bike improvements, trails, and fish habitat preservation projects.

- **Treatment Plant Design.** In December 2006, the county completed review of the 100 percent design documents, which included 33 volumes of plans, specifications, and equipment lists.
- **Preparations for treatment plant construction.** In preparation for construction, activities at the treatment plant site in 2006 included mass grading and removal of contaminated soil, installation of dewatering equipment, installation of temporary stormwater systems and erosion control measures, effluent drop structure construction, and placement of yard piping. Figure 2-4 depicts the construction of the effluent drop station and treatment plant site preparation as of October 2006.





**Figure 2-4. Effluent Drop Structure Construction and Treatment Plant Site Preparation**

- **Construction of the North Mitigation Area.** As part of Brightwater mitigation, the northern 43 acres of the treatment plant site are being enhanced to provide salmon habitat and a reforestation area that will be accessible to the public via trails and boardwalks. Activities in 2006 included construction of the stream beds, boardwalks, hills, and trails. Figure 2-5 depicts construction of the north mitigation area as of October 2006.



**Figure 2-5. North Mitigation Area Construction**

- **Permitting.** Much progress was made regarding the issuance of permits needed to construct the Brightwater Treatment Plant. Permits issued by Snohomish County in 2006 are as follows:
  - A permit relating to the construction of the north mitigation area was issued in February.

- The Site Grading Permit and Right-of-Way Use Permit for plant site preparation was issued in April.
- The Binding Site Plan Permit was issued in May.
- A Treatment Plant Portal Grading Permit was issued in June.
- A Building Permit was issued in August for the lower pond overlook, which is part of the north mitigation area.
- The Site Development Grading Permit was issued in November.

The Cross Valley Water District issued final approval for the north mitigation area water line in June. The Washington State Department of Transportation issued the General Permit for Matching Grades between State Route 9 and the Brightwater plant site and a Developer Access Permit in October. The Developer Access Permit establishes permanent access points to the Brightwater site to accommodate the long-term needs of the finished facility.

In addition, WTD submitted the Air Quality Permit application to the Puget Sound Clean Air Agency in July. The remainder of the building permits for treatment plant construction are scheduled to be issued in spring 2007.

- **Public Involvement.** WTD continues to place a high priority on involving stakeholders and members of the public in Brightwater design, permitting, and construction. Over 35 meetings and briefings with residents, community leaders, and groups were held in 2006, including informational meetings and open houses for community members who live or work near the portal areas and treatment plant. Brightwater informational booths were available at several community fairs, festivals, and public events. A model of the design for the treatment plant was also available at some of these events.

A groundbreaking ceremony took place in April 2006 to celebrate the start of construction on the Brightwater project and to thank all of the jurisdictions, consultants, contractors, and individuals who have been a part of the project through planning, siting, design, permitting, and now construction.

The Brightwater project team continues to respond to questions and comments received on the project from property owners, jurisdictions, neighbors of future facilities, and the general public. In addition, the team produced project newsletters, bulletins, and news releases to keep people informed about project activities.

Community interest and support for an education/community center at the treatment plant site continued to be facilitated by the Education/Community Center Advisory Group (ECCAG) organized in mid-2005. The ECCAG included representatives from local jurisdictions, tribes, environmental groups, and educational groups. The group's purpose was to provide input on the design of the center and a final design was unveiled in late 2006.

- **Brightwater Monthly Project Reports.** In accordance with RWSP reporting requirements, WTD continues to submit Brightwater monthly project reports to the King

County Council in the format that was approved in August 2005 via Motion 12189. This report includes information on project issues, schedules, expenditures, and a status of the project's contracts associated with the Brightwater Treatment System.

- **Brightwater Oversight Monitoring Consultants.** In accordance with the King County Council adopted 2005 budget ordinance, WTD retained R.W. Beck as the oversight monitoring consultant (OMC) for the Brightwater project in March 2005. The work of the OMC is to provide to the executive, council, and Brightwater project representatives the results of an initial comparison of the scope, schedule, budget, and distribution of budget categories of the Brightwater project with other projects of similar scope and scale or industry standards. In addition, as required by the 2005 budget ordinance, the OMC provided quarterly reports to the King County Council in 2006.

### Brightwater Cost Update Report<sup>6</sup>

As reported in the *RWSP 2005 Annual Report*, in December 2005, King County developed a Brightwater cost trend as part of an ongoing effort to keep decision-makers and stakeholders informed about the Brightwater project. The 2005 trend estimated the potential cost of the Brightwater project to be about \$1.621 billion in constant dollars without inflation.

In mid-2007, an update to the 2005 December cost trend was submitted to the King County Council. As of January 2007, the current lifetime cost estimate for the Brightwater project is \$1.767 billion in nominal dollars, which is about \$14 million, or less than 1 percent, above the December 2005 trend estimate adjusted for inflation, as shown in Table 2-2.

**Table 2-2. Comparison of Brightwater Cost Estimates since December 2005 (millions)**

Brightwater Component	December 2005 with 3% Inflation	January 2007 Inflated	Change from Dec. 05 to Jan. 07	Change from Dec. 05 to Jan. 07 (percent)
Treatment	\$584.0	\$629.4	\$45.4	7.8%
Conveyance	926.5	891.2	(35.3)	(3.8)
Land/ROW	97.6	97.1	(0.5)	(0.5)
Mitigation	145.0	149.7	4.7	3.3
<b>Total<sup>a</sup></b>	<b>\$1,753.0<sup>b</sup></b>	<b>\$1,767.3<sup>c</sup></b>	<b>\$14.3</b>	<b>0.8%</b>

<sup>a</sup> Totals may not add due to rounding.

<sup>b</sup> The December 2005 trend estimate was stated in 2005 constant dollars of \$1.621 billion; this cost is shown here in nominal dollars to be consistent with the way costs are presented in the *Brightwater Cost Update – Current Conditions and Trends*, January 2007.

<sup>c</sup> January 2007 costs include 3 percent inflation on estimated costs and actual inflation on awarded contracts and historical costs.

Table 2-2 shows that compared to the December 2005 cost trend estimate, there was an overall increase of about \$45 million in treatment plant costs and an overall decrease of about

<sup>6</sup> More details on the 2007 Brightwater cost trend are provided in the report titled *Brightwater Cost Update, Current Conditions and Trends*, dated January 2007.

\$35 million in conveyance costs. These changes, combined with a \$0.5 million reduction in land costs and a \$4.7 million increase in mitigation costs, result in a net increase in Brightwater costs of about \$14 million since December 2005.

The increase in the treatment plant costs is the result of higher-than-anticipated inflation, design refinements, and allied costs that were partially offset through the use of project contingency. The \$35 million decrease in conveyance costs reflects an increase in construction costs (\$45 million) that is more than offset by a reduction in non-construction costs (\$80 million).<sup>7</sup> Most of the conveyance construction cost increase is attributable to inflation, with the remainder attributable to insurance costs. As with the treatment plant, King County is using project contingency to offset conveyance cost increases while still maintaining sufficient construction contingency to handle issues that may arise during construction.

### ***Current Cost Estimate Compared to the Baseline***

The October 2004 Brightwater cost estimate of \$1.483 billion (2004 dollars) was used to develop the baseline budget for the Brightwater project. Table 2-3 shows the baseline budget forecasts in October 2004 with inflation at 3 and 5 percent per year and the current Brightwater trend estimate of \$1.767 billion projected with inflation.

**Table 2-3. Brightwater Baseline Costs Compared to the Current Cost Estimate (millions)**

<b>Brightwater Component</b>	<b>Baseline Cost (2004\$)</b>	<b>Baseline Cost with 3% inflation</b>	<b>Baseline Cost with 5% inflation</b>	<b>January 2007 Inflated</b>
<b>Treatment Plant</b>	\$ 426.4	\$ 490.6	\$ 537.8	\$ 629.4
<b>Conveyance</b>	869.7	974.4	1051.3	891.2
<b>Land/ROW</b>	98.9	101.3	102.0	97.1
<b>Mitigation</b>	88.0	94.4	98.8	149.7
<b>Total<sup>a</sup></b>	<b>\$1,483.1</b>	<b>\$1,660.7</b>	<b>\$1,789.9</b>	<b>\$1,767.3</b>

<sup>a</sup> Totals may not add due to rounding.

Table 2-3 shows that the current cost estimate (January 2007 inflated) is nearing the 5 percent inflation total of the baseline budget forecasted in 2004. This is consistent with predictions made in the October 2004 predesign cost report, which suggested that given recent and significant increases in commodity prices and a tighter bidding environment, an inflation assumption of 5 percent might better reflect future conditions.<sup>8</sup>

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<sup>7</sup> Non-construction costs refer to contingency costs, sales tax costs, and allied costs, which include engineering services, planning and management services, permitting and other agency support, and staff labor.

<sup>8</sup> King County Department of Natural Resources and Parks. Brightwater Facilities: Addendum to August 23 Report: Brightwater Predesign Cost Estimates. October 2004. p. 20.

***A Note about Presenting Brightwater Costs***

Generally speaking, the estimated cost of a capital project is the product of the price times the quantity of the elements that make up the project. However, for a multi-year project like Brightwater, presenting this information is complicated by the fact that these costs are incurred over time during which conditions change, most notably prices. In the planning phase of the Brightwater project, cost estimates were presented in present value terms, which provided a consistent means of comparing the various alternatives. Once the current project configuration was adopted, cost estimates were presented in constant dollars; that is, dollars adjusted for inflation (deflated) to reflect base-year prices. For example, a cost estimate in 2004 constant dollars reflected the cost of the project in the prices available in 2004. Another reason constant dollars were used is because it avoided having to forecast future prices in addition to estimating quantities.

In the December 2005 cost trend report, the future costs in constant 2005 dollars were spread over the remaining project lifetime by year and inflation was added at 3 percent per year to develop total lifetime costs in nominal (inflated) dollars. This 3 percent inflation rate was applied to all of the construction costs and future allied costs, primarily staff labor and consultants. Consequently, the current January 2007 cost estimate reflects a blend of inflated costs including the following.

- Actual costs through December 2006, which include inflation occurring since the start of the project
- Conveyance construction contract costs for awarded contracts, which incorporate the contractor's estimates of inflation
- Increases in general and extraordinary inflation on construction costs for both the treatment plant and conveyance system
- Inflation on the remaining allied costs of 3 percent per year

The Brightwater project is now transitioning to construction, and King County is awarding contracts based on contractor bids that identify the cost of the various work packages, including inflation. These nominal costs are now the most reliable source for creating the cost estimate and are used as the basis for presenting the costs in the January 2007 Brightwater cost update report.

**Changes in Contracting Assumptions**

The fourth and fifth Brightwater cost estimates were developed at 30 and 60 percent design, respectively, for the treatment plant. Both estimates assumed that the treatment plant would be constructed using the general contractor/construction manager approach. However, at about the 90 percent design cost estimate, the treatment plant's general contractor/construction manager (GC/CM), Hoffman Construction Company, notified King County that it had insufficient surety bonding capacity to obtain a performance and payment bond to cover the entire \$450 million estimated cost of the treatment plant.

Under Washington state law, a GC/CM is required to provide a bond for the full amount of the project's guaranteed construction costs. The bond protects the owner and construction subcontractors if the contractor were unable to complete the project. However, after years of losses in the surety market because of rising inflation, surety companies consolidated and significantly tightened their bonding requirements for large projects such as Brightwater, leaving many contractors unable to secure performance bonds.<sup>9</sup>

King County addressed this unforeseen circumstance by reducing the GC/CM's scope of work by removing the solids, odor control systems, and energy facilities from the GC/CM contract. King County bid this work separately under the design-bid-build contracting method in summer 2007. The GC/CM will continue to manage construction of the earthwork and liquids processing facilities. No impacts to the overall project schedule are anticipated.

### Schedule for 2007

Approximately 270 construction workers will be involved with the construction activities scheduled for 2007. The construction activities in 2007 for the Brightwater Treatment Plant include:

- Excavating areas for the plant's headworks, primary treatment, solids handling, and digesters
- Forming and pouring foundations
- Installing yard piping
- Completing north mitigation area
- Renovating the Stockpot Building; the Brightwater Operation and Maintenance Building will be housed in the Stockpot building

Visit the Brightwater project's Web site for more information:

<http://dnr.metrokc.gov/wtd/brightwater/>

### 2.2.2 Vashon Treatment Plant

Since 1999, King County has managed and operated the Vashon Treatment Plant for the Vashon Sewer District. The collection system, owned and maintained by the Vashon Sewer District, delivers wastewater to the plant from about 425 residential and commercial customers in and around the main business area.

Since 2004, the county has carried out several steps to improve the Vashon Treatment Plant, including extending the marine outfall an additional 1,450 feet farther into Puget Sound. The pipe now carries the treated water to a discharge point 2,800 feet offshore, which will help to protect geoduck beds in the area. The outfall construction also presented an opportunity to remove 5.3 acres of derelict gill nets in Colvos Passage, which posed safety risks to divers and

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<sup>9</sup> *Engineering News Record*. Bond Firm Profits Are Rising Fast as Sureties Climb Out of the Hole. Richard Korman with E. Michael Powers, Angelie Bergeron, Joe Florkowski, Tony Illia, and Eileen Schwartz. January 29, 2007.



marine life. Interim upgrades to improve the plant's performance and compliance with NPDES (National Pollution Discharge Elimination System) permit requirements were also completed.<sup>10</sup>

In 2004, construction began on major upgrades to increase plant capacity and enhance the facility's backup systems. These improvements include new headworks, an oxidation ditch, two secondary clarifiers, a stormwater detention tank, an administration building, and an electrical building. The upgrade is funded in part by loans from the Public Works Trust Fund, the Washington State Department of Ecology (Ecology), and the U.S. Environmental Protection Agency (EPA). Completion of this project will allow the plant to meet permit requirements and to protect human health and the environment.

A great deal of progress was made in 2006. Figure 2-6 shows an aerial view of the plant site as of July 2006. In fall 2006, substantial completion of the upgrades was achieved and startup activities began. Closeout of the construction contract is expected to occur in the fourth quarter of 2007.

Throughout 2006, WTD staff worked closely with Vashon community members and near neighbors of the Vashon plant to keep them informed of activities associated with the plant upgrades, to minimize construction impacts, and to respond to concerns and questions. Community members could also contact the project's 24-hour construction hotline with questions or concerns. The project Web site provided up-to-date information on a regular basis.



**Figure 2-6. Aerial view of Vashon Treatment Plant site in July 2006**

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<sup>10</sup> NPDES permits are issued by the Washington State Department of Ecology and set limits on the quality and quantity of effluent (treated wastewater) discharged from point sources such as treatment plants, CSOs, and industrial facilities.

Other milestones in 2006 are as follows:

- Submittal and approval of the revised NPDES permit application for the upgraded facility
- Completion of and submittal to Ecology of the facility's operations plan; this document provides a systematic plan for how the transition from the existing plant to the new plant will occur
- Completion of project site improvements, such as landscaping and paving the access road

An open house to celebrate the completion of the Vashon Wastewater Treatment Plant was held in May 2007.

Visit the Vashon Treatment Plant project Web site for more information:

<http://dnr.metrokc.gov/wtd/vashon/>

### 2.2.3 Carnation Treatment Plant

The City of Carnation decided to replace on-site septic systems with a new wastewater treatment facility and collection system to better protect public health and the environment, achieve the city's comprehensive plan goals, and maintain and enhance community livability. The city is designing and building the local wastewater collection system, and the city contracted with King County to design, build, operate, and maintain a new treatment plant and associated discharge facilities. The facilities will serve about 2,000 people in Carnation's urban growth area, with capacity to serve up to 4,000 in 2030. At startup, the plant will have the capacity to treat a maximum daily flow of about 430,000 gallons of wastewater per day, and the average daily flow capacity will be 210,000 gallons of wastewater per day.

The treatment plant will be located at the west end of Entwistle Street in downtown Carnation. A 12-inch-diameter effluent pipeline approximately 1.6 miles long will be built from the treatment plant to a discharge outfall into the Snoqualmie River at the Carnation Farm Road Bridge. The plant will use membrane bioreactor technology (MBR) and will produce reclaimed water that will be used to enhance a wetland in the Chinook Bend Natural Area. This 59-acre property is owned by King County and managed as an open space and habitat protection area by the Water and Land Resources Division (WLRD) in King County's Department of Natural Resources and Parks. After startup is complete, the wetland enhancement discharge at the Chinook Bend Natural Area will become the primary discharge location for reclaimed water. The river outfall will remain operational and will serve as a backup to the wetland when maintenance or equipment problems prevent the facility from producing reclaimed water. Figure 2-7 shows the location of the Carnation treatment and discharge facilities.



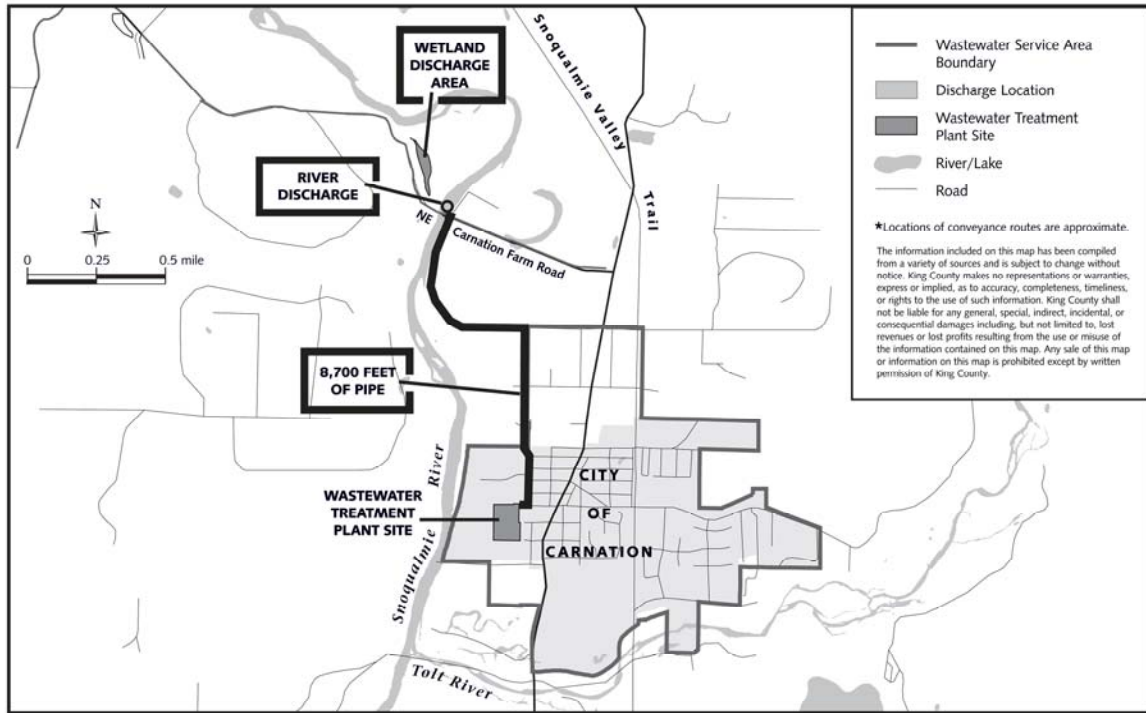


Figure 2-7. Location of Carnation Treatment Facilities

## Overview of 2006 Accomplishments

King County made substantial progress on the Carnation Treatment Plant in 2006, including purchase of the two-acre plant site from the City of Carnation. The groundbreaking ceremony for the new Carnation wastewater system was held on July 6, 2006. The project is on schedule for completion in 2008. Milestones achieved in 2006 include the following:

- **Treatment plant final design and construction.** Final design was completed in March 2006. Construction on the treatment plant began in late summer 2006. Although record-setting severe weather in November and December caused construction delays, the treatment plant remains on schedule for completion in 2008.
- **Permitting.** All permits for the Carnation Wastewater Treatment Plant project were obtained in 2006. Highlights are as follows:
  - The Washington State Department of Natural Resources approved an easement to allow a permanent structure (pipe) over and in the Snoqualmie River.
  - Two private property conveyance easements were finalized.
  - The Washington Trout appeal of the Shoreline Permit for the treatment plant site and conveyance was resolved in June 2006.
  - The Washington State Department of Ecology issued the Construction Stormwater Permit.
  - The Washington State Department of Fish and Wildlife issued the Hydraulic Project Approval for the project.

- Construction related permit approvals included the King County Department of Roads and Department of Development and Environmental Services (DDES) Utility Right of Way and Clear & Grade Permits, as well as City of Carnation Construction Permits.
- Permitting for the extended discharge pipe that will bring reclaimed water to the Chinook Bend Natural Area was initiated in 2006, including submittal of preliminary applications to the U.S. Army Corps of Engineers and to DDES.
- **Environmental review process.** An addendum to the Carnation Final Environmental Impact Statement (EIS) was issued in August 2006. The addendum includes new information about discharging reclaimed water from the treatment plant to enhance wetlands and help control invasive species at the Chinook Bend Natural Area. The information in the addendum does not substantially change the analysis of significant impacts and alternatives in the Final EIS.
- **Chinook Bend Natural Area wetland enhancement discharge.** The Chinook Bend Natural Area is located adjacent to the river outfall site at the Carnation Farm Road Bridge approximately one and a half miles north of the City of Carnation in unincorporated King County. The county is partnering with Ducks Unlimited, a non-profit group dedicated to wetland conservation, to develop the wetland enhancement. The county and Ducks Unlimited worked with the Snoqualmie Tribe and other interested stakeholders to develop a design for the wetland. The wetland design will increase the size of the wetland to nearly four acres, benefiting wildlife and enhancing opportunities for passive recreation at Chinook Bend. The conceptual enhancement of the Chinook Bend Natural Area is shown in Figure 2-8.

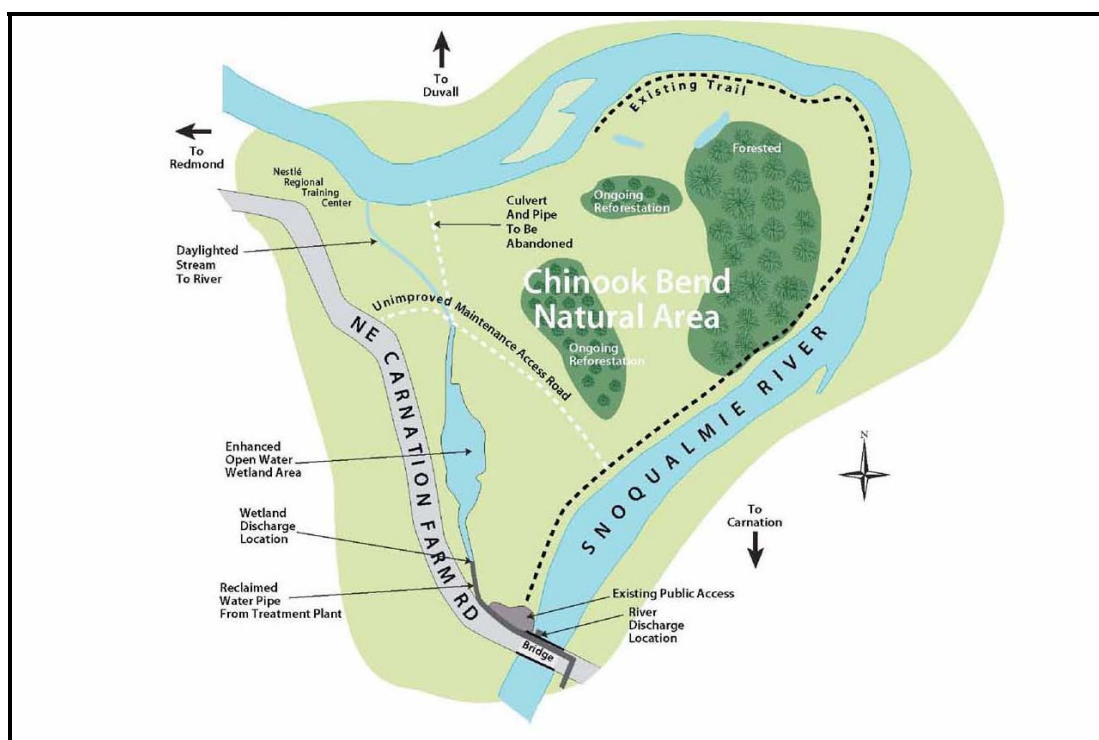


Figure 2-8. Conceptual Enhancement of the Chinook Bend Natural Area

- **Public involvement activities.** WTD staff and City of Carnation staff are continuing to work closely to involve Carnation residents and businesses in the project and to minimize potential construction impacts. In July 2006, community members joined Carnation and King County elected officials and other local dignitaries to break ground on the Carnation treatment facility and collection system. Construction kickoff meetings were held in June and July 2006 to solicit input and respond to questions from community members. A 24-hour construction hotline is available for community members to call with questions or concerns.

WTD staff also participates in meetings and informational booths to ensure community members are kept informed about the Carnation Treatment Plant project. In May, a field day was held at the Chinook Bend Natural Area for community members to find out more about the reclaimed water wetland enhancement project. Informational booths were held at the Carnation Farmer's Market in the summer. In addition, newsletters and the project Web site provide updates on a regular basis about the project. WTD staff also continues to periodically attend Carnation City Council meetings and work sessions to facilitate coordination between the county and the city on the project.

### **Schedule for 2007**

Construction on the treatment plant will continue through 2007. The facility is expected to be substantially complete in mid-2008. Construction of the wetland at Chinook Bend Natural Area is scheduled to begin in the second half of 2007.

Visit the Carnation Treatment Plant project Web site for more information:

<http://dnr.metrokc.gov/wtd/carnation/>

## **2.3 Amendments to Treatment Plant Policies**

The King County Council approved amendments to the RWSP treatment policies via adoption of Ordinance 15384 in March 2006, and Ordinance 15602 in September 2006. The amendments are as follows:

- Replaced references to “north treatment plant” with “Brightwater treatment plant” (Ordinance 15602)
- Required inclusion of a status of the odor prevention program in RWSP annual reports (Ordinance 15384)
- Added the words “municipal water supply” to a sentence in Treatment Plant Policy (TPP)-7; the sentence now reads:

“To ensure costs and benefits are shared equally throughout the region, all reclaimed water used in the community shall be distributed through a municipal water supply or regional water supply agency consistent with a regional water supply plan.” (Ordinance 15602)

- Deleted policies TPP-9 and TPP-10, which provided guidance to the Brightwater siting process; these policies were fully implemented with the completion of the siting process in 2003 (Ordinance 15602)

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## Chapter 3

# Conveyance Policies

The RWSP conveyance policies are intended to guide King County on how to accomplish major improvements to the regional wastewater conveyance system through 2030 and beyond, including building and upgrading the pipes and pump stations associated with the Brightwater Treatment Plant. The policies call for the county to use the 20-year peak flow storm as the design standard for its separated wastewater system to avoid sanitary sewer overflows and ensure there is sufficient capacity in the regional conveyance system to accommodate planned growth. In addition, RWSP Wastewater Planning Policy (WWPP)-4 calls for facility sizing to take into account the need to accommodate build-out population. By 2050, the regional wastewater service area is projected to be fully built out and all sewerable portions of the service area will be connected into the wastewater system. Therefore, new conveyance facilities are designed to convey the 20-year peak flow event projected to occur in 2050.

The 20-year peak flow storm design standard was adopted by the King County Council to serve as an objective measure for designing and building conveyance facilities intended to meet National Pollutant Discharge Elimination System (NPDES) permit requirements.<sup>1</sup> The 20-year peak flow storm consists of both storm flow (infiltration and inflow) and base flow (wastewater from homes and businesses). It is projected to occur on average about every 20 years and to have a 5 percent chance of being exceeded in any given year.

Because no uniform capacity standard was in place before adoption of the RWSP, portions of the regional conveyance system do not currently meet the 20-year peak flow storm standard. In setting this standard, the King County Executive and King County Council recognized that it is one of the most stringent standards in the nation and that it would take some time for the conveyance system to be upgraded to meet this standard. RWSP policies, therefore, direct King County's Wastewater Treatment Division (WTD) to develop, in consultation with the Metropolitan Water Pollution

### Types of Flow

**Base flow** is wastewater that enters sewers during dry weather in the absence of infiltration and inflow (I/I).

**Infiltration** is groundwater that seeps into sewers through holes, breaks, joint failures, defective connections, and other openings.

**Inflow** is stormwater that rapidly flows into sewers via roof and foundation drains, catch basins, downspouts, manhole covers, and other sources.

**Peak flow** is the highest combination of base flow and I/I expected to enter a wastewater system during wet weather over a set time period (for example, 30-minute increments).

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<sup>1</sup> NPDES permits are issued by the Washington State Department of Ecology. The permits set limits on the quality and quantity of effluent (treated wastewater) discharged from point sources such as treatment plants, combined sewer overflows, and industrial facilities.

Abatement Advisory Committee (MWPAAC), parameters to guide project scheduling and prioritization for projects in the separated portion of the county's wastewater system.<sup>2</sup>

The conveyance policies call for the county to periodically evaluate population, employment, and development pattern assumptions in the planning of regional conveyance facilities, as well as to consider water conservation and demand management assumptions developed by local utilities. They also provide guidance to the county for assuming responsibility for component agency interceptors that meet certain criteria for becoming regional facilities. In addition, the policies direct the county to integrate water reuse planning and infiltration and inflow study results in the planning for conveyance facilities.

This chapter provides an overview of implementation of the RWSP conveyance policies from 2004 through 2006. In accordance with RWSP reporting policies, this chapter also includes a summary of the activities carried out in 2006 related to design and construction of Brightwater conveyance and other RWSP conveyance projects. The chapter concludes with summary information on amendments to the conveyance policies adopted by the King County Council in 2004–2006.

The complete text of all the conveyance policies, including information on policy amendments and a brief summary of how each policy was implemented in 2004–2006, is provided in Appendix B.

### 3.1 Implementation of Conveyance Policies from 2004 through 2006

This section provides an overview of the major activities carried out in 2004–2006 in accordance with the conveyance policies. The activities are as follows:

- Building Brightwater conveyance
- Updating the conveyance system improvement program
- Acquiring regional conveyance facilities

#### 3.1.1 Building Brightwater Conveyance

The RWSP calls for King County to build and upgrade the pipes and pump stations needed to convey untreated wastewater (influent) to and treated wastewater (effluent) from the Brightwater Treatment Plant to a marine outfall for discharge to Puget Sound. In accordance with the conveyance policies, Brightwater conveyance is being built to meet the 20-year peak flow storm design standard; the system consists of approximately 14 miles of pipelines to be constructed in underground tunnels in north King County.

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<sup>2</sup> MWPAAC advises the King County Council and Executive on matters related to reducing water pollution. It was created by state law (RCW 35.58.210) and consists of representatives from cities and local sewer utilities that operate sewer systems in King County.

Brightwater conveyance activities in 2004 and 2005 focused on predesign, permitting, land acquisition, initiation of final design, and negotiation of mitigation agreements. In 2005, a reclaimed water pipeline was incorporated into the design of Brightwater conveyance. Brightwater conveyance construction began in 2006, and is on schedule for completion in 2010. Information on the 2004 and 2005 activities was documented in the 2004 and 2005 RWSP annual reports.<sup>3</sup> Details on Brightwater conveyance activities in 2006 are provided later on in this chapter.

### 3.1.2 Updating the Conveyance System Improvement Program

RWSP Conveyance Policy (CP)-3 directs the county to periodically evaluate assumptions regarding population and employment growth and development patterns in the planning of conveyance facilities.

Flow monitoring and modeling information developed for the Regional Infiltration and Inflow (I/I) Control Program allowed for a more accurate analysis of capacity needs in the regional conveyance system.<sup>4</sup> This information served as the foundation for the process to update the conveyance system improvement (CSI) program, which occurred in 2005 and 2006. As a result, the *2007 Conveyance System Improvement Program Update* refines the previously identified conveyance needs; categorizes these needs based on system age, condition, or capacity; and presents a list of projects and a schedule to address identified needs.

The project needs identified in the CSI program update focus on facilities in the separated portion of the county-owned regional conveyance system. It does not cover projects in construction, such as Brightwater, nor does it cover component agency systems. However, the development of project scopes, costs, and schedules in the update assumes that Brightwater will begin operating in 2010.

This section provides background on conveyance planning that has occurred since adoption of the RWSP, describes the process used in the 2007 CSI program update, and lists the proposed recommendations related to future conveyance planning that emerged as a result of the process.

#### **Background on Conveyance Planning**

King County's regional wastewater system is a large, integrated wastewater conveyance and treatment system. The 34 cities and sewer districts that are component agencies of the system are responsible for collecting wastewater from residences and businesses. King County's over 335 miles of pipes and sixty-one pump and regulator stations convey this wastewater to three secondary treatment plants.

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<sup>3</sup> RWSP annual reports are available on the RWSP library Web site at <http://dnr.metrokc.gov/wtd/rwsp/library.htm>

<sup>4</sup> A comprehensive six year I/I reduction study took place 2000-2005; as part of this study 800 flow meters were installed throughout the region in areas with separated sewers during the winter months of 2000-2001 and 2001-2002 (see Chapter 4 for more information)



Planning for the regional conveyance system is an ongoing function of WTD. WTD's CSI program is charged with planning conveyance improvements in accordance with RWSP policies to accommodate increased flows resulting from population and employment growth and to meet the 20-year peak flow storm design standard.

Since adoption of the RWSP, the approach to conveyance planning has undergone substantial reorganization, primarily to break down the service area into 10 sub-regional planning basins and to integrate conveyance planning with component agency plans and with other RWSP programs such as infiltration and inflow control. The CSI program was updated between 2000 and 2003 using this approach; the update was documented in the *2004 RWSP Update*.<sup>5</sup>

Significant new capacity needs were identified during development of the March 2005 *Regional Needs Assessment* (RNA) conducted for the Regional Infiltration and Inflow (I/I) Control Program.<sup>6</sup> The purpose of the RNA was to identify CSI projects and costs that could serve as a baseline for conducting benefit-cost analyses of potential I/I reduction projects. The RNA identified 63 capital conveyance projects needed through 2050. These capacity-related projects included a combination of projects previously identified in the 1999 RWSP and the 2000–2003 CSI programs and additional projects identified based on extensive flow monitoring data, sewer population information obtained during the six-year comprehensive I/I study, and input from component agencies. (Chapter 4 provides more information on the county's I/I reduction program.)

The *Regional Conveyance System Needs Technical Memorandum* that was published in December 2005 and updated in March 2007 built on the RNA by re-evaluating capacity needs and reviewing age and facility inspection data on the condition of the conveyance system.<sup>7</sup> The memorandum identifies the portions of the separated conveyance system that will need to be expanded or replaced over time in order to make the system capable of handling peak flow demands through 2050. It provided a basis for identifying and evaluating alternative approaches to address the identified needs and for seeking input from component agencies in the preparation of the 2007 CSI program update.

### Identifying Regional Conveyance Capacity Needs

The process for identifying regional conveyance capacity needs through 2050 consisted of four main steps:

- Estimating current 20-year peak flow demands to establish a baseline that represents how the system currently performs during peak flow conditions
- Projecting 20-year peak flows by decade, through 2050, using population and employment growth projections
- Verifying and adjusting identified growth assumptions and capacity constraints using updated information from component agencies

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<sup>5</sup> The *2004 RWSP Update* is available on the Web at <http://dnr.metrokc.gov/wtd/rwsp/library.htm#compreview>

<sup>6</sup> The RNA is available at <http://dnr.metrokc.gov/wtd/i-i/library/NeedsAssess/report.htm>

<sup>7</sup> The technical memorandum is available at <http://dnr.metrokc.gov/wtd/csi/csi-docs/RegionalConveySysNeeds/index.htm>



- Using a hydraulic model of the conveyance system to identify capacity constraints based on where the current or projected 20-year peak flow exceeds the capacity of existing conveyance facilities

To project future wastewater flows, WTD uses population and employment forecasts provided by the Puget Sound Regional Council (PSRC). PSRC data are provided in two levels of detail—the more geographically broad forecast analysis zones (FAZ) and the more detailed traffic analysis zones (TAZ). To forecast wastewater flows, WTD uses the TAZ information and allocates the population estimated by TAZ to each of the county's wastewater hydraulic model basins according to the number of developed parcels in each TAZ and model basin. There are 150 model basins in the separated system and 320 model basins in the combined system. Adjustments are made to account for major employers and apartment complexes in the service area. Detailed basin delineations are done by marking the sewer areas, potentially sewer areas, and where development is not expected to occur.

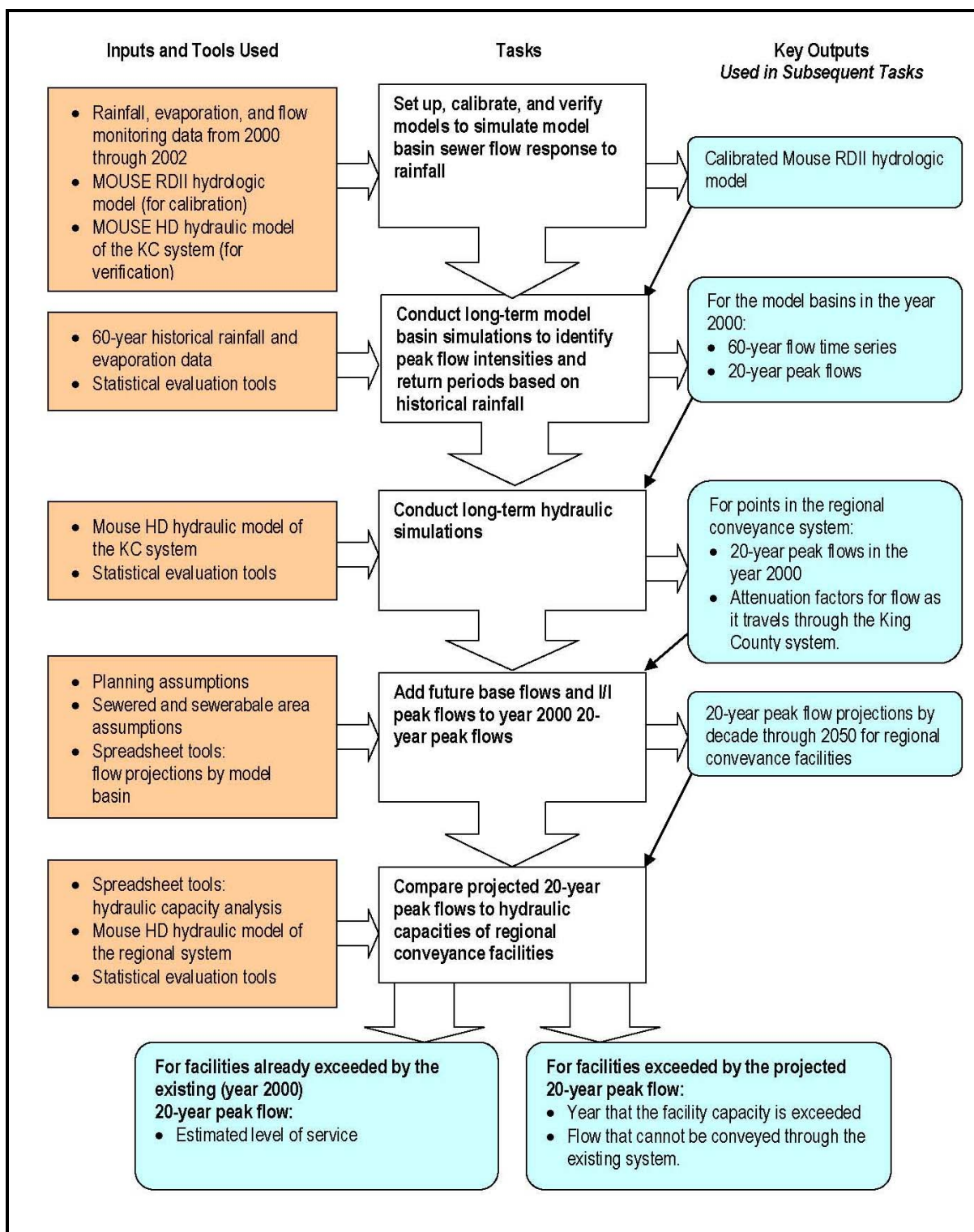
In 2003, PSRC forecasted population for the Puget Sound region out to 2030. This information was used to update the original RWSP flow projections made in 1998, which were based on PSRC FAZ data from 1995; the updated projections were documented in the *2004 RWSP Update*. This updated data was also used in the development of the *CSI Program Update*.<sup>8</sup> WTD staff will continue to update flow projections as updated PSRC TAZ information becomes available.

After projecting future flows and identifying capacity needs in the county's regional conveyance system, WTD staff met with representatives from the component agencies to present the identified needs and to obtain updated information from the agencies about local growth rates and other factors affecting conveyance capacity. The meetings resulted in a more common understanding of the basis for identified regional conveyance needs and incorporation of local conditions into the needs identification process. The flow projections and associated conveyance needs identified through flow modeling were, for the most part, consistent with component agency expectations. In some cases, information from an agency prompted changes in the estimated dates that 20-year peak flow volumes will exceed the capacity of regional conveyance facilities. The City of Issaquah, for example, provided information that demonstrates that the city is experiencing urban growth at a significantly faster rate than the rest of the region. The projected dates for needed improvements to the regional conveyance system in that area were adjusted accordingly and incorporated into the 2007 program update.

Thirty-three CSI projects were then identified to meet identified capacity needs through 2050; 24 of these projects are planned through the RWSP planning horizon of 2030. All 33 projects are in addition to the RWSP projects that are completed or that are in design or construction.

Figure 3-1 illustrates the process and inputs used to identify capacity needs in the county's separated conveyance system.

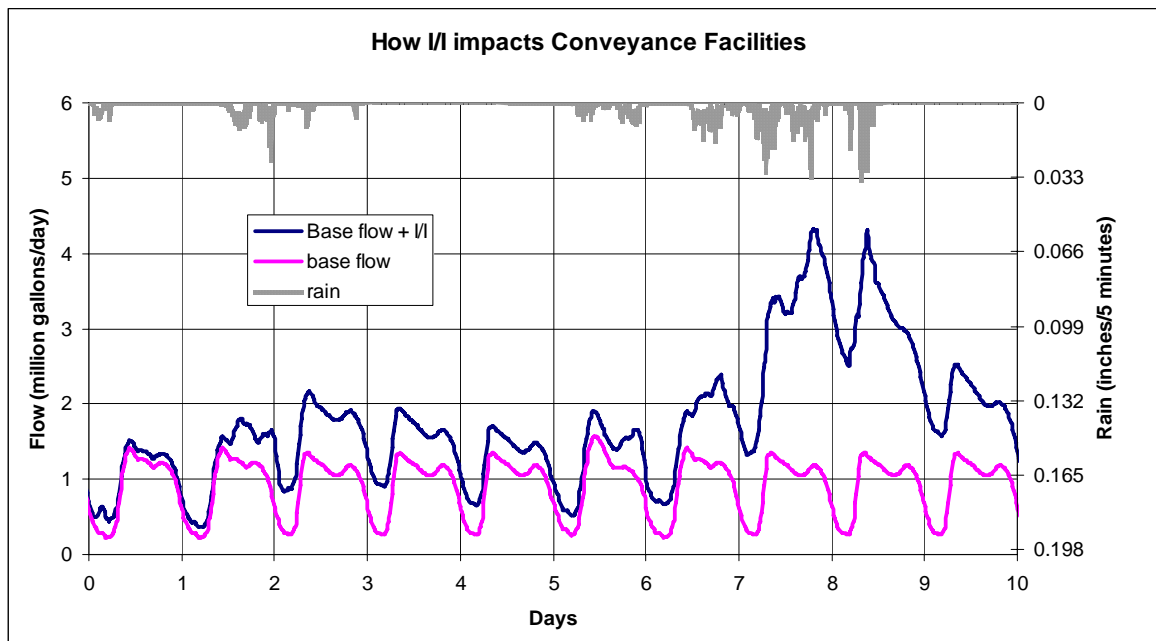
<sup>8</sup> For details on how PSRC information was used to update the CSI program, see Appendix A, Conveyance System Technical Analyses – Processes and Assumptions of the CSI Program Update, <http://dnr.metrokc.gov/wtd/csi/library.htm> ) More information about the PSRC population projections and their methods is available at <http://www.psrc.org/>.



**Figure 3-1. Process and Inputs for Identifying Capacity Needs in King County's Separated Conveyance System**

## Integrating I/I Reduction, Water Conservation, Reclaimed Water, and Climate Change in the Needs Identification Process

RWSP CP-5 directs the county to closely integrate and consider I/I study results, reclaimed water planning, and water conservation assumptions in wastewater facility planning. The two most significant factors that drive the need for expanding capacity within the regional conveyance system are infiltration and inflow and population and employment growth over time. I/I is clean stormwater and groundwater that enters the sewer system through cracked pipes, leaky manholes, or improperly connected storm drains, down spouts, and sump pumps. About 75 percent of the region's peak flows in the separated conveyance system comes from I/I.<sup>9</sup> Flow volumes can quadruple during rain events when the conveyance system must handle base flow plus I/I (Figure 3-2). Based on flow monitoring data, it is estimated that ninety-five percent of the I/I that enters the regional system originates in privately owned side sewers and in component agency systems.



**Figure 3-2. Typical Hydrograph Showing Impacts of I/I on Wastewater Flows**

The *Executive's Recommended I/I Control Program* includes implementation of two or three initial projects to test the cost-effectiveness of I/I reduction on a larger scale than the pilot projects that were completed in January 2004.<sup>10</sup> Each initial project, if successful, will eliminate the need for an identified CSI project. The goal is for the CSI program to invest in I/I reduction in lieu of investing in larger conveyance system improvements when it is cost-effective to do so. I/I reduction is considered cost-effective when the total estimated CSI project savings is greater than the total estimated cost of I/I reduction. The recommended capital improvements in the CSI

<sup>9</sup> *Regional Wastewater Services Plan, Executive's Preferred Plan*, April 1998, page 14.

<sup>10</sup> *Executive's Recommended I/I Control Program* was approved by the King County Council in May 2006 via adoption of Motion 12292, and is available at <http://dnr.metrokc.gov/wtd/i-i/library/ExecRec/report.htm>

program update will provide the basis for completing benefit-cost analyses for possible future I/I reduction projections. Chapter 4 provides more information on the I/I control program.

Water conservation assumptions are applied to flow projections and were used in the development of the CSI program update. For the update, the county used a water conservation planning assumption of a 10 percent reduction in per day consumption from the 2000 levels by 2010, with no additional reduction thereafter (Table 3-1). This is the same assumption used to update the 1998 RWSP flow projections in the *2004 RWSP Update*.

**Table 3-1. Projected Water Consumption**

Type of Consumption	2000 (Rate*)	2010 and Beyond (Rate*)
Residential (Seattle)	56	50
Residential (non-Seattle)	66	60
Commercial	33	30
Industrial	55	50

\* Rates are shown in gallons per capita per day for residential consumption, and in gallons per employee per day for commercial and industrial consumption.

WTD staff will continue to review and monitor the water conservation assumptions of the City of Seattle and other utilities in the county's wastewater service area. For example, in spring 2007, the City of Seattle revised its water conservation assumptions and is now projecting greater conservation through 2010 and additional conservation between 2010 and 2020. WTD is in the process of analyzing Seattle's revised water conservation assumptions to determine the effect, if any, on future flow projections and facility needs.

The RWSP policies also call for integrating reclaimed water planning in the planning of conveyance facilities. During the process to update the CSI program, no reclaimed water planning efforts were under way or planned that might affect the flow projections used in updating the CSI program. WTD staff will continue to review component agency comprehensive plans to incorporate any evaluation of reclaimed water opportunities in those plans into wastewater facilities planning. Chapter 7 provides more details on the county's reclaimed water program and implementation of the RWSP water reuse policies.

The effects of climate change on the regional wastewater system are currently under investigation. Climate change may cause more intensive storm events, which could increase projections of peak wastewater flows for the system. Currently, precipitation models for our region that account for the affects of climate change are inconclusive. When more is known, they will be incorporated into existing models for projecting peak flows. WTD will be evaluating the effects of rising sea levels on existing and planned facilities. This information will be incorporated in future CSI program updates.

## Using Criteria Developed in Consultation with MWPAAC to Prioritize CSI Projects

In addition to directing the county to use the 20-year peak flow storm as the design standard for the separated portion of the county's regional wastewater system, RWSP CP-1 also calls for the county to use parameters developed in consultation with MWPAAC to guide project scheduling and prioritization for regional conveyance projects.

As noted earlier in this chapter, the 20-year peak flow storm standard is one of the most stringent in the nation. In recognition that it is not technically practical or financially feasible to simultaneously construct all identified CSI projects necessary to bring facilities up to this standard, the King County Council directed the King County Executive to develop options for phasing or deferring non-Brightwater conveyance facilities anticipated for the 2006–2011 capital improvement plan, and in the 30-year RWSP capital plan (Ordinance 14942, Section 2F, adopted 6/17/04). In response to this directive, WTD and the component agencies worked collaboratively to identify and analyze alternative cost containment strategies. The alternatives analyzed included approaches to downsizing, phasing, or delaying construction of projects. Through this effort, it was determined that delaying or phasing project construction would be the best method of containing costs over time. Delaying projects would not reduce the overall capacity standard to be achieved and would allow WTD to focus on the region's most pressing conveyance needs with minimal risk to public health and the environment and with minimal impact to ratepayers.

To assist in identifying the most pressing conveyance system needs, WTD and MWPAAC developed eight prioritization criteria that address such factors as public health risks, coincident benefits, costs, and rate impacts. These prioritization criteria were submitted to the County Council in October 2004 in a report entitled *Prioritization Guidelines for Phasing Conveyance System Improvement Projects*. The criteria are as follows:

- Design new facilities to meet the 20-year peak flow expected by 2050.  
*Consistent with existing policy, providing one of the best levels of service for a wastewater utility in the country, by approximately 2020.*
- Determine risk of overflow vs. peak capacity.  
*Analyze to determine if overflows are actually occurring or expected to occur vs. surcharging the system without causing overflows.*
- Evaluate risk of public health and water quality issues.  
*Give highest priority to overflows that cause public health and/or water quality impacts.*
- Identify operation and maintenance (O&M) issues and costs.  
*Analyze specific operation and maintenance costs and reliability in maintaining the system vs. upgrading the system.*
- Determine the risk of regulatory non-compliance.  
*Apply results from overflow analysis and O&M reliability.*
- Identify community and local agency concerns.  
*Coordinate with local agencies and review customer concerns or complaints.*

- Evaluate coincident benefits.  
*Review state and local capital improvement program schedules to determine if partnering options are feasible and to minimize impacts to the affected community.*
- Identify financing benefits.  
*Analyze opportunities to adjust schedules to better coordinate with grant and loan programs.*

In accordance with RWSP CP-1, these criteria were applied to all planned CSI projects identified in the 2007 CSI program update. During this process, MWPAAC put a high priority on minimizing the potential for overflows in the regional conveyance system. The 2007 CSI program update (<http://dnr.metrokc.gov/wtd/csi/library.htm>) provides more detail on how these criteria were applied in the process to update the CSI program.

Table 3-2 lists the planned CSI projects in order of priority, and Figure 3-3 shows the location and priority of these projects.

**Table 3-2. Identified Planned Conveyance Projects Through 2050**

<b>Project Planned through 2030</b>	<b>Estimated Range of Project Completion</b>
Heathfield/Sunset Pump Station Replacement and Force Main Upgrade	2010-2013
Bellevue Influent Trunk Parallel	2010-2013
[CSI] Sammamish Plateau Diversion	2014-2030
Northwest Lake Sammamish Interceptor Parallel	2014-2030
Coal Creek Siphon and Trunk Parallel	2014-2030
North Mercer and Enatai Interceptor Parallels	2014-2030
Lake Hills Trunk Replacement	2014-2030
Thornton Creek Interceptor Parallel	2014-2030
Sammamish Plateau Storage	2014-2030
Boeing Creek Storage Expansion	2014-2030
Algona Pacific Trunk Stage 1	2014-2030
Richmond Beach Storage	2014-2030
Factoria Pump Station and Trunk Diversion	2014-2030
Soos Alternative 3A(3) – Pump Station D with Conveyance	2014-2030
Soos Alternative 3A(3) – Pump Station H with Conveyance	2014-2030
Soos Alternative 3A(3) – Pump Station B with Conveyance	2014-2030
Issaquah Storage	2014-2030
Eastgate Parallel Pipe Storage	2014-2030
Bryn Mawr Storage	2014-2030
Medina Storage	2014-2030
Issaquah Creek Highlands Storage	2014-2030
South Renton Interceptor Parallel	2014-2030
Issaquah Interceptor Section 2 Parallel	2014-2030
York Pump Station Modifications	2014-2030
<b>Project Planned 2031–2050</b>	<b>Estimated Range of Project Completion</b>
Swamp Creek – Section 1B Parallel	2031-2050
Garrison Creek Trunk Parallel	2031-2050
Juanita Bay Pump Station Force Main Upgrade	2031-2050
ULID 1 Contract 4 Parallel	2031-2050
Lower North Creek Interceptor Parallel	2031-2050
Algona Pacific Trunk Stage 2	2031-2050
Auburn Interceptor – Section 3 Parallel Pipe Storage	2031-2050
Upper North Creek Parallel	2031-2050
Lakeland Hills Pump Station Replacement	2031-2050



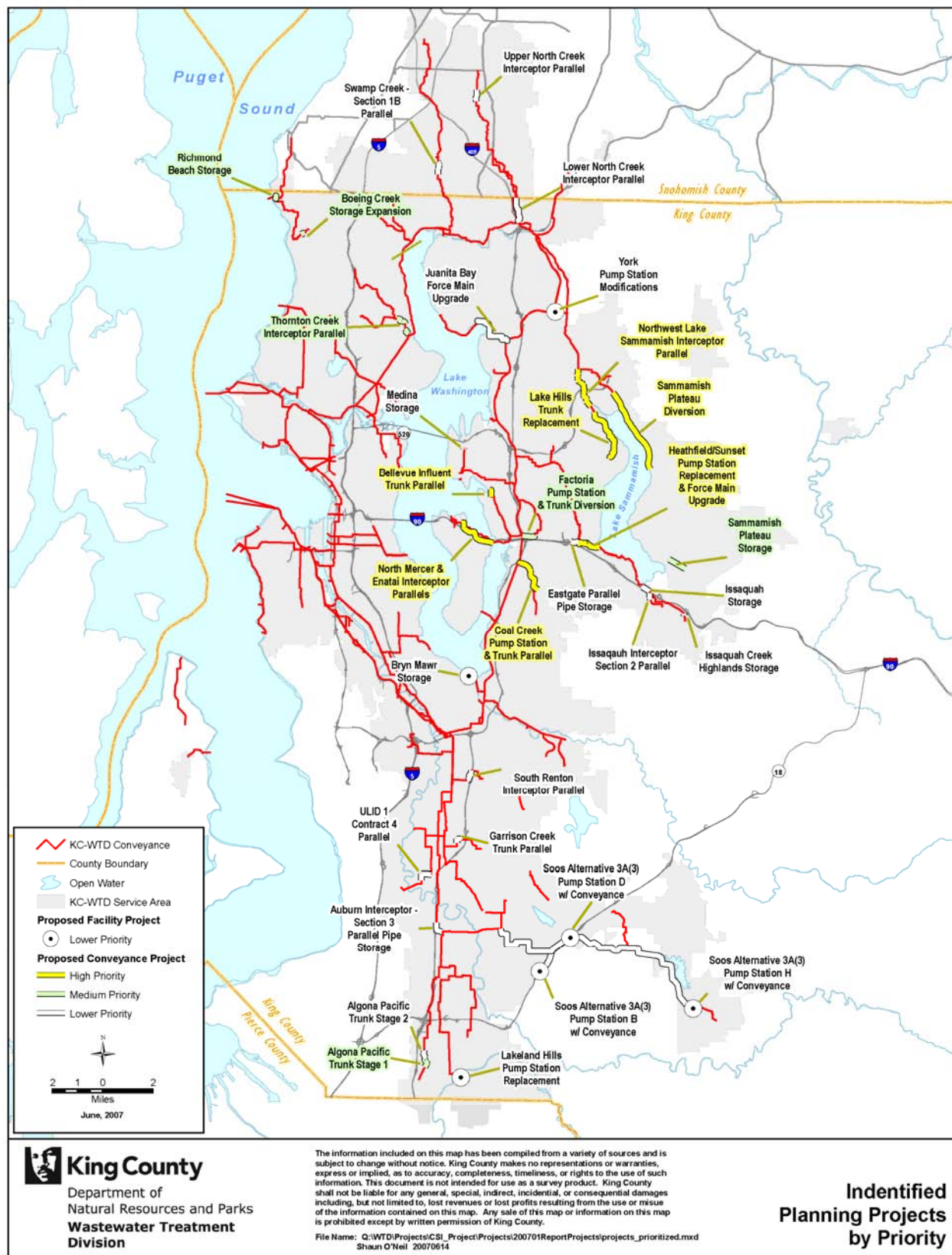


Figure 3-3. Identified Planned Conveyance Projects by Priority

## **Recommendations for Future Conveyance Planning**

King County worked closely with MWPAAC, through its Engineering and Planning (E&P) Subcommittee, and individual component agencies during the process to update the CSI Program. In recognition of the fact that long-term management of the conveyance system is expensive and largely dependent upon projections of future flow volumes that are themselves based on projections of regional growth and weather patterns, several recommendations were made related to future conveyance planning. WTD will continue to work with MWPAAC on these recommendations; it is likely the King County Executive will propose formalizing these recommendations as conveyance policy amendments. The recommendations are as follows:

- To ensure the CSI program remains current, WTD should update the CSI program every five years beginning in 2013
- To ensure flow projections remain accurate, WTD should conduct systemwide flow monitoring to correspond with the decennial census of the population
- To avoid over-building the system, WTD should perform field verification of wastewater flows and conveyance component conditions prior to implementation of regional conveyance projects that are intended to address capacity needs
- To meet identified conveyance needs, WTD should evaluate other demand management alternatives, such as I/I reduction, water conservation, and reclaimed water facilities

For more information on the CSI Program, visit the program's Web site at <http://dnr.metrokc.gov/wtd/csi/>

### **3.1.3 Acquisition of Facilities**

During the development of the RWSP, there was agreement among the Regional Water Quality Committee, the King County Council, and the King County Executive to establish uniform financing, construction, operation, maintenance, and replacement policies for all interceptors and trunks in its service area and for the county to assume responsibility for interceptors that meet the criteria outlined in RWSP CP-4. The criteria are as follows:

- County ownership and operation of permanent conveyance facilities that serve natural drainage areas of greater than one thousand acres
- Conformance to the county's comprehensive water pollution abatement plan and the RWSP as precondition of county ownership
- A financial feasibility threshold governing limitations of the county's financial contribution to development of a new interceptor or trunk sewer or acquisition of an interceptor or trunk sewer constructed by a component agency. The threshold, as specified in K.C.C. 28.84.080, shall consider the capital costs that can be supported by the existing customers in the natural drainage area that would be served by the new facility

In accordance with this policy guidance, the following acquisitions took place from 2004 through 2006:

- Acquisition of the Southeast Sammamish Interceptor and flow control structure from the Sammamish Plateau Water and Sewer District
- Acquisition of the Juanita Creek Trunk Sewer from the Northshore Utility District
- Acquisition of the Coal Creek Interceptor Extension from the Coal Creek Utility District

## 3.2 2006 Annual Report Activities of Conveyance Improvement Projects in Design and Construction

The RWSP reporting policies require the RWSP comprehensive review report to include all elements of the RWSP annual report, replacing the annual report for the year that the comprehensive review report is produced. The RWSP annual report provides information on RWSP capital projects in design and construction. This section meets the 2006 annual report requirements for Brightwater conveyance and the following non-Brightwater conveyance projects that are in design or construction:

- Bellevue Pump Station Upgrade
- Kent/Auburn Conveyance System Improvements
- North Creek Interceptor Improvements
- Hidden Lake Pump Station Replacement and Sewer Improvement
- Fairwood Interceptor Sewer
- Black Diamond Storage Facility
- Juanita Bay Pump Station Replacement
- Pacific Pump Station Replacement

Figure 3-8 (on page 3-20) shows the locations of the non-Brightwater conveyance projects in design and construction during 2006.

### 3.2.1 Brightwater Conveyance

The Brightwater conveyance system includes the pipes and facilities that bring influent to the Brightwater plant and effluent from the plant to a marine outfall for discharge to Puget Sound. The system consists of approximately 14 miles of pipelines to be constructed in underground tunnels in north King County. The tunnels will be constructed in three segments (east, central, and west), as shown in Figure 3-4.

Other facilities needed for the conveyance system include pumps, flow and odor control facilities, and electrical and monitoring equipment. Many of these facilities will be below ground. There will be a larger pump station building at the North Creek portal site in Bothell, and smaller aboveground structures at some of the other portal locations.<sup>11</sup>

In addition, the Brightwater reclaimed water pipeline is being constructed in conjunction with the construction of the Brightwater conveyance tunnels.

Chapter 2 provides information on the activities and accomplishments in 2006 related to construction of the Brightwater Treatment Plant. Information on updated cost trend estimates of the Brightwater system is also included in Chapter 2.

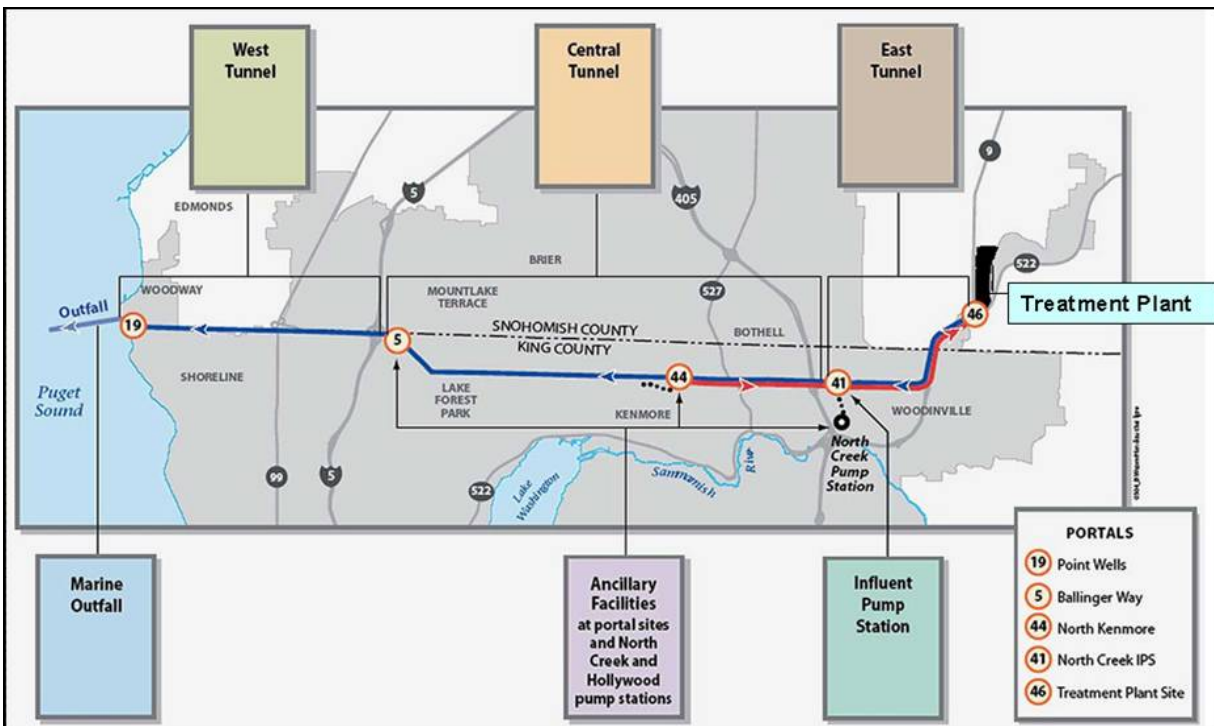


Figure 3-4. Components of the Brightwater System

### Overview of 2006 Accomplishments

King County made substantial progress on Brightwater conveyance in 2006. The Brightwater project is on schedule for completion in 2010. Brightwater conveyance accomplishments in 2006 include the following:

- East Conveyance Tunnel.** Construction began on the Influent Structure/Influent Pump Station shafts at the North Creek Portal. Through 2006, the contractor completed excavation of the Influent Structure (IS) shaft and began constructing the Influent Pump

<sup>11</sup> Portals are the access shafts where workers, machines, equipment, and soils will enter and exit the tunnel during construction.



Station (IPS) shaft slurry wall panels. Figure 3-5 depicts construction activities associated with the Influent Pump Station (IPS) and Influent Shaft (IS).

Anticipated activities in 2007 include pouring a slab at the base of the IS, dewatering the IS shaft, and completing IPS shaft slurry wall panels.



Workers use a hydromill trench cutter to excavate the slurry walls for the Influent Pump Station



Workers cleaning the walls of the Influent Structure Shaft

#### **Figure 3-5. Influent Pump Station and Influent Shaft Construction Activities**

- **Central Conveyance Tunnel.** In 2006, construction began on the tunnel shafts at the North Kenmore Portal. Sound walls were constructed and excavation of the slurry wall panels began. Figure 3-6 depicts construction activities associated with the North Kenmore Portal.

Anticipated activities in 2007 include constructing a slurry wall for the North Kenmore shaft, excavating the Swamp Creek Connector jacking pit, and constructing the diversion structure and open-cut pipeline along NE 192nd Street.



Workers construct rebar cages for the slurry walls at the North Kenmore Portal site

#### **Figure 3-6. North Kenmore Portal Construction Activities**

- **West Conveyance Tunnel.** In late 2006, the county selected a joint venture contractor for the West Tunnel. The contract was signed in January 2007. Activities anticipated in 2007 include site development at the Point Wells Portal site and procurement of the tunnel boring machine.
- **Influent Pump Station.** Design was completed on the Influent Pump Station (IPS) and construction bids were advertised in late 2006.
- **Marine Outfall.** In December 2006, King County received statements of qualifications from five teams for the marine outfall design-build project. Final selection of the design-build team is expected in summer 2007.<sup>12</sup>
- **Brightwater Reclaimed Water Backbone.** In 2006, design was completed on the Brightwater reclaimed water pipeline. Construction bids were advertised for the reclaimed water pipeline from the Brightwater IPS to the North Creek Pump Station. Design was also initiated on converting the existing pipelines from the North Creek Pump Station to the York Pump Station and on the final section of new reclaimed water purple pipe from the York Pump Station to Willows Run Golf Course. The location of the Brightwater reclaimed water system is shown in Figure 3-7.

Activities anticipated in 2007 include completing the design and State Environmental Policy Act (SEPA) work associated with the pipelines from the North Creek Pump Station to the York Pump Station and from the York Pump Station to Willows Run Golf Course, completing property easements and acquisition, and obtaining construction permits.

- **Permitting.** All conveyance permits for tunnel construction, local connections, North Creek facilities, and for the section of the reclaimed water pipeline from the Brightwater IPS to the North Creek Pump Station were finalized in 2006. Agreements were obtained for 146 of the 147 conveyance easements for the conveyance tunnel.

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<sup>12</sup> The selected contractor will be responsible for completing the project design, construction, and installation of the outfall.

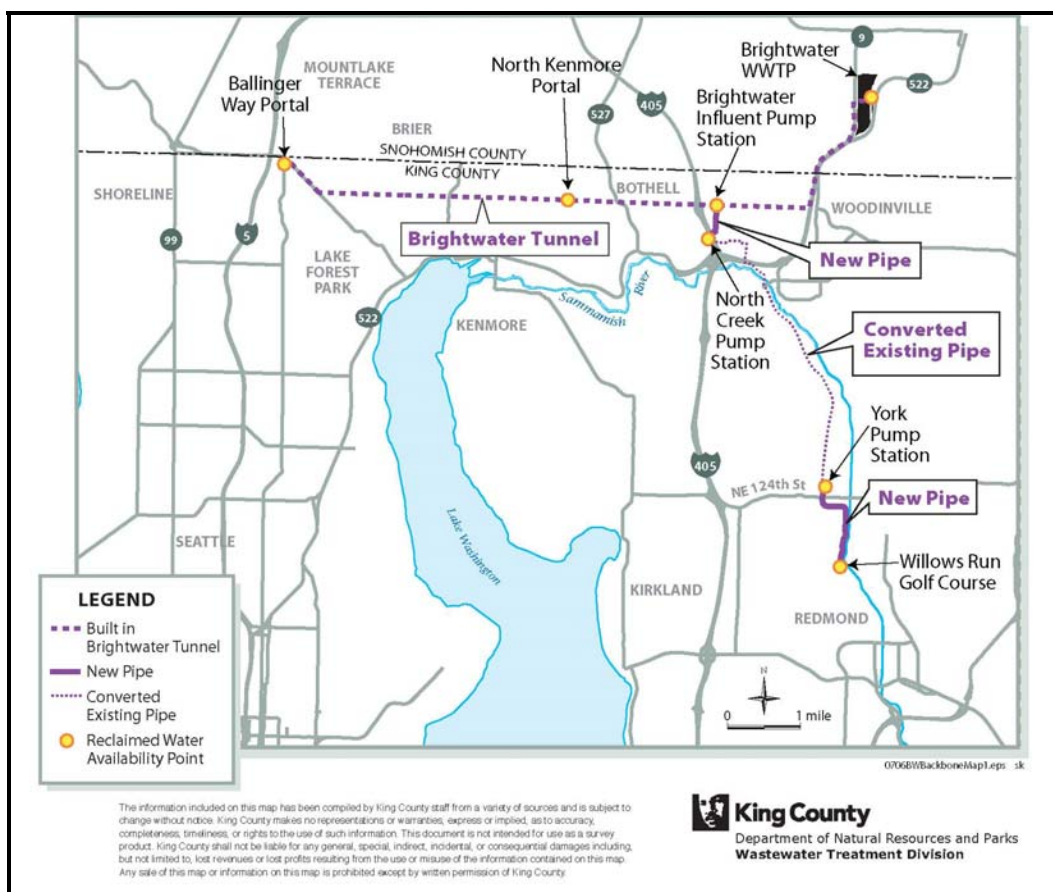


Figure 3-7. Brightwater Reclaimed Water Backbone System

- Public Involvement.** WTD continues to place a high priority on involving stakeholders and members of the public in Brightwater design, permitting, and construction. Over 35 meetings and briefings with residents, community leaders, and groups were held in 2006, including informational meetings and open houses for community members who live or work near the conveyance portal areas and treatment plant. Brightwater informational booths were available at several community fairs, festivals, and public events.

A groundbreaking ceremony took place in April 2006 to celebrate the start of construction on the Brightwater project and to thank all of the jurisdictions, consultants, contractors, and individuals who have been a part of the project through planning, siting, design, permitting, and now construction.

The Brightwater project team continues to respond to questions and comments received on the project from property owners, jurisdictions, neighbors of future facilities, and the general public. In addition, the team produced project newsletters, bulletins, and news releases to keep people informed about project activities.

Visit the Brightwater project's Web site for more information:

<http://dnr.metrokc.gov/wtd/brightwater/>



### 3.2.2 Bellevue Pump Station Upgrade

The Bellevue Pump Station needs to be upgraded to handle growing wastewater flows from the Bellevue area. Built in 1964, the facility pumps about 8 million gallons per day (mgd) of wastewater to the Swayolocken Pump Station near the Mercer Slough. From there, the wastewater is piped to the county's South Treatment Plant in Renton. The Bellevue Pump Station Upgrade project will increase the Bellevue Pump Station's firm capacity to 11 mgd to meet projected flows in the future and will improve the station's electrical and control systems.<sup>13</sup>

The pump station improvements include new pumps; new electrical, mechanical, and odor control equipment; a new standby generator; new aboveground facilities to house the new equipment; and better access for maintenance vehicles and workers. In addition to these improvements, a new 5,500-foot-long, 24-inch-diameter force main will be constructed to convey the added flows directly from the upgraded Bellevue Pump Station to the East Side Interceptor. Because of space constraints, the Swayolocken Pump Station cannot be upgraded to handle these additional flows.

Project design was near completion by the end of 2006. All project-related permits and easements were obtained in 2006. The project will be implemented through two construction contracts: one for the force main and one for the pump station. The construction bids for the force main were received in January 2007; construction is expected to begin in spring 2007. The pump station contract is expected to be advertised in November 2007 and will be awarded in early 2008. The project is on schedule for completion in 2010.

Visit the project Web site for more information: <http://dnr.metrokc.gov/wtd/projects/bellevue/>

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<sup>13</sup> Firm capacity means the capacity of the pump station with one of the larger units out of service for maintenance or repair needs.

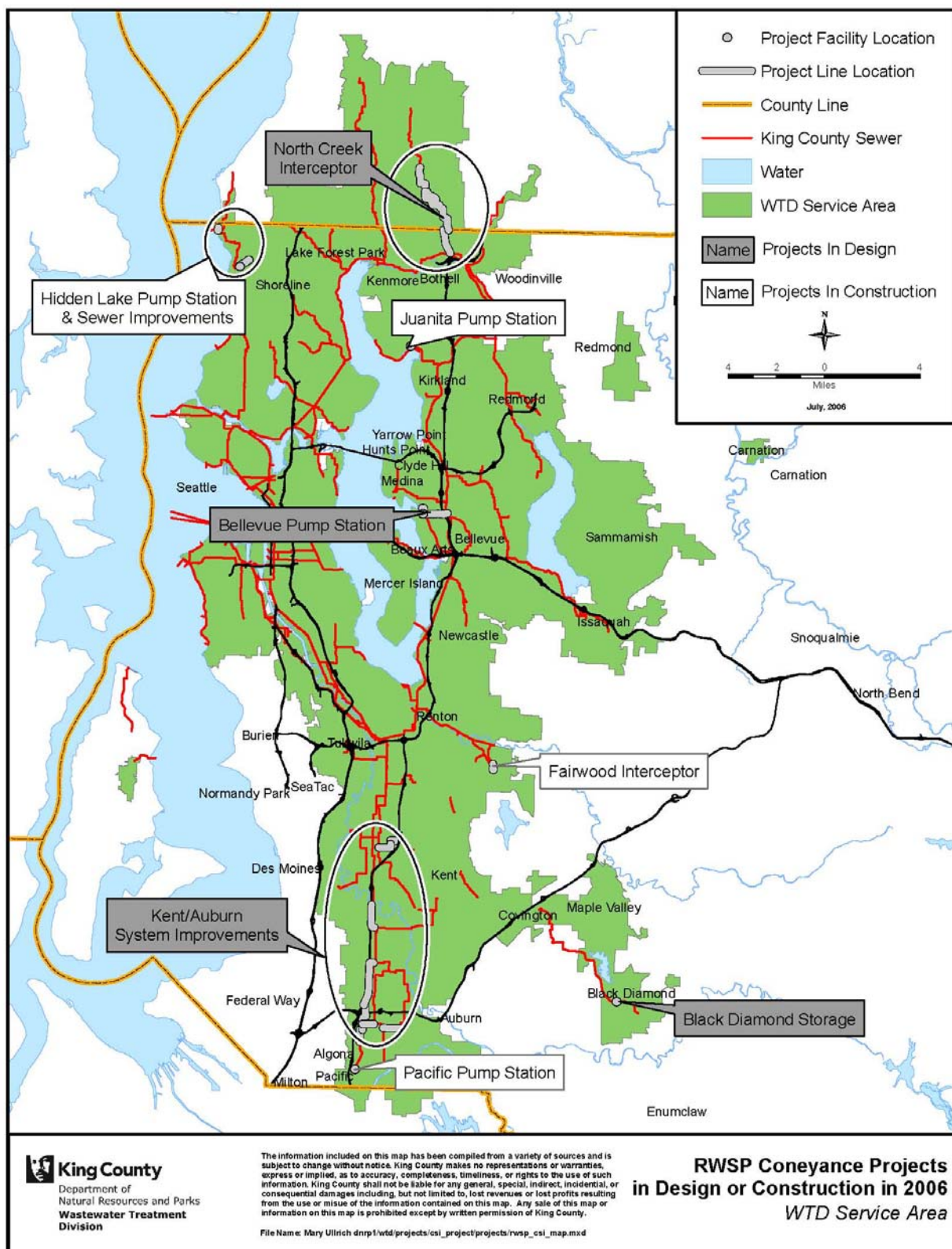


Figure 3-8. RWSP Conveyance Projects in Design and Construction in 2006

### 3.2.3 Kent/Auburn Conveyance System Improvements

The Kent/Auburn Conveyance System Improvements will provide additional capacity needed in the cities of Kent, Auburn, Algona, and Pacific. To meet these needs, the county is looking at constructing approximately five miles of new pipe, ranging from 18 to 54 inches in diameter. This project was formerly known as the Southwest Interceptor project, which proposed to meet the capacity needs in the Kent and Auburn planning areas by rerouting flows to a new large-diameter sewer located primarily in the West Valley Highway right-of-way. As a result of the information gathered during the I/I control study, the planning analyses were revisited. It was determined that the capacity needs were lower than originally projected and that the revised capacity needs could be met with construction of fewer miles of sewers compared with the original Southwest Interceptor. In addition, it was determined that it would be most cost-effective to build the new sewers in phases based on capacity needs. A number of alternative approaches were evaluated. In 2006, WTD staff met with staff from the cities of Auburn, Kent, Algona, and Pacific to help determine the preferred locations for the pipelines associated with the Kent/Auburn Conveyance System Improvement project.

The proposed solution to meeting the capacity needs in the Auburn planning area involves three project elements:

- **Pacific Pump Station Force Main.** Located in Pacific, Algona, and Auburn, this new pipeline will carry flow north from the Pacific Pump Station to the Auburn West Interceptor.
- **Stuck River Trunk.** Located in Auburn, this new gravity pipeline will be constructed to convey flow away from the M Street Trunk to the Auburn West Interceptor.
- **Auburn West Interceptor Parallel or Replacement.** Located in Auburn, this new gravity pipe will either replace or parallel an existing portion of the Auburn West Interceptor between 15th Street Southwest and West Main Street in Auburn.

Two project elements are proposed for meeting the capacity needs in the Kent planning area:

- **Kent East Hill Diversion.** Located on the East Hill of Kent, this new gravity pipe will divert flow out of the upstream portion of the Mill Creek Interceptor and into the South 277th Interceptor.
- **Kent ULID 1/5 Interceptor Parallel or Replacement.** Located north of downtown Kent, this new gravity pipe would either replace or parallel portions of the existing interceptor along 4th Avenue North between approximately State Route 167 and South 212th Street.

Predesign is expected to be complete in October 2007. During predesign, it is possible that modifications will be made to these project elements.

Visit the project Web site for more information: <http://dnr.metrokc.gov/wtd/projects/Kent-Auburn/index.htm>

### **3.2.4 North Creek Interceptor Improvements**

Improvements to the North Creek Interceptor are necessary to avoid overflows and meet current and future growth needs in the North Creek basin. This project is located within unincorporated Snohomish County and the City of Bothell and consists of constructing 16,400 feet of gravity sewer pipes, ranging from 21 to 48 inches in diameter, to replace the existing sewer pipes.

King County has signed an interlocal agreement with the Alderwood Water and Wastewater District to provide design and construction management services to this project. King County WTD staff is providing overall project management and oversight to the project.

In 2006, activities focused on predesign and permitting activities. Final design began in late 2006 and is expected to be completed in the third quarter of 2007. Construction is expected to begin in late 2007. The project is scheduled for completion in 2010.

### **3.2.5 Hidden Lake Pump Station Replacement and Sewer Improvements**

The 40-year-old Hidden Lake Pump Station does not have capacity to handle existing or future peak storm flows, nor does it meet current design standards for odor control, instrumentation, and equipment handling. Further, the pump station discharges to the Boeing Creek Trunk, which has a history of capacity, odor, and corrosion problems. This project will address these problems through new facilities to control overflows and increase the capacity of the Boeing Creek Trunk to meet the 20-year peak flow storm design standard.

This project is located in the City of Shoreline and includes constructing a new Hidden Lake Pump Station on the site of the existing pump station, replacing approximately 12,000 feet of the Boeing Creek Trunk, and building a 500,000-gallon underground storage pipe in Boeing Creek Park.

The pipelines will be constructed by open-cut and microtunneling. The pump station will be constructed by conventional aboveground methods. The new pump station will have a pumping capacity of 6.8 mgd; the existing pump station's capacity is 4.3 mgd. Designed with public input, the new pump station will fit in the neighborhood and include native landscaping.

Activities in 2006 included selecting a construction contractor; issuing a notice to proceed in the spring; and beginning construction in the summer. A 12-foot-diameter storage pipe was installed in Boeing Park, and site preparation and construction of the pump station foundation were completed. Construction is expected to be complete in 2009.

WTD staff is working closely with nearby residents and businesses to keep them informed of construction activities. Notice of activities is provided via mail, e-mail, phone, and door-hangers. Project updates and newsletters are widely distributed and posted on the project Web site. In addition, the county holds community briefings and open houses, and works directly with affected community members to problem-solve project-related concerns. WTD has established a 24-hour construction hotline for people to call with questions or concerns.

In addition, WTD staff is coordinating with the City of Shoreline, Ronald Wastewater District, and the City of Seattle to minimize community impacts. Because of this coordination, it has been possible to keep Boeing Creek and Richmond Beach parks open during construction. The county is also replacing 5,000 feet of water mains owned by Seattle Public Utilities as well as replacing existing and constructing new manholes and sewer pipes for the Ronald district as part of this project.

Visit the project Web site for more information:

<http://dnr.metrokc.gov/wtd/projects/hiddenlake.htm>

### 3.2.6 Fairwood Interceptor Sewer

This project replaced the erosion-prone and unstable Madsen Creek sewer pipeline that served the Fairwood community with a new deep gravity Fairwood Interceptor Sewer, located in a new alignment outside the Madsen Creek ravine. The new alignment follows Fairwood Boulevard for several blocks from the Fairwood Elementary School to the Bonneville Power Administration's right-of-way near 140th Avenue SE. It includes an inverted siphon underneath the west Madsen Creek tributary. In accordance with community preference, the new interceptor avoided the need to build a pump station in Fairwood. This project included improvements to existing Cedar River Water and Sewer District pipelines.

Construction of the final phase of the project began in 2005. Activities in 2006 focused on completing the final phase of the project:

- Microtunneling the final new sewer segment from the end of the inverted siphon sewer in the Bonneville Power Administration's right-of-way to the existing sewer installed along 140th Avenue Southeast
- Installing the new pipeline along Fairwood Boulevard from the 15th fairway at the Fairwood Golf and Country Club to the Fairwood Elementary School playfield using underground microtunneling
- Upsizing sewer pipelines along 167th Place SE from the cul-de-sac to 155th Place SE using open-cut construction
- Upsizing sewer pipelines along Southeast 166th Place between 162nd Avenue SE and 157th Avenue SE at the playground using open-cut construction

The final phase of the project was substantially complete in December 2006, and the new interceptor began operating at that time. Final activities, such as restoring roads, sidewalks, and public rights-of-way that were disturbed by project construction were complete in spring 2007.

Throughout the life of the project, WTD staff have been working closely with the project's affected neighbors and surrounding community to keep them informed about construction impacts and respond to their questions and concerns.

Visit the project Web site for more information: <http://dnr.metrokc.gov/wtd/projects/fairwood/>

### 3.2.7 Black Diamond Wastewater Storage Facility

Planning for the Black Diamond Wastewater Storage Facility began in 2006. This project will meet the near-term capacity needs in the Black Diamond area, extend the life of existing equipment, and defer the need to build additional major new pump stations and sewer pipelines for several years.

This project will design and construct approximately 600,000 gallons of underground wastewater storage to be located in the City of Black Diamond. In 2006, activities focused on preparing and advertising a request for proposal and selecting a design engineer for the facility.

The county is working closely with the City of Black Diamond on this project. Activities in 2007 will focus on predesign, including siting and preliminary sizing and configuration of the facility. Construction is scheduled to begin in 2009; the facility is expected to be operational in 2010.

### 3.2.8 Juanita Bay Pump Station Replacement

The existing 14.2-mgd Juanita Bay Pump Station is an aging facility that is experiencing significant operational difficulties in conveying existing flows and that has insufficient capacity to convey future flows. To meet flow demands projected through 2050, a 30.6-mgd pump station is being built to replace the existing station. In addition to increased capacity, the new pump station will include features to improve safety and reliability, such as a standby generator, odor and corrosion prevention systems, improved access for maintenance vehicles and workers, and equipment lifting devices. The existing and future pump stations are located at the intersection of NE Juanita Drive and 93rd Avenue NE in Kirkland.

Construction began in September 2005. Progress made in 2006 includes the following activities:

- Building a network of temporary pumps and wells extending 90 feet underground to stabilize groundwater on the site during construction
- Drilling more than 80 interlocking concrete secant piles 70 feet into the ground to hold back soil during excavation and to serve as the pump station foundation
- Tunneling under NE Juanita Drive to install a new sewer line 40 feet beneath the road

Throughout construction, project staff has worked closely with the surrounding neighbors and community to keep them informed about construction activities and to respond to their questions and concerns. Fliers and e-mail alerts are distributed to update community members about construction activities. A 24-hour project construction hotline has been established; staff respond promptly to questions or concerns received on the hotline. In addition, the project Web site is updated on a regular basis.

Plans for 2007 include completing the pump station foundation and building and starting to install the pump station with mechanical and electrical equipment. The new pump station is expected to begin operating in spring 2008.



Visit the project Web site for more information:

<http://dnr.metrokc.gov/wtd/projects/juanita/index.htm>

### 3.2.9 Pacific Pump Station Replacement

As of December 2006, the Pacific Pump Station Replacement project is substantially complete. The project constructed a new Pacific Pump Station and a gravity sewer and force main, replacing the 1.6-mgd underground Pacific Pump Station that had insufficient capacity to convey existing and projected future peak flows. The new 3.3-mgd pump station was constructed in an industrial zone two blocks west of the existing station. It was built with features such as standby power, odor control, reliable and safe access for operational and maintenance staff, and equipment lifting devices.

Activities in 2006 focused on completing construction and on conducting testing and startup activities. Visit the project Web site for more information:

<http://dnr.metrokc.gov/wtd/projects/pacific/index.htm>

## 3.3 Amendments to Conveyance Policies

In September 2006, the King County Council approved amendments to the conveyance policies via adoption of Ordinance 15602. The amendments are as follows:

- Clarified that the design standard for the county's separated system is the "twenty year peak flow storm" in place of "twenty year design storm"
- Added direction for the county to use parameters developed by WTD in consultation with MWPAAC as a guide to project scheduling and prioritization for separated conveyance projects
- Provided criteria for the financing, development, ownership, operation, maintenance, repair and replacement of conveyance facilities
- Added language directing the county to consider water conservation and demand management assumptions in its planning of wastewater facilities





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## Chapter 4

# Infiltration and Inflow Policies

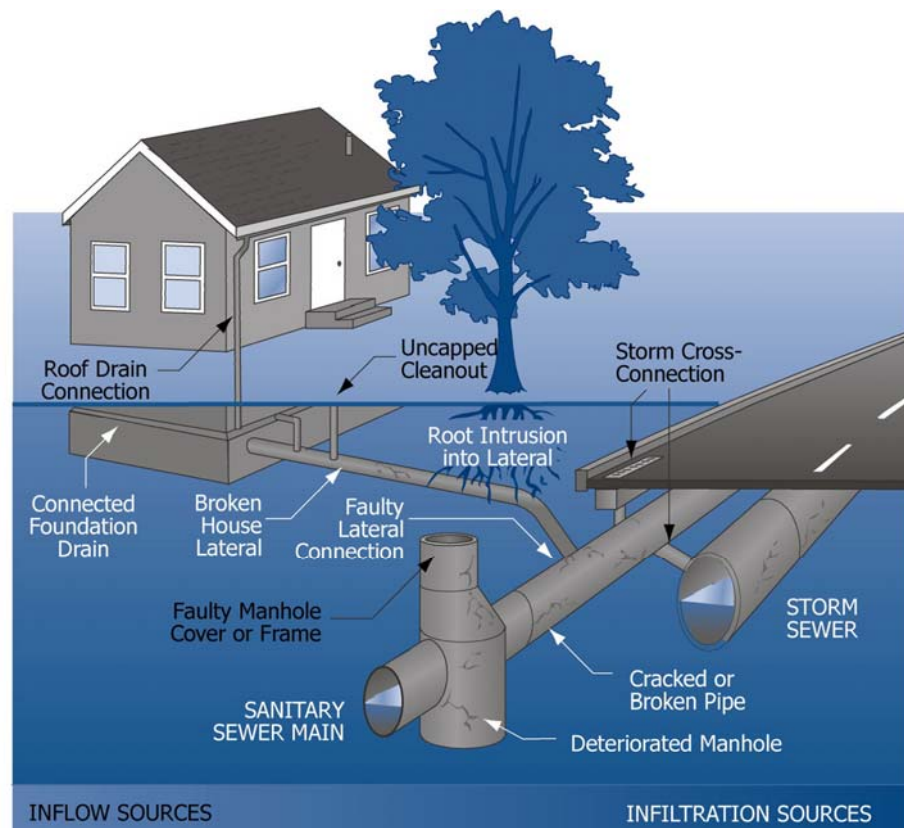
The RWSP infiltration and inflow (I/I) policies provide direction to King County on working with the component agencies to reduce the amount of I/I that flows into local systems in order to reduce the impact of I/I on the county's regional wastewater system. The policies call for conducting I/I pilot rehabilitation programs, developing conveyance design standards, and performing other actions to meet RWSP I/I reduction goals. The policies also direct the county to consider an I/I surcharge in order to ensure compliance with I/I reduction measures.

This chapter provides an overview of implementation of the RWSP I/I policies from 2004 through 2006. In accordance with the RWSP reporting policies, this chapter includes a summary of the activities carried out in 2006 related to implementation of the *Executive's Recommended I/I Control Program* that was approved by the King County Council in May 2006. The chapter concludes with summary information on amendments to the I/I policies adopted by the King County Council from 2004 through 2006.

The complete text of all the I/I policies, including information on policy amendments and a summary of how each policy was implemented from 2004 through 2006, is provided in Appendix C.

## 4.1 Implementation of I/I Policies from 2004 through 2006

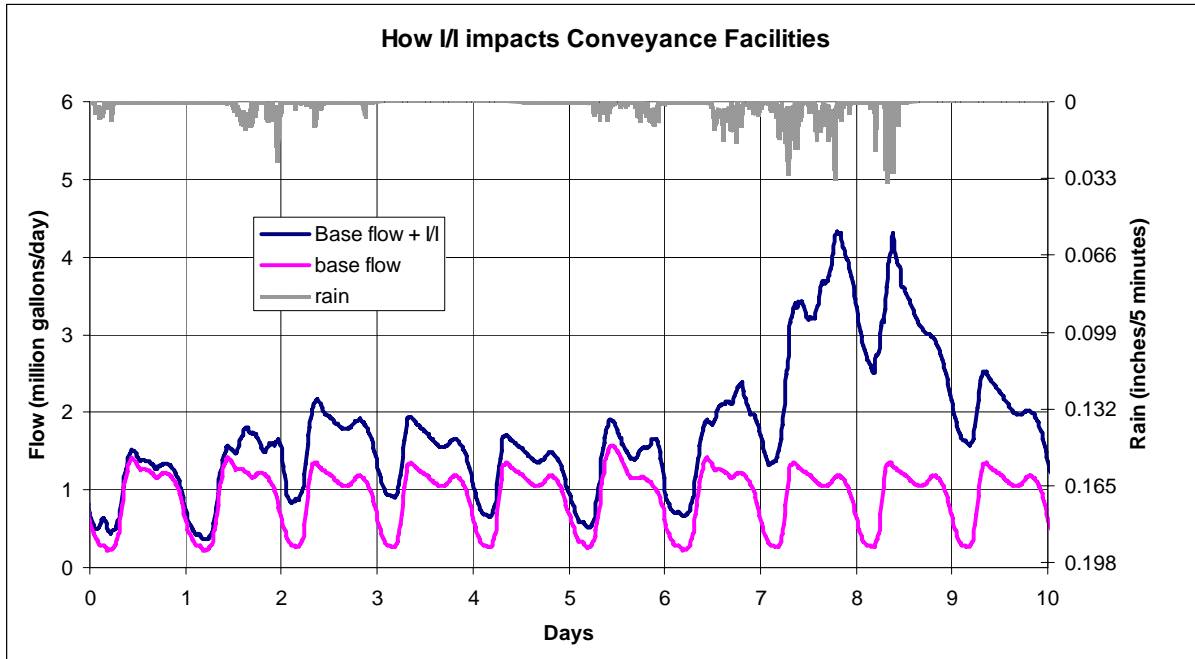
I/I is clean stormwater and groundwater that enter the sewer system through cracked pipes, leaky manholes, or improperly connected storm drains, down spouts, and sump pumps. Most inflow comes from stormwater, and most infiltration comes from groundwater (see Figure 4-1).



**Figure 4-1. Sources of Infiltration and Inflow**

I/I affects the size of King County's regional conveyance and treatment systems and, ultimately, the rate that businesses and residents pay to operate and maintain them. About 75 percent of the region's peak flows in the separated conveyance system comes from I/I.<sup>1</sup> Flow volumes can quadruple during rain events when the conveyance system must handle base flow plus I/I (see Figure 4-2). Based on flow monitoring data, it is estimated that 95 percent of the I/I that enters the regional system originates in privately owned side sewers and in component agency systems.

<sup>1</sup> *Regional Wastewater Services Plan, Executive's Preferred Plan*, April 1998, page 14.



**Figure 4-2. Typical Hydrograph Showing Impacts of I/I on Wastewater Flows**

This section provides an overview of the major activities carried out in 2004–2006 in accordance with the I/I policies.

#### 4.1.1 Six-Year Comprehensive I/I Study

RWSP I/I Policy (I/IP)-2 calls for conducting I/I pilot rehabilitation projects, developing conveyance design standards, and submitting a report to the King County Council on the options and associated cost of removing I/I. The work associated with the six-year study to complete these tasks was carried out in accordance with RWSP I/IP-2 and documented in the *2004 RWSP Update* and the 2004 and 2005 RWSP annual reports.<sup>2</sup> Brief descriptions of the four key elements of the study are as follows:

- Region-wide flow monitoring  
Approximately 800 flow meters were installed throughout the region in areas with separated sewers during the winter months of 2000–2001 and 2001–2002. Flow monitors were placed in component agency systems and provided the needed information to define the current levels of I/I for each agency tributary to the county's regional wastewater system.

<sup>2</sup> The documents detailing the results of the six-year comprehensive study and the *Executive's Recommended I/I Control Program* are available on the Web at <http://dnr.metrokc.gov/wtd/i-i/library.htm#reports>

- Ten pilot I/I reduction projects

Ten pilot projects were completed in 2004 and included a mix of projects on public and private property in 12 component agency jurisdictions. Technologies tested by the pilot projects included lining pipes using various cured-in-place materials, replacing pipes by pipe bursting or open-cut methods, replacing manholes, rehabilitating manholes by using chemical grouting or epoxy injection and by adjusting frames and covers, and installing cleanouts. Rehabilitation technologies reduced I/I in eight of the ten pilot projects. An important lesson learned during these projects is that I/I control would not have been possible without the support of the component agencies and private property owners.

The pilot projects demonstrated that I/I can be effectively reduced, depending on the location and method of rehabilitation. However, none of the pilot projects, either individually or collectively, was of sufficient scale to test the cost-effectiveness of I/I reduction in relation to constructing larger conveyance system improvements.<sup>3</sup>

- A regional needs assessment

The purpose of the Regional Needs Assessment (RNA) was to identify needed conveyance system improvement (CSI) projects, the year they would be needed, and their estimated costs to serve as a baseline for conducting benefit-cost analyses of potential I/I reduction projects. The RNA was completed in March 2005.

- A benefit-cost analysis

To make the most effective use of county resources, King County's Wastewater Treatment Division (WTD), with input from the component agencies, evaluated whether it would be cost effective to eliminate or delay CSI projects identified in the RNA by reducing the amount of I/I in the conveyance system. The benefit-cost analysis compared the estimated costs of constructing CSI projects with the estimated costs of I/I reduction projects. Nine potential cost-effective I/I reduction projects were identified in the *Benefit-Cost Analysis Report*, which was completed in November 2005.

### 4.1.2 Executive's Recommended I/I Control Program

The results of the six-year comprehensive I/I study were used to prepare the *Executive's Recommended Regional Infiltration and Inflow Control Program*. The program report was completed in December 2005 and transmitted to the King County Council for review and approval by the Regional Water Quality Committee and the King County Council. The council approved the recommended I/I control program in May 2006 via adoption of Motion 12292.

The recommendations in the approved program represent the consensus reached by the county and component agencies throughout the six-year program development process. The recommendations reflect the need to reduce I/I by cost-effectively removing enough I/I from the collection system to delay, reduce, or eliminate some otherwise needed CSI project. The recommendations also reflect the need to maintain I/I reductions long-term to prevent future increases in I/I throughout the regional system. Long-term I/I control includes policy,

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<sup>3</sup> I/I reduction is considered cost-effective when the total estimated CSI project savings is greater than the total estimated cost of I/I reduction.

administrative, financial, and technical measures that promote an ongoing program of review, maintenance, and repair of the collection and conveyance system.

A key component of the recommended I/I control program is the selection and implementation of two or three “initial” I/I reduction projects from the list of the nine cost-effective projects identified in the *Benefit-Cost Analysis Report* in order to test planning assumptions on a larger scale and gain more information about costs. The recommended program calls for the initial projects to be funded through King County wastewater revenue that is dedicated to funding CSI projects in the regional conveyance system.

#### **I/I Recommended Program Highlights**

King County and the local agencies will select, implement, and evaluate two or three “initial” I/I reduction projects to test the effectiveness of I/I reduction on a larger scale than the pilot projects.

After completion of the initial projects, recommendations will be made to the King County Council regarding long-term I/I reduction and control, including applicable changes to policy or code.

The recommended program also includes applying the draft standards, guidelines, procedures, and policies that were developed by King County and the Metropolitan Water Pollution Abatement Advisory Committee (MWPAAC) during the I/I study to the initial I/I reduction projects.<sup>4</sup> In addition, the recommended program includes the recommendation to not implement a surcharge as contemplated in the RWSP I/I policies; the county and component agencies found that implementing such a surcharge would be costly to administer, would pose difficulties in verifying violations, and would not result in sufficient revenue to be used to reduce I/I. There was agreement among the county and MWPAAC to complete and evaluate the initial projects before proposing any amendments to the RWSP I/I policies.

Details on the *Executive’s Recommended I/I Control Program* were provided in the 2005 RWSP Annual Report. The complete report on the recommended I/I control program is available on the Web at <http://dnr.metrokc.gov/wtd/i-i/library/ExecRec/report.htm>

## 4.2 Implementation of the Executive’s Recommended Regional I/I Control Program in 2006

The RWSP reporting policies require the RWSP comprehensive review report to include all elements of the RWSP annual report, replacing the annual report for the year that the comprehensive review report is produced. This section meets the 2006 RWSP annual report requirements for the county’s regional I/I control program.

I/I control program efforts in 2006 focused on starting implementation of the *Executive’s Recommended I/I Control Program*. As noted earlier in this chapter, details on the recommended

<sup>4</sup> MWPAAC advises the King County Council and Executive on matters related to reducing water pollution. It was created by state law (RCW 35.58.210) and consists of representatives from cities and local sewer utilities that operate sewer systems in King County.

program were documented in the *RWSP 2005 Annual Report*. This section provides information on implementation of the recommended program in 2006 and early 2007.

## 4.2.1 Development and Application of Selection Criteria

In spring 2006, WTD worked with MWPAAC's Engineering and Planning (E&P) Subcommittee to start implementing the recommended I/I control program. The first step in the process was to review the details of the nine cost-effective projects identified in the *Benefit-Cost Analysis Report* and develop and apply criteria to select the two to three projects to be implemented as initial projects. Table 4-1 provides details on the nine projects.

Throughout the summer of 2006, WTD staff and MWPAAC's E&P Subcommittee developed and applied a set of primary and secondary selection criteria to the nine projects. As a result of these efforts, the E&P Subcommittee recommended that four projects undergo further evaluation through sewer system evaluation survey (SSES) work and predesign.<sup>5</sup> Based on the results of this work, at the end of predesign, WTD will work with MWPAAC to select the two to three most feasible projects for design and construction.

**Table 4-1. Cost-Effective I/I Reduction Projects Identified in the *Benefit-Cost Analysis Report*, November 2005**

Project (Facility)	I/I Available (mgd)	I/I Reduction (mgd)	Benefit: Capital CSI Cost Reduction	Cost: I/I Reduction Project	Benefit- Cost Ratio	No. of Private Properties
South Renton Interceptor (RE*SRENTON.R18-16(9))	7.0	0.81	\$7,270,000	\$2,217,645	3.3	119
ULID 1 Contract 4 (RE*ULID 1-4.S-31(8))	5.5	1.08	\$2,410,000	\$999,123	2.4	101
Auburn 3 New Storage (Auburn3 Twin Tube Storage)	52.8	6.87	\$22,990,000	\$11,362,511	2.0	1,176
Issaquah 2 Trunk (RE*ISSAQ2.R17-40(3))	5.4	1.05	\$5,770,000	\$3,964,850	1.5	395
Bryn Mawr Storage (Bryn Mawr Tube Storage)	16.2	2.04	\$8,510,000	\$6,018,534	1.4	557
Lk Hills Trunk 3rd Barrel Upgrade (WE*LKHILLST.ENTR(3))	10.8	2.20	\$14,438,000	\$11,307,052	1.3	1,086
Eastgate Storage and Trunk (Eastgate Tube Storage)	8.7	3.55	\$16,629,000	\$14,459,862	1.2	1,163
Wilburton PS / Factoria Trunk (RE*FACTOR.RO6-05(7))	10.4	2.39	\$12,058,000	\$10,550,378	1.1	976
Garrison Creek Trunk (RE*ULID 1-5.57(10))	5.7	2.12	\$13,660,000	\$12,013,489	1.1	1,275

<sup>5</sup> SSES consists of closed circuit TV inspections and other testing methods designed to identify specific types and locations of I/I sources within sewer system components.



## **Selection Criteria**

The primary and secondary criteria that were applied to the nine projects are as follows:

### *Primary Criteria*

- Implementation of the I/I reduction project allows for the use of field-tested I/I rehabilitation technologies
- Implementation of the I/I reduction project has a mid-range projected benefit-cost ratio (to test the ability to reduce I/I cost-effectively)
- There is an adequate level of service in conveyance facilities within the I/I reduction project area to allow time to implement the I/I reduction process without risking public health
- Predesign, design, construction, and post-flow monitoring work for the I/I reduction should be completed as close to the budgeted date for construction of the associated conveyance system project as practicable
- Implementation of the I/I reduction project will not require extraordinary permitting and environmental review processes that could make it difficult to complete project design, construction, and post flow monitoring within three to five years, or within budget
- Implementation of the I/I reduction project is supported by the host local agency
- The I/I reduction projects selected for implementation have a total cost of \$25 million or less (2007–2011 budget projection), unless additional funds are contributed by host local agencies

### *Secondary Criteria*

- All other project details being equal, implementation of the I/I reduction project will directly benefit multiple local agencies
  - Rehabilitation work will be done within more than one local agency system and/or
  - The I/I reduction project will address a capacity need or needs within a conveyance component(s) that conveys flows from multiple local agencies
- All other project details being equal, implementation of the I/I reduction project helps address an identified overflow or public health issue within the local sewerage agency's system

## **Projects Selected for Further Evaluation**

Based on application of the selection criteria, four projects were selected to undergo further evaluation through sewer system evaluation survey (SSES) work and predesign. Upon completion of this work, WTD and MWPAAC will then work together to select the two to three most feasible projects for construction. The four projects selected for SSES work and predesign are as follows:

- **South Renton Interceptor.** This proposed I/I reduction project could eliminate the need for the South Renton Interceptor Upgrade. The I/I reduction project includes side sewer and lateral rehabilitation in one mini-basin in the City of Renton. The estimated cost for the I/I reduction is \$2.2 million and is projected to remove 0.8 million gallons per day (mgd) of I/I from the local agency collection system, which is approximately 15 percent of the total I/I present in this mini-basin.<sup>6,7</sup>
- **Issaquah 2 Trunk.** This proposed I/I reduction project could eliminate the need for constructing the Issaquah 2 Trunk. The I/I reduction project includes side sewer and lateral rehabilitation in two mini-basins in the City of Issaquah. The estimated cost for the I/I reduction is \$4 million. It is projected to remove 1.05 mgd of I/I from the local agency collection system, which is approximately 19.4 percent of the total I/I present in these mini-basins.
- **Bryn Mawr Storage.** This proposed I/I reduction project could reduce the size of the Bryn Mawr Tube Storage Facility. The I/I reduction project includes side sewer and lateral rehabilitation in two mini-basins in Bryn Mawr. The estimated cost for the I/I reduction is \$6 million and is projected to remove 2.04 mgd of I/I from the local agency collection system, which is approximately 12.6 percent of the total I/I present in these mini-basins.
- **Eastgate Storage and Trunk.** This proposed I/I reduction project could eliminate the need for the Eastgate Tube Storage Facility improvement. The I/I reduction project includes side sewer and lateral rehabilitation in five mini-basins in the City of Bellevue. The estimated cost for the I/I reduction is \$14.5 million. It is projected to remove 3.55 mgd of I/I, which is approximately 40.8 percent of the total I/I present in these mini-basins.

### 4.2.2 I/I Initial Reduction Projects Schedule

Requests for proposals were issued in early 2007 for the SSES work and a notice to proceed (NTP) on the SSES contract was issued in late March 2007. Requests for proposal for predesign were issued in early 2007. An NTP on the predesign contract was issued in July 2007.

SSES work began in summer 2007; this work is expected to be complete by the end of 2007. The methods being used to conduct the SSES work include:

- **TV Inspection.** Use of closed circuit TV cameras pushed down a sanitary sewer line can record a "movie picture" of the conditions in that section of sewer. This recording can identify breaks, root intrusion, leaking water (especially infiltration from groundwater), and general deteriorating conditions. Camera equipment usually is operated from

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<sup>6</sup> The costs and estimated I/I reduction quantity for the Renton I/I project have been revised from the original estimates shown in Table 4-1, to reflect the elimination of the Soos Creek basin from the project. It was determined that the marginal additional amount of I/I reduction possible from the Soos Creek basin would not be necessary in order to achieve the I/I reduction target for elimination of the South Renton Interceptor CSI project.

<sup>7</sup> On average, a mini-basin consists of approximately 150 acres and 22,000 feet of pipe.

manholes located in streets or within public rights of way. Occasionally access to easements in backyards or alleys is required to inspect the public sewer in these areas.

- **Smoke Testing.** Smoke testing involves pumping smoke through sanitary sewer pipes from manholes in streets or within public rights of way and observing and documenting where smoke exits. Depending on the specific circumstances, the exiting smoke can indicate the location of a broken pipe, manhole, catch basin, or where roof or foundation drains might be connected to the sewer system, indicating where infiltration or inflow might enter the sanitary sewer system.<sup>8</sup>
- **Dye Testing.** By using fluorescent colored dye, inappropriate connections can be determined. For instance, if a dye is introduced to a catch basin and the dye is then observed in the sanitary sewer downstream from that point, the evidence would indicate that the catch basin is directly connected to the sanitary sewer system. The dyes that are used are biodegradable and safe for the environment and the sewer lines.

King County is working closely with the component agencies hosting the projects to notify affected homeowners, businesses, residents, and the surrounding community about the SSES work. WTD has established a 24-hour project information line for people to call with any questions or concerns.

Predesign is expected to be complete in fall 2008. At the completion of predesign, WTD and MWPAAC will work together to select the two to three most feasible projects for construction. Construction is anticipated to be complete in late 2011. Post-project flow monitoring and analysis will occur after construction is complete and a final report and findings are expected to be issued in the fourth quarter of 2012. It is likely that amendments to the RWSP I/I policies will be proposed after completion and evaluation of the initial I/I reduction projects.

Visit the Regional I/I Control Program's Web site for more information:

<http://dnr.metrokc.gov/wtd/i-i/>

## 4.3 Amendments to I/I Policies

The King County Council approved amendments to the RWSP I/I policies via adoption of Ordinance 15602 in September 2006. The amendments are as follows:

- Updated I/IP-2 to reflect conditions as of January 2005; previously the direction in I/IP-2 focused on the I/I pilot projects, which were completed in January 2004.
- Changed the date for the county to consider an I/I surcharge from June 30, 2005, to June 30, 2006. As noted earlier in this chapter, the recommended I/I control program that was approved by the King County Council in May 2006 includes the recommendation to not implement a surcharge.

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<sup>8</sup> A catch basin is an inlet to a storm drain system that typically includes a grate or curb inlet and a sump to capture sediment, debris, and associated pollutants.



## CSO Control Policies

RWSP combined sewer overflow (CSO) policies are intended to guide King County in controlling CSO discharges so that all CSO locations meet state and federal regulations. In setting schedules for implementing CSO control projects, the county is to give highest priority to locations with the greatest potential to impact human health, bathing beaches, and species listed under the Endangered Species Act. The policies call for regular assessment of CSO projects, priorities, and opportunities using the most current studies. In particular, the King County Executive is to submit a CSO program review to the Regional Water Quality Committee in preparation for each CSO plan update.<sup>1</sup> Another CSO control policy addresses the cleanup of contaminated sediments near county CSOs. The policy directs the county to implement its long-range sediment management strategy and, where applicable, to participate with partners in sharing responsibilities and costs of cleaning up sites such as the Superfund sites in the Lower Duwamish Waterway.

This chapter provides an overview on implementation of the CSO control policies from 2004 through 2006. In accordance with the RWSP reporting policies, this chapter also includes a summary of the activities carried out in 2006. The complete text of all the CSO control policies, including information on policy amendments and a brief summary of how each policy was implemented in 2004–2006, is provided in Appendix D. Chapter 9 provides information on CSO volumes and frequencies.

### 5.1 Implementation of CSO Control Policies from 2004 through 2006

This section describes King County’s activities in 2004 through 2006 to implement RWSP CSO control and sediment management policies.

#### 5.1.1 CSO Control

CSOs are discharges of wastewater and stormwater from combined sewers into water bodies during heavy rainstorms when sewers are full. Combined sewers, which carry both wastewater and clean stormwater, exist in many parts of older cities across the nation, including Seattle. To protect treatment plants and avoid sewer backups into homes, businesses, and streets, combined sewers in Seattle sometimes overflow into Puget Sound, the Duwamish Waterway, Elliott Bay,

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<sup>1</sup> The CSO plan updates are submitted to the Washington State Department of Ecology (Ecology) every five to seven years in conjunction with the renewal of the National Pollutant Discharge Elimination System (NPDES) permit for the West Point Treatment Plant.

Lake Union, the Lake Washington Ship Canal, and Lake Washington. Although the wastewater in CSOs is greatly diluted by stormwater, CSOs may be harmful to public health and aquatic life because they can carry chemicals and disease-causing pathogens.

In response to the Clean Water Act of 1972, Metro adopted the *Combined Sewer Overflow Program* in 1979. Since adoption of this first program, Metro and then King County have prepared plans to respond to evolving CSO regulations, including the Washington State Department of Ecology's "control" standard of no more than an average of one untreated discharge per year at each CSO location. The most recent CSO control plan was adopted as part of the RWSP.

Strategies for reducing or mitigating the effects of CSOs include pollution prevention through source control, operational controls, upgrades of existing facilities, and construction of additional facilities to provide storage and treatment of excess flows prior to discharge. A number of such improvements were implemented before adoption of the RWSP. These improvements included sewer separation and storage projects, conversion of the Alki and Carkeek treatment plants to CSO treatment plants, and control system improvements to maximize storage and transfer of combined flows to treatment plants.

The RWSP calls for continued improvements to control King County's CSOs by 2030. It identifies 21 projects (Table 5-1). By May 2005, after projects that were under way prior to RWSP adoption were brought online, about half of King County's 38 CSOs were controlled to Ecology's standard. The remaining 21 uncontrolled CSOs will meet state standards as capital improvement projects are completed between 2012 and 2030.<sup>2</sup> Figure 5-1 shows the locations of county CSOs.

A major accomplishment during 2004–2006 was construction of two projects that were under way prior to RWSP adoption: the Mercer/Elliott West CSO and Henderson/Norfolk CSO control systems.<sup>3</sup> Both systems were brought online in 2005. The Mercer/Elliott West system—undertaken as a joint project with the City of Seattle—consists of several facilities to store and treat CSOs from the county's Dexter Regulator Station and the city's CSOs around Lake Union and to control the county's largest CSO at Denny Regulator Station on Elliott Bay. The Henderson/Norfolk system was built to control the Henderson and Martin Luther King CSOs into Lake Washington and the Norfolk CSO into the Duwamish River.

### A History of CSO Plans

1979—Metro adopted its first *Combined Sewer Overflow Control Program*.

1985 and 1986—The *Plan for Combined Sewer Overflow Control* and the *Supplemental Plan for Combined Sewer Overflow Control* were prepared as part of a system-wide planning effort

1988—The *1988 Combined Sewer Overflow Control Plan* was prepared in response to Ecology's 1987 definition of control as one untreated discharge per year.

1995—As part of the 1995 West Point NPDES permit renewal, King County prepared an update and amendment to the 1988 plan.

1999—A CSO control plan was adopted as part of the RWSP. The plan lists 21 control projects to bring all CSOs into control by 2030.

2000—The RWSP CSO control plan was updated as part of the West Point NPDES permit renewal. No changes to the RWSP CSO control plan were recommended.

<sup>2</sup> An update and calibration of the hydraulic model, expected to be ready in 2008, will help verify the control status of King County CSOs. More information on the update of the hydraulic model is provided later on this chapter.

<sup>3</sup> These systems were formerly called the Denny Way/Lake Union and Henderson/MLK/Norfolk CSO control projects.

**Table 5-1. CSO Projects in Order of Priority in RWSP**

Project Name	DSN <sup>a</sup>	Project Description	Projected Year of Control	Water Body
South Magnolia	006	1.3 MG storage tank	2012 <sup>c</sup>	Puget Sound
SW Alaska Street <sup>b</sup>	055	0.7 MG storage tank	Controlled	Puget Sound
Murray Avenue	056	0.8 MG storage	2012 <sup>c</sup>	Puget Sound
Barton Street	057	Pump station upgrade	2012 <sup>c</sup>	Puget Sound
North Beach	048	Storage tank and pump station expansion	2012 <sup>c</sup>	Puget Sound
University/Montlake	015/ 014	7.5 MG storage	2015	Lake Union/ East Ship Canal
Hanford #2	032	3.3 MG storage/treatment tank	2017	Duwamish River
West Point Treatment Plant Improvements		Primary/secondary enhancements	2018	Puget Sound
Lander Street	030	1.5 MG storage/treatment at Hanford	2019	Duwamish River
Michigan	039	2.2 MG storage/treatment tank	2022	Duwamish River
Brandon Street	041	0.8 MG storage/treatment tank	2022	Duwamish River
Chelan Avenue	036	4 MG storage tank	2024	Duwamish River
Connecticut Street	029	2.1 MG storage/treatment tank	2026	Elliott Bay
King Street	028	Conveyance to Connecticut Street treatment	2026	Elliott Bay
Hanford at Rainier Avenue	031	0.6 MG storage tank	2026	Duwamish River
8th Avenue S	040	1.0 MG storage tank	2027	Duwamish River
West Michigan	042	Conveyance upgrade	2027	Duwamish River
Terminal 115	038	0.5 MG storage tank	2027	Duwamish River
3rd Avenue W	008	5.5 MG storage tank	2029	West Ship Canal
Ballard	003	1.0 MG storage tank (40% King County)	2029	West Ship Canal
11th Avenue West	004	2.0 MG storage tank	2030	West Ship Canal

<sup>a</sup> DSN refers to the Discharge Serial Number, an identifier set in the NPDES permit for an individual CSO location. See Figure 1-3 in Chapter 1 for locations of CSOs.

<sup>b</sup> Updated monitoring and modeling data indicate that the SW Alaska Street CSO is already controlled; thus, the project is no longer needed.

<sup>c</sup> In the RWSP, the Barton, Murray, North Beach, and South Magnolia projects were scheduled to be completed in 2010 or 2011. They are now scheduled to be completed in 2012.



As expected, the startup period for these systems has extended over a couple of wet seasons because of the size and complexity and the seasonal and intermittent operation of the systems.<sup>4</sup> The Mercer/Elliott West system significantly reduced the volume and frequency of CSOs at the Denny and Dexter Regulator Stations during its first wet season of operation (2005–2006); data for 2006–2007 are still being analyzed. The system is expected to be fully controlled in the 2007–2008 wet season after further system refinements are made. The Henderson Tunnel in the Henderson/Norfolk system did not operate in 2005–2006 because of programming errors that have since been identified and corrected. No discharges occurred from the locations controlled by this system during this period. The system operated in full starting late in 2006, providing more startup experience that is currently under analysis.

Early in 2006, the King County Executive submitted the first CSO control program review to the King County Council.<sup>5</sup> The review meets RWSP policy and sets the stage for the next CSO plan update. The update is scheduled to be submitted to Ecology in 2008 as part of West Point's next NPDES permit renewal application. The CSO program review concluded that based on information accumulated since RWSP adoption, the priorities set for CSO control projects in the RWSP remain sound. Following completion of the review, WTD selected the predesign consultant and began public involvement work on the four highest priority projects located along Puget Sound beaches.

Improvements to the CSO control program and facilities, identified as a part of the program review, have been implemented or are in progress. The hydraulic model used to predict the effectiveness of CSO control and to design CSO control projects is being updated and recalibrated. The updated model, expected to be ready in 2008, will provide more accurate information on remaining control needs. Promising new CSO treatment technologies that may offer greater cost-effectiveness will be pilot tested from 2007 through 2009. (Project scoping occurred in 2006.)

The total project capital cost estimate for CSO control projects is \$388 million (2006\$). This amount represents the 1998 preliminary planning-level estimates for the projects listed in Table 5-1, adjusted for inflation. Planning-level cost estimates are based on generic facility concepts. Specific details of a project such as location, technologies, and environmental impacts and potential mitigation of such impacts are determined later during project predesign. The accuracy of a project's cost estimate will increase as the project progresses through the project life cycle. Costs for projects in planning can have a rough order of magnitude estimate in the range of - 50 to +100 percent.<sup>6</sup> No additional analysis of the CSO project costs has been done because the update of the hydraulic model will likely change sizes, definitions, and thus costs of several planned control projects. Cost estimates may also increase as the result of design changes made to accommodate evolving regulations, odor control policies adopted in 2003, and increases in materials and contractor costs in this competitive construction environment.

When the hydraulic model is updated, projects may be resized, any necessary technology changes will be incorporated, and new cost estimates will then be developed. This information, including any recommended schedule changes to address new scientific information, should be available for discussion in the next CSO control program review in 2010.

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<sup>4</sup> See the 2006 activities section later in this chapter for more details.

<sup>5</sup> The CSO control program review is available on the Web at <http://dnr.metrokc.gov/wtd/cso/library.htm#plans>

<sup>6</sup> Project Management Institute's *A Guide to the Project Management Body of Knowledge*, third edition

# King County CSO Locator Map



Figure 5-1. CSO Locations

Results of the 2006 program review underscore the importance of WTD's practice of transferring as much CSO flow as possible to regional treatment plants for optimal treatment. This and other operational practices serve to improve water quality before completion of the more expensive capital CSO control projects in the plan.<sup>7</sup> Over the past few years, SCADA (supervisory control and data acquisition) system hardware and software at West Point were replaced with a new system to bolster the reliability of monitoring and control of offsite regulator and pump stations. The new system will include a predictive control program that can monitor rainfall and conditions in the major trunks and interceptors, predict inflows to the sewer system, and optimize the regulation of flow through the regulators to further reduce CSOs. Development and calibration of the predictive control model has been taking place since 2005. The first phase of the effort, a new "rules-based" control program, is expected in 2007–2009. These and other improvements could reduce CSO volumes by as much as 150 million gallons per year.

In 2005, the pumping capacity of the Carkeek Pump Station was upgraded from 8.4 to 9.2 mgd to increase the volume of flows conveyed to West Point for secondary treatment and discharge. Ecology modified the NPDES permit limits to reflect these new conditions. Flows in excess of 9.2 mgd are stored at Carkeek CSO Treatment Plant. Stored flows that cannot be sent to West Point receive treatment, disinfection, and dechlorination before being discharged to Puget Sound.

During the past three years, WTD continued to find opportunities to optimize cost-effectiveness by coordinating CSO control with other WTD projects. The Ballard Siphon replacement project is one example of such coordination. The project—initiated in 2006 and scheduled for completion in 2010—will protect water quality in the Lake Washington Ship Canal by replacing the 70-year-old wooden sewer pipe that extends across the floor of Salmon Bay near the Hiram M. Chittenden Locks. In addition, the project is being designed to bring the CSO at the Ballard Regulator Station under control and, thus, eliminate the need for the CSO storage project at this location scheduled in the RWSP for completion in 2029. The project also holds the potential to reduce CSOs at the 11th Avenue Regulator Station and thus reduce the size of the CSO storage project planned to be completed at this location in 2030.

Coordination of county and City of Seattle CSO programs continued during this period. The coordination helps to identify mutual project opportunities, minimize community impacts, and ensure equitable and cost-effective programs.

WTD submitted annual reports to Ecology on the operation of the CSO system, volumes and frequencies of CSOs, and progress toward CSO control. Work on the next CSO plan update, due to Ecology in 2008, will begin in late 2007. Annual reports and previous plan updates are available at <http://dnr.metrokc.gov/wtd/cso/library.htm#annualreport>.

### 5.1.2 Sediment Management

King County is responsible for cleaning up sediment contamination related to CSOs under the federal Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA)

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<sup>7</sup> King County documents its CSO-related operations and maintenance practices to comply with the U.S. Environmental Agency's CSO Control Policy. The policy requires implementation of Nine Minimum Controls for CSOs.

and the state Model Toxics Control Act (MTCA).<sup>8</sup> To meet RWSP policies, WTD is carrying out a sediment management plan developed in the late 1990s to remediate sediment near CSO outfalls that are contaminated with a variety of heavy metals (lead, copper, zinc), phthalates, polychlorinated biphenyls (PCBs), and hydrocarbons.<sup>9</sup> Most of the contamination is from the first half of the 20th century.

Work on three projects is under way—cleanup of the Denny Way and Hanford/Lander CSOs and development of a prediction model:

- In mid 2007, design was completed for cleanup of the old Denny Way CSO site and the Cleanup Action Plan has been released by Ecology for public review. Dredging, which must be done in the winter, is expected to occur November 2007–January 2008.
- The Hanford/Lander CSOs are part of the Duwamish East Waterway cleanup—a joint effort among King County, the Port of Seattle, and the City of Seattle. The U.S. Environmental Protection Agency (EPA) has approved the scope of the remedial investigation/feasibility study, and work has started.
- The model to better predict deposition of contaminants around CSO outfalls will be ready by the end of 2007. The model will help to identify which CSOs are likely to have contaminated sediments and will inform cleanup decisions.

Work on another project—the King Street CSO—was scheduled for 2007–2008. The work has been delayed, however, because City of Seattle and Washington State Department of Transportation negotiations over Colman Dock renovations have caused the state to drop its share of the funding for the renovation from this biennium’s budget. It may be possible to proceed without an agreement between these two parties if a pier in the area of the CSO is removed so that cleanup can begin.

The county continues to work to improve water quality in the Lower Duwamish Waterway through actions such as reducing CSOs, restoring habitats, capping and cleaning up sediments, and controlling toxicants from industries and stormwater runoff. WTD is partnering with the City of Seattle, the Port of Seattle, and the Boeing Company under a consent agreement with EPA and Ecology to prepare a remedial investigation and feasibility study for the Lower Duwamish Waterway Superfund Site. The remedial investigation, which defines the extent and inherent risks of contamination, will be ready for public review in autumn 2007. The feasibility study, which will identify cleanup alternatives, is scheduled to be completed in 2009.

The county is participating in two early action sites—the Diagonal/Duwamish CSO/Storm Drain and Slip 4 CSO—to clean up portions of the waterway earlier than required. The cleanup at Diagonal/Duwamish was completed in February 2004. The dredged area was capped with three to six feet of clean sediment and gravel to provide new fish habitat. Follow-up work was completed at the site in February 2005, and monitoring of these actions is providing critical

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<sup>8</sup> CERCLA is commonly known as Superfund.

<sup>9</sup> The sediment management plan is available on the Web at <http://dnr.metrokc.gov/WTD/sediment/library.htm>

information on cleanup alternatives for the Superfund site.<sup>10</sup> Monitoring activities in 2005 showed accumulations of phthalates and some other chemicals in front of the Diagonal/Duwamish outfall. This discovery led to formation of the Sediment Phthalate Work Group, composed of representatives from EPA, Ecology, King County, and the cities of Seattle and Tacoma. The work group is looking at environmental occurrence, sources, risks and receptors, source control and treatment, and regulatory aspects of phthalate sediment contamination.

Phthalates come from a variety of sources, mainly in low levels that add up across many inputs.<sup>11</sup> The King County Industrial Waste Program's sampling efforts, including air deposition sampling, helped to define the problem. It appears that air deposition to stormwater runoff may be the dominant source of phthalates to river sediments. These findings may prompt considerations regarding the acceleration of CSO control; however, remedying the causes of recontamination will be more complex than simply controlling CSOs because stormwater far outweighs CSOs as the primary source of these contaminants. The county will continue to investigate effective ways to reduce phthalates. Phthalate removal efficiency will be included in the pilot tests of promising CSO treatment technologies. Other pilot studies to investigate ways to break the phthalate air-water-sediment pathway are being explored.

In 2006, EPA approved a cleanup plan for Slip 4 CSO sediments. Sediments with the highest contamination will be removed, and the remaining sediments will be capped. The cleanup will create shallow fish habitat along the northern banks of the slip. Salmon migrating through the waterway will be able to feed and grow in the area before continuing their journey to Puget Sound. Design of the cleanup began in 2005, and cleanup is hoped to be completed in 2008. The discovery of ongoing PCB sources into the slip has put the cleanup on hold until the sources are effectively controlled.

## 5.2 CSO Control Activities in 2006

The key achievements of the CSO control program in 2006 are as follows:

- Startup of Mercer/Elliott West CSO and Henderson/Norfolk CSO control systems
- Completion of the CSO control program review
- Start of predesign for Puget Sound beach CSO control projects
- Incorporated Ballard CSO control needs in design of Ballard Siphon replacement project
- Scoping for CSO treatment technology pilot projects
- Submission to Ecology of the report on public notification of overflows
- Continued coordination with the City of Seattle on CSO and stormwater management

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<sup>10</sup> The Diagonal/Duwamish remediation closure report issued in July 2005 summarizes the purpose for and details of the follow-up work. The closure report is available on the Web at <http://dnr.metrokc.gov/wtd/duwamish/diagonal.htm>.

<sup>11</sup> Inputs may include stormwater (via vehicular traffic), wastewater (via everyday products), and air deposition.

- Continued work on the projects identified in the sediment management plan and on the response to the Environmental Protection Agency's Superfund listing of the Lower Duwamish Waterway

### 5.2.1 Startup of Mercer/Elliott West CSO Control System

The Mercer/Elliott West CSO control project was under way prior to the adoption of the RWSP. This project was a joint effort of King County and the City of Seattle to control CSOs into Lake Union and Elliott Bay. The new system was brought online in May 2005. It will control several of Seattle's CSOs in addition to the largest CSO in the county's system.

The system operated during the 2005–2006 and 2006–2007 CSO reporting periods (June through May). Although volumes and frequencies at the county's Denny and Dexter CSO locations were substantially reduced, the locations are not yet controlled to the state standard. Seattle and the county have made adjustments to improve system operation and are continuing to assess the need for other refinements to address permit compliance issues (see Chapter 9). Both entities will try to complete identified actions before the start of the 2007–2008 wet season, with the goal of meeting permit requirements.

### 5.2.2 Startup of Henderson/Norfolk CSO Control System

The Henderson/Norfolk CSO control project was under way prior to the adoption of the RWSP. The new system was brought online in May 2005. This system was built to control two CSOs in Lake Washington and one CSO on the Duwamish River at Norfolk. With completion of this system, all of the county's CSOs along Lake Washington are controlled.

The system started full operation in late 2006. Programming errors, which have since been identified and corrected, prevented the Henderson treatment tunnel from operating during the 2005–2006 period.

### 5.2.3 CSO Control Program Review

In accordance with the RWSP CSO control policies, WTD carried out a CSO control program review to evaluate the benefits of continuing the CSO control program identified in the RWSP. The CSO control program review was completed and transmitted to the Metropolitan King County Council in spring 2006.

The review assessed whether adjustments in the CSO control program were needed to respond to changing conditions, ongoing regulatory requirements, and county business needs. Results of the review indicate that current scientific information supports the approach and direction of the RWSP CSO control program. The review confirmed that the current WTD priority of using conveyance improvements or storage facilities to capture and then transfer CSOs to the secondary plants provides the best CSO control management and that satellite CSO treatment should be used where transfer is not feasible. The review also confirmed that the schedule for completing the CSO control projects meets the RWSP's direction to prioritize projects according



to their potential to protect human health, the environment, and endangered species. The project priorities (Figure 5-2) are as follows:

- **Priority 1, CSOs near Puget Sound Beaches.** The current schedule calls for completion of the Barton, Murray, North Beach, and South Magnolia projects in 2012.
- **Priority 2, University/Montlake CSO.** This CSO is located at the east end of the Ship Canal. The control project was given a high priority because of the high level of boating in that area, which could result in secondary contact with the water. The current schedule calls for completion of this project in 2015.
- **Priority 3, CSOs Along the Duwamish River and in Elliott Bay.** The RWSP designated that nine projects at CSOs along the Duwamish River and in Elliott Bay be completed between 2017 and 2027. These projects were given third priority because King County's 1998 *Combined Sewer Overflow Water Quality Assessment for the Duwamish River and Elliott Bay* indicated that the level of bacterial pollution originating upstream of CSOs was high enough to dwarf improvements by CSO control projects.
- **Priority 4, CSOs at the West End of the Ship Canal.** Three projects to control CSOs at the west end of the Ship Canal (Ballard, 3rd Avenue West, and 11th Avenue West) are scheduled to be completed by 2030. These are the last projects to be completed because significant CSO control had already been accomplished in this area prior to the adoption of the RWSP. As noted earlier in this chapter, it is possible that the Ballard CSO will be controlled in coordination with the Ballard Siphon replacement project.



Note: The SW Alaska Storage project is no longer needed; updated monitoring and modeling data indicate that this CSO is already controlled.

Figure 5-2. Prioritized CSO RWSP projects



WTD will continue to monitor the information that is being generated through the Lower Duwamish Waterway Superfund project for factors that could lead to recommending future schedule changes to CSO control projects. For example, if an ongoing human health risk in the Duwamish River is identified as resulting from CSOs, recommendations for changes in the schedule may be considered to accelerate the CSO control projects in these locations.

Information from the review will inform the CSO plan update, due for submittal to Ecology in 2008. The next CSO program review, scheduled for 2010, will include information on the results of the updated hydraulic model and the pilot tests of CSO treatment technologies, as well as updated schedules and cost estimates for the CSO control program projects.

The CSO control program review is available at <http://dnr.metrokc.gov/wtd/cso/library.htm#plans>

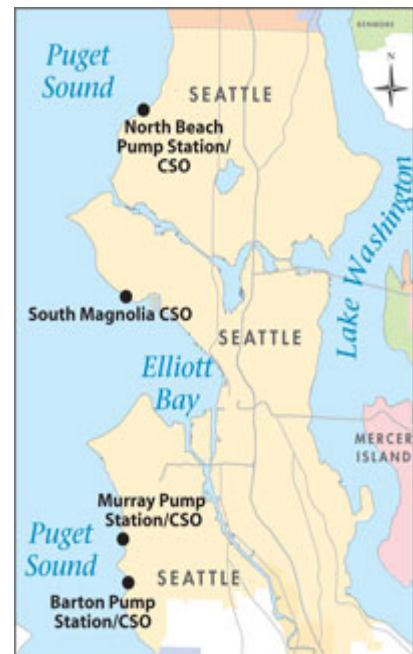
#### 5.2.4 Predesign of Puget Sound Beach Projects

In 2006, predesign and public involvement began on the four CSO control projects along Puget Sound beaches—Murray and Barton in West Seattle, Magnolia along north Elliott Bay, and North Beach near Carkeek Park. Because the Barton Pump Station sends flow to the Murray Pump Station and anything that happens at one affects the other, design and construction of the pump station upgrades and CSO control projects are being coordinated.

Alternative control options and sites will be identified based on evaluation criteria developed in 2007. The projects are scheduled for completion in 2012.

Control options to be considered, either alone or in combination, are as follows:

- Store peak flows during large storms and send flows to the existing treatment plant once the storm passes
- Increase pumping and conveyance capacity to direct peak flows to existing treatment facilities
- Reduce peak flows of stormwater and groundwater into the wastewater collection system through separation of storm and sanitary sewers, low-impact “green” solutions, or other measures
- Treat peak flows at a new local treatment facility during large storms



Visit the Puget Sound beach projects Web site for more information: <http://dnr.metrokc.gov/wtd/projects/cso/index.htm>

### 5.2.5 CSO Treatment Technology Pilot Tests

The RWSP calls for satellite CSO treatment for four CSO sites—King/Kingdome, Hanford/Lander, Brandon, and Michigan. Flows at these CSO sites are so high that storage facilities to hold all the flows would be large, difficult to site, and prohibitively expensive. Even if such storage facilities could be built, they could not be drained to regional plants before the next storm begins to fill them again.

In support of the CSO program review, studies on the newer solids removal and disinfection technologies were reviewed for quantifiable performance data that could be directly compared with performance and associated costs of the more conventional technologies. In 2005, two workshops were held to examine the results of this literature review, to present new information, and to discuss the suitability of the technology to meet county needs and objectives. Conclusions from both workshops were that little new information has come to light that warrants a change from the RWSP approach of storage, conventional primary treatment, and chlorine (typically hypochlorite) disinfection. It was recommended that WTD continue to monitor the ballasted sedimentation and ultraviolet disinfection processes for performance data from other entities. In addition, because of the potential cost savings of smaller footprint facilities, it was recommended that pilot tests be conducted and detailed cost estimates be developed for variations of the ballasted sedimentation process that hold the most promise.

In 2006, scoping for pilot testing took place to identify a range of technologies of interest. The scoping narrowed the tests to variations of the high-rate sedimentation process. A request for proposals went out in January 2007, and the consultant contract was signed mid-year. The pilot tests will be implemented through 2009.

### 5.2.6 Public Notification Report to Ecology

King County, the City of Seattle, and Public Health–Seattle and King County operate a joint public outreach effort to inform the public about the location of CSOs, their actual occurrence, and the possible health or environmental impacts of CSOs. Signs are posted near CSO outfalls. In addition, the outreach effort includes media releases and a brochure, fact sheet, Web site (<http://www.metrokc.gov/health/hazard/cso.htm>), and CSO information telephone number to answer health concerns about CSOs.

The most recent modified NPDES permit for West Point requires King County to conduct a study to determine the feasibility of providing more immediate notification of overflows, including the feasibility of providing a Web-based notification system.<sup>12</sup> The county submitted a draft report to Ecology in July 2006 and then incorporated Ecology comments on the draft, solicited public input through briefings and displays, and submitted a final report in July 2007. The technical feasibility of the Web-based system is currently being tested.

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<sup>12</sup> The permit was modified in June 2005 to include the new Mercer/Elliott West and Henderson/Norfolk CSO control systems. Public notification programs of CSO events and impacts are required as one of EPA's Nine Minimum Controls.

### 5.2.7 Coordination with the City of Seattle

Early in 2006, WTD continued to coordinate with the City of Seattle on plans for managing CSO and stormwater in the area to be affected by the Alaskan Way Viaduct and Seawall Replacement project. For example, WTD provided support for and reviewed iterations of a city-developed model in order to ensure that the model accurately described the interface with the county's system. Coordination on the project was no longer necessary after June 2006 when the city withdrew its request for joint management projects in relation to the viaduct project. The city is now planning to reduce stormwater runoff by pursuing green alternatives and low-impact development in the project area.

In addition to the viaduct project and startup of the Mercer/Elliott West CSO control system (see above), the county has worked with the city during the year on development of alternatives for managing stormwater in the Seattle's Madison Valley that could potentially benefit the county's planned Montlake CSO control project, on early planning for the city's Genesee CSO control project in order to optimize opportunities and to avoid adverse impacts to county projects, and on preparation of city and county CSO plan updates, both due for submission to Ecology in 2008.

### 5.2.8 Sediment Management Activities

#### **Sediment Management Plan**

In 2007, King County completed design of the cleanup of sediments in front of the old Denny Way outfall structure. Ecology has released the proposed cleanup plan for public comment. This three-year project will clean up the remaining contaminated sediments in the nearshore area adjacent to the outfall. Dredging is scheduled to be completed by February 2008.

The Lander and Hanford CSOs are part of the Duwamish East Waterway cleanup. EPA has approved a scope of work for the remedial investigation/feasibility study. The Port of Seattle and City of Seattle will split costs with the county for this portion of the work. Costs for the studies, for any further cleanup work, and for previous cleanup work done in the area and borne by the Port will be allocated among the parties once the studies are completed and EPA issues a Record of Decision in 2010. The allocation process for previous cleanups could start earlier than that.

Development of the model to better predict deposition of contaminants near CSO outfalls continued in 2006. The model is expected to be ready in early 2008.

Visit the Sediment Management Program Web site for more information:

<http://dnr.metrokc.gov/wtd/sediment/>

#### **Lower Duwamish Waterway Superfund Site**

In 2006, work continued on the remedial investigation for the Lower Duwamish Waterway Superfund site. The draft remedial investigation is scheduled for public review in autumn 2007. EPA has approved the work plan for the feasibility study, which will identify cleanup alternatives. The remedial investigation and feasibility study will be completed in 2008 and

2009. King County continues to receive 50 percent reimbursement for this work from an Ecology grant. Once the feasibility study is completed and a cleanup plan is selected, then responsibilities will be allocated to participating parties.

Post-remediation monitoring of the Diagonal/Duwamish early-action cleanup site continued in 2006. Monitoring is providing information for cleanup decisions for the entire Superfund site. EPA, Ecology, King County, and the cities of Seattle and Tacoma formed a workgroup to determine appropriate actions and strategies to address runoff problems for ubiquitous contaminants like phthalates. In 2007, sampling to characterize the water quality of CSO events was started. The Industrial Waste Program participated in source control efforts, including sampling and analysis of industrial waste discharges and of rainfall samples for contaminants, such as phthalates, found in the cleanup area (see Chapter 9).

In 2006, EPA approved a cleanup plan for Slip 4—another early-action site.<sup>13</sup> In early 2007, source control sampling from areas upland to Slip 4 indicated that PCBs were still getting into the storm drains that discharge to the slip. EPA put the cleanup of Slip 4 on hold until contamination can be controlled adequately to prevent recontamination of the cleanup.

Visit the Duwamish Waterway Programs Web site for more information:

<http://dnr.metrokc.gov/WTD/duwamish/>

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<sup>13</sup> The Slip 4 cleanup is being managed by the City of Seattle. King County is partnering with the city on this cleanup effort.

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## Chapter 6

# Biosolids Policies

RWSP biosolids policies focus on the beneficial use of wastewater solids. The policies provide guidance on continuing to produce and market Class B biosolids while evaluating alternative technologies that have the potential to produce the highest quality marketable biosolids, including Class A biosolids.<sup>1,2</sup>

The RWSP biosolids policies require King County to produce biosolids in accordance with federal, state, and local regulations. The policies provide direction on working cooperatively with statewide organizations on biosolids issues. They also provide guidance on minimizing noise and odor impacts and on using digester gas for energy generation.

This chapter provides an overview on the efforts associated with implementation of the RWSP biosolids policies from 2004 through 2006. In accordance with the RWSP reporting policies, this chapter also includes a summary of the biosolids activities carried out in 2006. There were no amendments made to the RWSP biosolids policies in 2004–2006.

The complete text of all the biosolids policies, including a brief summary of how each policy was implemented in 2004–2006, is provided in Appendix E.

## 6.1 Implementation of Biosolids Policies from 2004 through 2006

Biosolids are the nutrient-rich organic material produced by treating wastewater solids. After processing and treatment, they can be beneficially recycled as a fertilizer and soil amendment. When added into the soil, biosolids help to retain soil moisture, reduce erosion, improve soil tilth, and slowly release essential plant nutrients like nitrogen, phosphorous, potassium, and zinc. King County has been recycling biosolids for more than 30 years. In addition, the digester gas that is a byproduct of the solids treatment process can be used as fuel and converted to electricity and heat for treatment plant use.

The Wastewater Treatment Division's (WTD) vision of creating resources from wastewater aligns closely with the RWSP biosolids and reclaimed water policies. (Chapter 7 provides

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<sup>1</sup> Class B biosolids refer to biosolids that have been treated to significantly reduce pathogens to levels that are safe for beneficial use in land application. Federal and state regulations require site management and access restrictions when biosolids of this quality are land applied.

<sup>2</sup> Class A biosolids refer to biosolids that have been treated to reduce pathogens to below detectable levels. Federal and state regulations require this level of quality for biosolids that are sold or given away in a bag or other container, or applied to lawns or home gardens.

information on implementation of water reuse policies.) As part of this vision, WTD also recycles grit—the sand, pebbles, and debris that are removed from incoming wastewater.

WTD’s biosolids recycling, energy recovery, and reclaimed water efforts are also consistent with the 2006 King County Executive orders to reduce global warming.<sup>3</sup> The orders include innovative actions to turn waste into resources to help buffer global warming impacts.

This section provides information on implementation of the biosolids policies in regard to biosolids recycling, quality of biosolids, maximizing program reliability, exploring technologies to generate Class A biosolids, and working cooperatively with statewide organizations on biosolids issues. In addition, this section includes information that corresponds to the policies that relate to energy recovery.

### 6.1.1 Biosolids Recycling

The RWSP biosolids policies call for King County to achieve beneficial use of wastewater solids. The county’s biosolids are used in agriculture and forestry, and as an ingredient in compost. One hundred percent of King County’s biosolids were recycled in 2004–2006 and continue to be used in the following programs and projects.

- **Boulder Park Soil Improvement Project.** About 60 percent of the county’s biosolids are used to fertilize and amend the soils for dryland wheat crops in Douglas County. Boulder Park, Inc., under contract to King County, manages the largest multi-farmer biosolids recycling project in the United States, with more than 100 participating farmers and 65,000 acres permitted for application. It is one of the most successful long-term, community-supported biosolids operations in the country. Biosolids from other agencies are also used in this project.
- **Green Valley Project.** About 15 percent of the county’s biosolids are used by farmers in the Yakima Valley for a variety of irrigated and dryland crops. Natural Selection Farms (NSF), a farmer-owned company, distributes and applies the biosolids.

WTD participated in research initiated by the University of Washington to evaluate the

#### History of King County’s Biosolids Program

The formation of a regional wastewater treatment system and overall treatment improvements helped reduce pollution to waterways. However, solids were still considered a waste and typically dumped in landfills or discharged into the ocean.

King County was a pioneer in recycling biosolids. Looking for an environmentally sound alternative, King County’s Biosolids Program began working with local universities in the early 1970s to find safe and beneficial uses for this nutrient-rich soil-like material. Landfills were a costly option with no environmental benefit.

Research projects showed that biosolids enhanced tree and plant growth and could be used safely in the environment. Federal and state governments used results from research and demonstration programs to establish standards for land application of biosolids. These regulations and guidelines protect public health and the environment. King County’s biosolids quality and recycling practices easily meet these stringent requirements for land application.

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<sup>3</sup> The Executive orders to reduce global warming (PUT 7-5 to 7-8 [AEO]) are available at <http://www.metrokc.gov/recelec/archives/sysindex.htm>

response of canola crops to fertilization with biosolids. The research showed that using biosolids is a suitable fertilizer for canola. Because of this research, canola farmers are using the county's biosolids. NSF is operating the first crushing facility to produce "made in Washington" canola oil for biodiesel production. King County's buses are running on biodiesel made from these biosolids-fertilized canola crops.

- **Mountains to Sound Greenway Biosolids Forestry Program.** This program is a partnership of private and public agencies that uses biosolids to fertilize and preserve working forests in eastern King County. About 20 percent of the county's biosolids are used to fertilize forests owned and managed by the Hancock Forest Management Group (on the former Snoqualmie Tree Farm) and the state Department of Natural Resources (at Marckworth Forest, east of Duvall).
- **GroCo Compost.** About 5 percent of the county's biosolids are mixed with sawdust and composted to make GroCo compost for use in residential and commercial landscaping, home gardens, and soil restoration. GroCo compost meets state and federal Class A standards.

For more information, visit WTD's Biosolids Program Web site at <http://dnr.metrokc.gov/wtd/biosolids/index.htm>

### 6.1.2 Producing High Quality Biosolids

The RWSP policies require the county to meet federal, state, and local regulations regarding the production of biosolids. In addition, the policies guide the county to produce the highest quality of biosolids economically and practically achievable and provide direction to minimize impacts associated with biosolids recycling.

#### Meeting state and federal regulations

Biosolids are regulated under both state and federal regulations (WAC 173-308 and 40 CFR, Part 503). WTD's biosolids are routinely monitored for metals, conventional constituents (phosphorous, potassium, and pH), microbes, and organic compounds.<sup>4</sup> WTD's biosolids consistently meet or exceed all federal and state criteria. For example, King County's biosolids metal concentrations are well below the most restrictive federal and state standards. Industrial source control and pretreatment have reduced the amount of metals in biosolids by 70–90 percent since the 1980s. Implementation of the county's Dental Waste Program has helped to reduce the amount of mercury in biosolids by 50 percent from levels in 2000. Chapter 9 provides more information on the county's source control and pretreatment programs. Table 6-1 provides information on the metal concentrations in the county's biosolids in 2006 as compared to federal and state standards.

<sup>4</sup> Details on the quality of King County's Biosolids is provided in the *2006 Biosolids Quality Summary*, March 2007 <http://dnr.metrokc.gov/wtd/biosolids/pdf/2006%20Biosolids%20Quality%20Summary.pdf>



**Table 6-1. Trace Metals in King County's Biosolids in 2006  
Compared to Federal and State Standards**

<b>2006 Averages (dry weight)</b>	<b>Federal and State Standard mg/kg</b>	<b>West Point Plant mg/kg</b>	<b>South Plant mg/kg</b>
Arsenic	41	6.95	6.16
Cadmium	39	3.03	4.75
Lead	300	111	59.6
Copper	1,500	561	507
Mercury	17	1.43	1.1
Nickel	420	30.4	26.4
Selenium	100	6.86	6.95
Zinc	2,800	940	866

It is anticipated that EPA will limit molybdenum (Mo) in biosolids for land application in future rules revisions. WTD's Industrial Waste Program is evaluating potential sources that contribute Mo to the wastewater system, such as air conditioning cooling towers.<sup>5</sup>

### Participating in Studies and Investigations

King County continues to participate in studies and investigations to understand the significance and fate of various chemicals found in its biosolids. WTD is also evaluating information on microconstituents of emerging concern, such as potential endocrine disruptors. In 2005, WTD began participating in a three-year study to evaluate the presence of fire retardant chemicals (PBDEs) in biosolids and their fate after land applications, including degradation and potential risk to public health, relative to other exposures such as house dust. The study is being conducted by the University of Arizona Water Quality Center and includes long-term biosolids field sites in western Washington.

King County's Environmental Lab and the University of Washington collaborated on a laboratory and greenhouse project to study the fate and degradation of nonylphenol from land applied biosolids. Nonylphenol is a surfactant found in many household cleaning products and therefore is commonly found in wastewater and biosolids. Results indicated that nonylphenol is not absorbed by plants and degrades quickly after application to soil.

### Implementing Best Management Practices

In 2004, the county's biosolids program passed an independent audit and was certified into a national program of Environmental Management Systems (EMS).<sup>6</sup> King County was the third wastewater agency in the nation to earn this prestigious certification. The EMS is a program

<sup>5</sup> Mo is a metallic element that resembles chromium and tungsten; it is used in strengthening and hardening steel and is also a trace element in plant and animal metabolism.

<sup>6</sup> For more information on the National Biosolid's Partnership EMS Program, visit the program's Web site at [http://www.biosolids.org/ems\\_main.asp?sectionid=48](http://www.biosolids.org/ems_main.asp?sectionid=48)

developed by the National Biosolids Partnership to document, monitor and optimize the management of wastewater solids and improve biosolids management programs nationwide. In order to be admitted and certified by this program, WTD's biosolids program had to meet the following five requirements.

- The agency has documented its responsibility for the Biosolids Value Chain (pretreatment, treatment and final use)
- The agency has committed to the 10 principles in the National Biosolids Partnership's Code of Good Practice
- The agency operates a Biosolids Environment Management System that meets all the National Biosolids Partnership's requirements
- The agency has committed to make continual improvements in their Environmental Management System for environmental performance, regulatory compliance, public participation, and quality biosolids management practices
- The agency has successfully completed a fully independent audit of its Environmental Management System and has been verified by a National Biosolids Partnership's accredited company

The EMS is used to document the county's biosolids program's performance and management practices that go beyond minimum regulatory requirements, ensure protection of public health and the environment, and foster relationships with the community. A commitment to sustainable management practices and operations is a key component in maintaining EMS certification. Annual third-party audits are being used to confirm that the county's EMS is addressing its biosolids management goals of environmental protection, cost-effectiveness, and public acceptability.

Highlights of WTD's EMS achievements in 2004–2006 are as follows:

- Trained staff and contractors on EMS tools and performance goals
- Worked with member agencies of the Northwest Biosolids Management Association to develop a method to provide interagency assistance on EMS internal audits to reduce costs
- Converted biosolids truck fleet to seasonal use of B20 (20 percent blend) biodiesel to reduce greenhouse gas emissions
- Developed policy guidelines for permitting discharges from the biotechnology industry sector to King County's sewers (<http://dnr.metrokc.gov/wlr/indwaste/biotech.htm>)

The National Biosolids Partnership has a tiered recognition program to track agency progress in developing and implementing an environmental management system that has been audited by an independent third-party auditor. In 2007, the partnership awarded the Platinum Level designation to WTD's Biosolids Program. The Platinum Level designation represents the highest achievement of biosolids management and environmental stewardship.

## Minimizing Impacts Related to Biosolids Recycling

The RWSP biosolids policies call for the county to seek ways to minimize impacts related to biosolids recycling. One of the county's stated goals is to reduce biosolids truck trips to an average of five per day. In the period from 2004 through 2006, biosolids truck trips at West Point have averaged about four trips per day. At South plant, the trips went from an average of 6.6 trips per day in 2003 to fewer than five trips per day in 2006. The reduction in truck trips at both plants is attributed to the installation of high solids centrifuges.<sup>7</sup> However, odors at application sites have increased due to the use of the centrifuges. WTD is evaluating the options available to reduce these odors. National studies are also under way as other treatment plants are facing similar results from the use of high-solids centrifuges.

The West Point Digestion System Improvements project is being planned to increase the stability of the digestion system and decrease the potential for digester upsets. In addition to affecting the quality of the biosolids, these upsets increase odor at the plant. The project will also include modifications to the blending storage tank (Digester 6) to enable its use as an emergency active digester if needed. Predesign will be completed in 2007; final design is expected to be complete in 2008.

### 6.1.3 Maximizing Program Reliability

RWSP Biosolids Policy (BP)-4 directs the county to maximize program reliability and minimize risk using one or more of several options. One option is to consider diverse technologies, end products, and beneficial uses. WTD accomplishes this by supplying Class B biosolids to two agricultural projects, two forestry projects, and a composter. The composter then creates and markets a Class A compost product made with King County's biosolids. WTD also continues to evaluate new markets that would provide additional site capacity, environmental benefits, or lower costs. The canola research mentioned earlier in this chapter is an example of evaluating and creating new markets for the county's biosolids.

Another option for maximizing program reliability is maintaining reserve capacity to manage 150 percent of the projected annual volume of biosolids. This additional capacity (primarily in Douglas County) has allowed King County to recycle 100 percent of its biosolids even when one or more of its projects has temporarily reduced capacity.

In accordance with RWSP BP-6, which provides guidance on exploring technologies that may enable the county to generate Class A biosolids cost-effectively or because they have better marketability, WTD conducted investigations into the most appropriate technologies and resultant costs of producing Class A biosolids at the regional treatment plants in 2004–2006. These technologies, which produce Class A “exceptional quality” biosolids, could open up opportunities to market the product in King County and Western Washington, thereby reducing hauling and site management costs. The investigation concluded that, at this time, temperature-phased anaerobic digestion would be the most viable alternative for converting each plant to Class A biosolids production. Further assessment of costs, benefits, and markets will continue.

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<sup>7</sup> Centrifuges are equipment that removes water from biosolids.

### 6.1.4 Working Cooperatively with Statewide Organizations

RWSP BP-8 directs the county to work cooperatively with statewide organizations on biosolids issues. King County's biosolids program is built on partnerships with public agencies, private companies, landowners, university researchers, and environmental organizations. These partners help manage field sites, provide information, and conduct credible research. The partnerships have been instrumental in achieving and maintaining public acceptance and markets for biosolids in the Northwest. In addition, the county participates in local organizations and is a founding member of the Northwest Biosolids Management Association (NBMA), whose purpose is to share technical knowledge about biosolids management between members, provide opportunities to work with university scientists; local, state, and federal regulators; and the general public.

Through the NBMA, WTD works cooperatively with regulatory officials, scientists, and other biosolids managers on regulatory issues, education and training, public information, and research and demonstration. WTD is participating in the Washington State Department of Ecology's biosolids rule revision advisory group and in the NBMA's regulations committee review and comment process.

In addition, the county and the University of Washington are evaluating the amount of carbon storage created by each of WTD's current biosolids end users.<sup>8</sup> These include using biosolids to enhance forest growth, to increase soil carbon reserves in agriculture or restoration projects, and to grow energy crops such as oil seed crops for biodiesel. The study will include details on how to account for carbon storage in soils and in different ecosystems.

### 6.1.5 Energy Recovery

During solids treatment, naturally occurring microorganisms degrade the solid organic matter and produce digester gas, which consists mostly of energy-rich methane gas. Both the West Point and South plants recover this gas to generate electricity and heat for treatment plant processes; it is used to power engines, boilers, turbines, and a fuel cell to produce heat and power. Some of the gas produced at South plant is sold to Puget Sound Energy for distribution in its natural gas system.

In 2004–2006, in cooperation with the U.S. Environmental Protection Agency and FuelCell Energy, Inc., King County sponsored the world's largest fuel cell demonstration project using digester gas at South plant.<sup>9</sup> The project had two main objectives—to demonstrate that molten carbonate fuel cell technology can be adapted to use anaerobic digester gas as a fuel source and to achieve a nominal power output target of one megawatt using either digester gas or natural gas. Both of these objectives were met and the demonstration project confirmed that fuel cell technology is a viable, clean, sustainable power generation alternative.

<sup>8</sup> Carbon storage is the process through which agricultural and forestry practices remove carbon dioxide (CO<sub>2</sub>) from the atmosphere and store it in soil or above ground biomass. CO<sub>2</sub> is a major contributor to global warming.

<sup>9</sup> A fuel cell is a device that chemically combines hydrogen and oxygen to make electrical energy without combustion. Fuel cells can operate on a variety of fuels including natural gas, methanol, ethanol, landfill methane, coal gas, digester gas, propane, gasoline, and pure hydrogen.

King County will own the fuel cell power plant beginning in 2007 and will evaluate negotiating a new service agreement with FuelCell Energy, Inc., for operations and maintenance if it is determined that the plant meets the county's energy objectives. For more information on the fuel cell demonstration project, visit the project's Web site at

<http://dnr.metrokc.gov/wtd/fuelcell/library.htm#supplemental>

Plans are under way to replace an existing cogeneration facility at the West Point plant that was commissioned in 1984 to burn digester gas as fuel and to generate heat and electricity for the plant. The existing system has been operating with increasing unreliability and because of this will be removed in 2008. WTD staff is evaluating other options to continue to beneficially use digester at the West Point plant; the evaluation process is expected to be complete in fall 2007.

A feasibility study will be prepared in 2007 to identify potential technologies for using digester gas to generate alternative forms of energy at Brightwater. The study has been funded by a state grant.

The Executive orders to reduce global warming include direction to maximize the conversion and use of waste for energy and to minimize existing energy use through increased efficiency, optimized operation and maintenance, and conservation efforts. In addition, a goal of the *King County Energy Plan* (February 2007) is for the county to achieve a 10 percent per square foot reduction in county energy use by 2012.<sup>10</sup> WTD is developing a division-wide energy plan to meet these goals.

For more information on WTD's energy recovery efforts, visit the program's Web site at <http://dnr.metrokc.gov/wtd/energy/index.htm#2>

## 6.2 2006 Annual Report Activities

In accordance with RWSP reporting policies to include elements of the RWSP annual report in the RWSP comprehensive review, this section describes accomplishments of WTD's Biosolids and Energy Recovery programs in 2006.

Approximately 110,000 wet tons of biosolids were produced and recycled beneficially in 2006. The county met all the conditions of its Statewide General Permit for Biosolids.<sup>11</sup>

In 2006, King County's biosolids were used as a soil amendment for a variety of applications:

- 5,600 acres of wheat in Douglas County
- 128 acres of hops in the Yakima Valley

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<sup>10</sup> The *King County Energy Plan*, February 2007, is available on the Web at <http://www.metrokc.gov/exec/news/2007/pdf/EnergyPlan.pdf>

<sup>11</sup> The Statewide General Permit for Biosolids is issued by the Washington State Department of Ecology and establishes the conditions that must be met for land application of biosolids and other related processes and aspects of operations related to biosolids.

- 320 acres of state forestlands and 1,207 acres of Douglas-fir plantations in Hancock's Snoqualmie Forest
- 3 percent of the biosolids for GroCo compost

Other highlights in 2006 are as follows:

- Generated more than \$100,000 in fertilizer revenue from customers
- Completed the *2006 Biosolids Quality Summary* report; this report provides information on the results of monitoring and data analysis of King County's biosolids
- Worked with the University of Washington to estimate carbon sequestration for biosolids end uses. In addition, the University evaluated the potential for biosolids applications to qualify for carbon credits that could be traded on the Chicago Climate Exchange.<sup>12</sup>
- Converted entire biosolids truck fleet to seasonal use of B20 biodiesel to reduce greenhouse gas emissions
- Issued a Notice to Proceed on the West Point Digestion Improvement Project in June 2006; predesign is expected to be complete by the end of 2007
- Worked with WTD's Industrial Waste Program to develop policy guidelines for permitting discharges from the biotechnology industry sector to King County's sewers
- Completed demonstration testing on the fuel cell project at South plant

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<sup>12</sup> In July 2006, the King County Council approved membership in the Chicago Climate Exchange, which works to reduce greenhouse gas emissions through binding goals and the trading of "carbon credits." The trading of carbon credits is similar to pollution credit programs that allow industries and jurisdictions to sell, trade, or purchase emissions that contribute to air pollution, with the goal of reducing the overall amount of emissions.





## Water Reuse Policies

RWSP water reuse policies provide guidance to King County on the development and implementation of its reclaimed water program. Producing and using reclaimed water can help reduce the volume of treated effluent discharged to Puget Sound. Reclaimed water is wastewater that is treated to such a high level it can be used safely and effectively for nondrinking purposes such as landscape and agricultural irrigation, heating and cooling, and industrial processing. Reclaimed water can also be used to enhance wetlands and help reduce withdrawals from streams and groundwater. The county's Wastewater Treatment Division (WTD) has been safely producing and using reclaimed water at its regional treatment plants (South plant in Renton and West Point plant in Seattle) since 1997.

The 15 water reuse policies provide direction on pursuing the use of reclaimed water, coordinating with regional water supply planning efforts, working with local water purveyors, preparing a reclaimed water feasibility study, and evaluating and implementing nonpotable water projects on a case-by-case basis. The policies call for the county to develop a water reuse public education program and provide guidance for this program to be coordinated with water conservation education programs. Some of the policies correspond to Washington State's Reclaimed Water Act (RCW 90.46), such as Water Reuse Policy (WRP)-10, which calls for the county to hold and maintain the exclusive right to any reclaimed water generated by the county's wastewater treatment plants. In addition, RWSP treatment plant policies direct the county to continue and to explore opportunities for expanded use of reclaimed water at existing plants and at all new treatment facilities and provide guidance on exploring the possible construction of satellite facilities to produce reclaimed water (Chapter 2).

This chapter provides an overview on implementation of the RWSP water reuse policies from 2004 through 2006. In accordance with the RWSP reporting policies, this chapter includes a summary of the activities carried out in 2006 related to the county's reclaimed water program and water conservation efforts. This chapter concludes with information on amendments to the RWSP treatment plant policies adopted by the King County Council in 2004–2006.

The complete text of all the water reuse policies, including information on policy amendments and a summary of how each policy was implemented in 2004–2006, is provided in Appendix F.

### 7.1 Implementation of Water Reuse Policies from 2004 through 2006

The RWSP water reuse policies provide the foundation for King County's reclaimed water program. WTD's vision of creating resources from wastewater aligns closely with these policies. The division's reclaimed water efforts are also consistent with the 2006 King County Executive

orders to reduce global warming and the *King County 2007 Climate Plan*.<sup>1,2</sup> The executive orders and climate plan provide direction for the county to maximize the creation of resources from waste products in ways that both adapt to natural resource conditions impacted by global warming and mitigate impacts of global warming by reducing greenhouse gas emissions.

The Reclaimed Water Act of Washington State (RCW 90.46) recognizes the value of reclaimed water in the process to better manage, protect, and conserve our water resources. Measures to increase water conservation and expand the use of reclaimed water for non-potable uses are important elements in preparing for potential climate change impacts. Such measures can also assist in Puget Sound recovery efforts and in preparing for more stringent discharge regulations that could occur in the future.

This section provides an overview of the major activities and efforts carried out in 2004–2006 in accordance with the RWSP water reuse policies. The activities are as follows:

- Producing and using reclaimed water at South and West Point plants
- Planning for reclaimed water at the Carnation and Brightwater plants
- Preparing a reclaimed water feasibility study
- Working with local agencies in reclaimed water planning efforts
- Carrying out reclaimed water and water conservation education activities

### 7.1.1 Reclaimed Water Opportunities at South and West Point Plants

The RWSP treatment plant policies encourage King County to continue water reuse and explore opportunities for expanded use at its existing plants. At the same time, the water reuse policies provide direction to ensure that the reclaimed water is used in a manner that protects public health and the environment.

WTD has been safely using reclaimed water since 1997 at the South and West Point plants. Annually, these plants use about 255 million gallons of reclaimed water for landscape irrigation, internal plant reuse, and other non-drinking purposes. King County's reclaimed water meets strict Class A standards set by the Washington State Departments of Health and Ecology.<sup>3</sup>

At West Point plant, about 173 million gallons are used for on-site processes and irrigation. At South plant, about 82 million gallons are used for on-site processes and irrigation and for irrigation of nearby sports fields at the City of Tukwila's Fort Dent Park, a wetland plant nursery,

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<sup>1</sup> The executive orders to reduce global warming (PUT 7-5 to 7-8 [AEO]) are available at <http://www.metrokc.gov/recelec/archives/sysindex.htm>

<sup>2</sup> The *King County 2007 Climate Plan* is available at <http://www.metrokc.gov/exec/news/2007/pdf/ClimatePlan.pdf>

<sup>3</sup> Class A reclaimed water is reclaimed water that, at a minimum, is at all times an oxidized, coagulated, filtered, and disinfected wastewater. Allowed end uses of Class A reclaimed water are irrigation of food and non-food crops and irrigation of open access areas, such as parks. The water could also be used for industrial cooling and process water and other non-drinking-water (non-potable) uses.

and habitat restoration efforts. The county is exploring additional uses for reclaimed water from South plant with some of the cities near the plant.

Installation of a greenhouse began in early 2007 at the South Treatment Plant as part of the county's resource recovery program. The greenhouse will showcase the safe use of reclaimed water and biosolids compost in growing ornamental and horticultural plants. Researchers from the University of Washington will be able to use the greenhouse for on-site studies involving reclaimed water and biosolids. Much of their research will focus on answering questions from current and future customers of reclaimed water and will use water from South Plant's sand filters and from membrane bioreactor systems.

Studies currently under way include:

- Effects of reclaimed water on growth of golf course turfgrasses
- Fate and degradation of various organic compounds (pharmaceutical, anti-microbial, and estrogenic compounds) in soil irrigated with reclaimed water and in soil amended with biosolids.

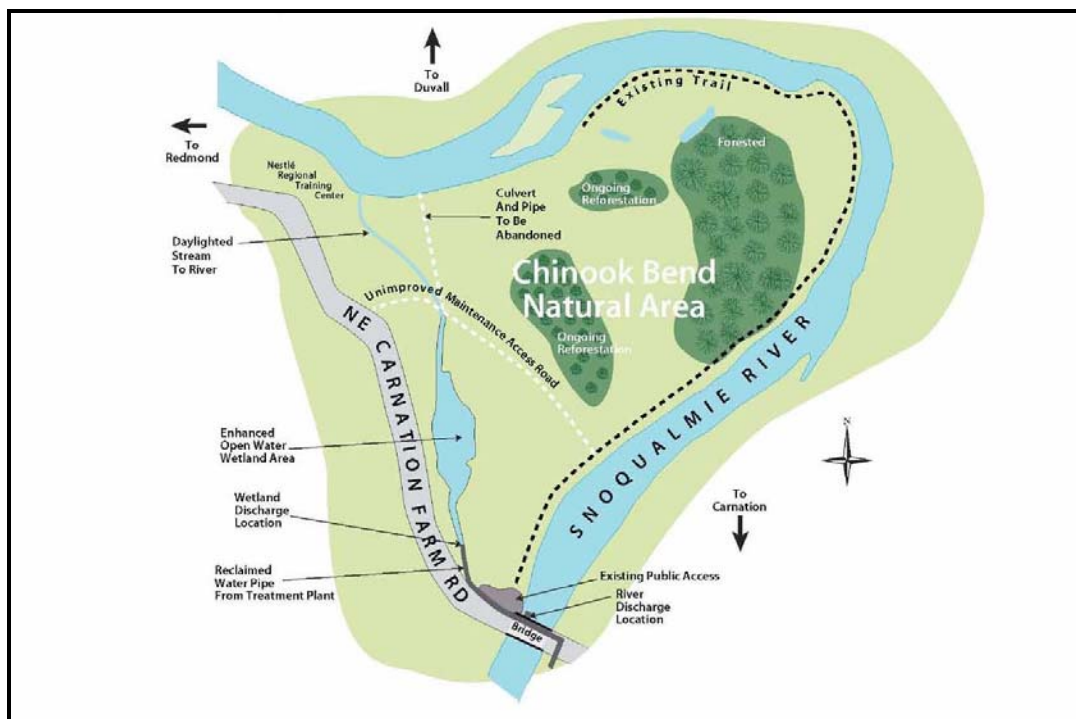
The research will also help to fine-tune operational practices.

### 7.1.2 Moving Forward on Reclaimed Water Opportunities at the Carnation and Brightwater Treatment Plants

The RWSP treatment plant policies direct the county to explore reclaimed water opportunities at all new treatment plants. The Brightwater and Carnation treatment plants will use membrane bioreactor technology (MBR), which provides better and more consistent overall treatment than conventional activated sludge secondary treatment. The technology results in treated wastewater (effluent) that is seven to ten times cleaner than typical secondary treated wastewater. In addition, MBR systems can produce Class A reclaimed water. As a result, King County has looked for opportunities to combine reclaimed water during the construction of the conveyance systems associated with these projects.

#### **Carnation Treatment Plant Wetland Enhancement**

When operational, reclaimed water from the Carnation Treatment Plant will be used to enhance a wetland in the Chinook Bend Natural Area. King County is partnering with Ducks Unlimited, a nonprofit organization dedicated to wetland conservation, to design the wetland discharge project. In summer 2005, the county and Ducks Unlimited worked with the Snoqualmie Tribe and other interested stakeholders to develop a design for the wetland. The wetland design focuses on enhancing native plantings and controlling reed canary grass through the use of a water control structure, which allows for moist soil management and for fish passage. The design includes removing an existing culvert and pipe system that currently drains the existing degraded wetland, installing a new water control structure, and daylighting the water flowing out of the wetland. The design will increase the size of the wetland to nearly four acres, benefiting wildlife and enhancing opportunities for passive recreation at Chinook Bend (Figure 7-2).



**Figure 7-1. Conceptual enhancement of the Chinook Bend Natural Area**

Construction of the wetland is scheduled to begin in the second half of 2007. The treatment plant is expected to come online in the first half of 2008. During startup, treated water from the plant will be discharged via the plant's outfall to the Snoqualmie River. After startup is complete, the wetland will become the primary discharge location for reclaimed water. The river outfall will remain operational and serve as a backup to the wetland when maintenance or equipment problems prevent the facility from producing reclaimed water. In such cases, highly treated water that meets or exceeds river discharge standards would be discharged via the outfall. Information on the Carnation Treatment Plant is also provided in Chapter 2.

### **Brightwater Reclaimed Water Backbone**

As reported in the *RWSP 2004 Annual Report*, development of the Sammamish Valley Reclaimed Water Production Facility was cancelled in late 2003 in favor of developing capabilities of the Brightwater system to produce and distribute reclaimed water. Reclaimed water from Brightwater will provide a greater quantity of reclaimed water at lower cost. King County started predesign work in 2004 to distribute reclaimed water to communities along the Brightwater Treatment Plant's effluent pipeline and to the Sammamish Valley. State regulators advised the county that using the Brightwater effluent pipeline to convey reclaimed water would limit the water's usefulness because it would not meet Class A reclaimed water standards at all times without further treatment. In response, a decision was made to add an additional 27-inch diameter pipe for reclaimed water within the Brightwater conveyance effluent tunnel between the Brightwater plant and the Influent Pump Station (IPS) in Bothell.

In early 2005, the county determined that adding an additional pipe for reclaimed water within the Brightwater effluent tunnel west of Bothell would be more cost-effective in the long term than additional small tertiary treatment plants along the effluent tunnel route. Staff from King County's Department of Natural Resources and Parks provided briefings to King County Council members, the Regional Water Quality Committee, the Metropolitan Abatement Advisory Committee (MWPAAC), and other stakeholders about the opportunity to distribute reclaimed water from Brightwater, referred to as the Brightwater reclaimed water "backbone". In addition, in November 2005, the Washington State Department of Ecology (Ecology) reiterated its support of the backbone as part of the state and region's water resource management strategy.

WTD issued a draft white paper on the Brightwater backbone in fall 2005 and updated it in spring 2006.<sup>4</sup> The paper provides information about the opportunity to build the backbone in conjunction with the construction of Brightwater conveyance, reclaimed water quality, and results of a preliminary reclaimed water rate and revenue analysis and impacts to monthly sewer rates. The paper also includes responses to questions and concerns raised by MWPAAC and Seattle Public Utilities and letters, articles, and publications that support the county's reclaimed water efforts.

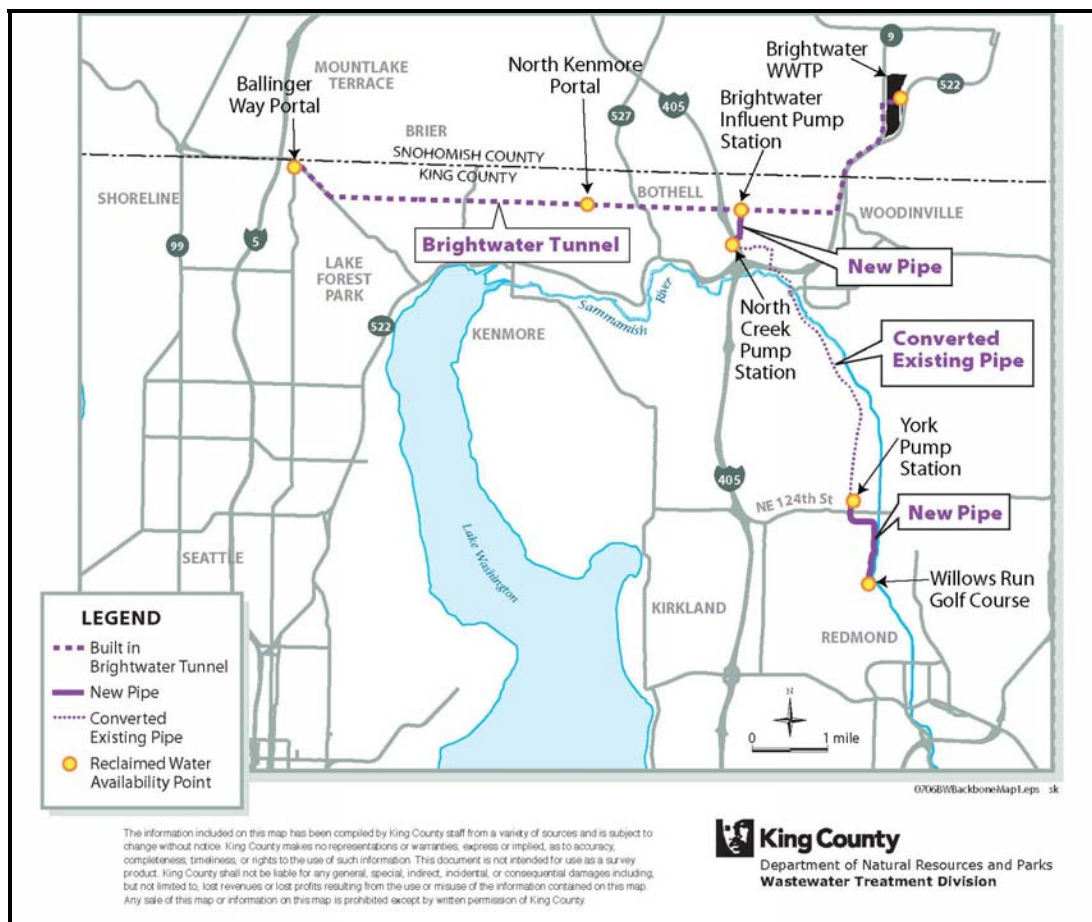
To keep costs down, the Brightwater backbone takes advantage of existing infrastructure and planned construction. In addition to including reclaimed water pipes in the Brightwater tunnels while the tunnels are being built, an existing pipeline is being converted to carry reclaimed water from Bothell to the York Pump Station in the Sammamish Valley.

In November 2005, the King County Council approved Phase 1 of the Brightwater reclaimed water backbone as part of WTD's 2006 budget. Phase 1 involves construction of the backbone segments—the South Segment (Sammamish Valley) and the West Segment. The South Segment includes connecting the Brightwater IPS to the North Creek force main and construction of approximately 10,000 feet of purple pipe from the York Pump Station to points in the Sammamish Valley.<sup>5</sup> It will provide up to 7 million gallons per day (mgd) of reclaimed water to customers beginning in 2011. Potential reclaimed water opportunities from this segment include uses for parks and businesses in Bothell, Woodinville, Redmond, and other cities in the area, as well as farms, parks, and businesses in the Sammamish Valley. In addition, the county has an agreement with Willows Run Golf Course to supply the golf course with reclaimed water from this portion of the backbone. Figure 7-2 depicts the locations of the Brightwater reclaimed water system.

The West Segment consists of dedicated, concrete-encased 27-inch diameter reclaimed water pipes within the Brightwater effluent tunnel that runs from the IPS in Bothell to the Ballinger Way Portal in Shoreline. Additional infrastructure is required before access to reclaimed water from this segment is available; such infrastructure will not be built until demand is demonstrated. When the entire reclaimed water pipeline and associated infrastructure are constructed and operational, 21 mgd of reclaimed water will be available.

<sup>4</sup> *Draft White Paper, Reclaimed Water Backbone Project*, version 3, March 2006, is available through the Wastewater Treatment Division of King County's Department of Natural Resources and Parks

<sup>5</sup> Reclaimed water is distributed through a separate set of purple pipes which helps guarantee reclaimed water and drinking water supplies are never mixed. Purple is the nationally designated color for marking reclaimed water pipes, hoses, pumps, and other equipment.



**Figure 7-2. Brightwater Reclaimed Water System**

In 2006, design was completed on the backbone and construction bids were advertised for the reclaimed water pipeline from the Brightwater IPS to the North Creek Pump Station. Design was also initiated on converting the existing pipelines from the North Creek Pump Station to the York Pump Station and on the final section of new reclaimed water purple pipe from the York Pump Station to Willows Run Golf Course. The *Brightwater Reclaimed Water Engineering Report* was approved by the Washington State Department of Health (DOH) on October 31, 2006 and by Ecology on November 8, 2006. WTD continues to work with DOH and Ecology to ensure the design and construction of the backbone complies with state standards.

Implementation of the reclaimed water backbone will help meet the Washington State Department of Natural Resources' Aquatic Land Use Authorization for the Brightwater outfall. This authorization stipulates that the county document progress made to limit discharges to Puget Sound in every NPDES (National Pollutant Discharge Elimination System) permit renewal application process, which occurs about every five years.

King County is working with cities, districts, and businesses to identify potential Brightwater reclaimed water users. In addition, the county will continue to work with its component agencies to address concerns raised during the development of the backbone; these concerns focused on issues of who pays for and who benefits from reclaimed water. Some of the agencies also

expressed concern about their potential loss of water customers and stranded costs. As stated in the Brightwater backbone white paper, the county's preference is to act as a wholesale supplier of reclaimed water to the cities or districts; the cities or districts would then retail the water to the users in their water service area.

The county is also continuing efforts to identify additional funding sources for the project. The Washington State Public Works Board awarded a \$1 million low-interest loan in spring 2006 to help with the preconstruction costs of building the reclaimed water system.

For more information, visit the Brightwater Reclaimed Water System Web site:

<http://dnr.metrokc.gov/wtd/reuse/brightwater/index.htm>

### 7.1.3 Preparing a Reclaimed Water Feasibility Study

In response to a Regional Water Quality Committee recommendation, RWSP Water Reuse Policy (WRP)-2 was amended via Ordinance 15602, which was adopted by the King County Council on September 25, 2006. The amended policy replaced the directive for a reclaimed water work program—which the executive submitted in December 2000 in accordance with WRP-2 as adopted in 1999—with the directive for preparation of a reclaimed water feasibility study by December 2007. The complete text of the amended policy is as follows:

**WRP-2:** By December 2007, the King County executive shall prepare for review by council a reclaimed water feasibility study as part of a regional water supply plan which will include a comprehensive financial business plan including tasks and schedule for the development of a water reuse program and a process to coordinate with affected tribal and local governments, the state and area citizens. The reclaimed water feasibility study shall be reviewed by the RWQC. At a minimum the feasibility study shall comply with chapter 90.46 RCW and include:

1. Review of new technologies for feasibility and cost effectiveness, that may be applicable for future wastewater planning;
2. Review of revenue sources other than the wastewater rate for distribution of reused water;
3. Detailed review and an update of a regional market analysis for reused water;
4. Review of possible environmental benefits of reused water; and
5. Review of regional benefits of reused water.

Although a regional water supply plan has not been developed, WTD is proceeding with the work of the feasibility study to meet the December 2007 deadline. Activities in late 2006 focused on selecting a consultant for the study; a Notice to Proceed was issued in late February 2007.

Activities under way to complete the feasibility study are as follows:

- **Scope of work.** The county worked with the selected consultant to develop and finalize a scope of work; comments and input from the MWPAAC's Engineering and Planning Subcommittee were considered during the development of the scope of work.
- **Focus groups.** A series of focus groups targeted toward park users, business organizations, and agricultural interests were held in 2007. Information gathered from the park users groups focused on issues related to acceptability of using reclaimed water in



parks; economic issues were the focus for the business organizations; and questions related to end user and customer concerns were the focus of the agricultural interests groups.

- **Meetings with cities and water and sewer districts.** WTD staff is meeting with cities and water and sewer districts in the county's wastewater service area to gather information for the feasibility study. The cities and districts will have the opportunity to share their views on the benefits and drawbacks of reclaimed water, provide information on their current and anticipated needs related to reclaimed water, and discuss factors that would influence their decision to use reclaimed water. The meetings will also help to identify potential users of reclaimed water and any other issues that the cities and districts would like the county to consider as it moves forward with its reclaimed water program.

In addition, the county is reviewing information on reclaimed water programs in the State of Washington, identifying potential uses for reclaimed water in the county's service area, reviewing potential funding and cost recovery options, and using the WateReuse Foundation's Economic Framework to evaluate the benefits and costs of the county's reclaimed water program.<sup>6</sup>

The focus of the feasibility study is on the county's reclaimed water program as a whole; it will not provide an evaluation of specific reclaimed water projects. Proposals for new major reclaimed water projects will be evaluated on a case-by-case basis in accordance with the direction provided in RWSP policy WRP-5 (see Appendix F).

### 7.1.4 Working with Local Agencies in Reclaimed Water Planning Efforts

The water reuse policies call for the county to work with local water purveyors regarding opportunities for reclaimed water. WTD participates in ongoing discussions with individual purveyors, jurisdictions, MWPAAC, and other entities concerning reclaimed water opportunities.

The Brightwater mitigation agreements with the City of Bothell, City of Kenmore, and the Cross Valley Water District discuss pursuing opportunities for using reclaimed water. The February 2005 *Memorandum of Understanding on Water Resource and Supply Planning Between Cascade Water Alliance and King County* also includes discussion on potential reclaimed water opportunities. The meetings taking place in preparation of the reclaimed water feasibility study provide another example of how the county is working with local agencies on reclaimed water efforts.

In addition, in 2005, WTD participated in the Reclaimed Water Technical Committee of the Regional Water Supply Planning process. The purpose of the planning process is to identify, compile information on, and discuss many of the key issues that relate to or may affect water resources of the region. The goal of this process is to develop the best available data,

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<sup>6</sup> The WateReuse Foundation is an educational, nonprofit public benefit corporation that serves as a centralized organization for the water and wastewater community to advance the science of water reuse, recycling, reclamation, and desalination. More information is available at <http://www.watereuse.org/Foundation/index.html>.

information, and pragmatic tools that participants may use, at their discretion, to assist in the management of their respective water systems and resources and in their water supply planning activities. The Reclaimed Water Technical Committee was composed of representatives from local jurisdictions, water and sewer districts, regional water associations, and the DOH and Ecology. The committee reviewed reclaimed water analysis tools and maps of potential areas for reclaimed water use during their meetings in 2006. More information on the Regional Water Supply Planning Process is available at <http://www.govlink.org/regional-water-planning/index.htm>

King County was a co-sponsor of the June 2007 Reclaimed Water Workshop that was sponsored by the Pacific Northwest Clean Water Association. Other co-sponsors included the Puget Sound Action Team, DOH, Ecology, and the WaterReuse Association. Representatives from tribal governments, cities and special purpose districts, regulatory agencies, and other groups attended this sold-out statewide conference. During the conference, state and local leaders, including the King County Executive, signed a formal declaration of support for the continued development and use of reclaimed water in communities throughout Washington. Many different environmental organizations have subsequently signed the declaration.

In 2006, the Washington State Legislature amended the Reclaimed Water Act (Chapter 90.46 RCW). The amendments direct Ecology to form an advisory committee and to adopt rules for all aspects of reclaimed water use by December 31, 2010. King County's Department of Natural Resources and Parks (DNRP) is a member of this advisory committee. The committee includes a broad range of interested parties representing various stakeholder groups, including those potentially affected by the rule and those with technical expertise and knowledge of new advancements in technology. More information on the advisory committee is available at [http://www.ecy.wa.gov/Programs/wq/reclaim/rule\\_develpmnt.html](http://www.ecy.wa.gov/Programs/wq/reclaim/rule_develpmnt.html)

King County Code 13.24.010 calls for water comprehensive plans to include an evaluation of reclaimed water opportunities as required by RCW 90.46.120 and for sewer comprehensive plans to consider opportunities for reclaimed water as required under RCW 90.48.112. King County's Utilities and Technical Review Committee serves as the technical review body for county water and sewer utilities' comprehensive plans.

### 7.1.5 Reclaimed Water and Water Conservation Public Education Activities

King County has an ongoing reclaimed water and water conservation public education program. In 2004–2006, written materials on reclaimed water and water conservation were developed for a variety of audiences, from large water users to the general public. Information on reclaimed water is included in tours and open houses of the county's regional treatment plants. The greenhouse demonstration project at South plant will be a part of plant tours as well. Informational displays on reclaimed water are available for public meetings and events.

WTD's reclaimed water and water conservation Web sites are available to the public and are updated on a regular basis (<http://dnr.metrokc.gov/wtd/reuse/index.htm> and <http://dnr.metrokc.gov/wtd/waterconservation/index.htm>). The Web sites include contact

information for submitting questions or requesting additional information on reclaimed water and water conservation.

Since 2005, reclaimed water issues have been incorporated into DNRP's annual water quality survey. Questions were included about specific potential uses for reclaimed water to help identify potential markets for reclaimed water and identify the benefits, concerns, and educational needs concerning reclaimed water. In the 2005 and 2006 surveys, over 82 percent of the respondents said that the county should use as much reclaimed water as possible. DNRP plans to include questions on reclaimed water in future annual water quality surveys.

More information on WTD's public involvement programs is provided in the Public Involvement Policies Chapter (Chapter 12).

## 7.2 Reclaimed Water Activities in 2006

Key achievements of the reclaimed water program in 2006 are as follows:

- Produced about 255 million gallons of reclaimed water at West Point and South plants; some of the reclaimed water from South plant was used as an irrigation source for sports fields at Fort Dent Park, a wetland park nursery, and habitat restoration efforts
- Completed design of the Carnation Treatment Plant's wetland discharge project
- Updated the draft white paper on the Brightwater backbone in March 2006
- Advertised construction bids for the Brightwater backbone
- Completed design on the Brightwater reclaimed water pipeline
- Received DOH and Ecology approval of the *Brightwater Reclaimed Water Engineering Report*
- Selected a consultant for work associated with the reclaimed water feasibility study
- Participated in the Reclaimed Water Technical Committee of the Regional Water Supply Planning Process
- Served as a co-sponsor of the June 2007 Reclaimed Water Workshop
- Met with representatives from local jurisdictions, water and sewer districts, parks, and businesses to discuss reclaimed water opportunities

## 7.3 Amendments to Water Reuse Policies

In September 2006, the King County Council approved amendments to the RWSP water reuse policies via adoption of Ordinance 15602. The amendments are as follows:

- Replaced the word "accelerate" with "facilitate" in this sentence within WRP-1: *The county shall facilitate the development of a water reuse program to help meet the goals of the county to preserve water supplies within the region and to ensure that any reclaimed*

*water reintroduced into the environment will protect the water quality of the receiving water body and the aquatic environment.*

- Replaced the directive in WRP-2 for a reclaimed water work program—which the executive submitted to the King County Council in December 2000—with the directive for a reclaimed water feasibility study as part of a regional water supply plan.
- Added the word “future” to WRP-3: *Recycling and reusing reclaimed water shall be investigated as a possible future significant new source of water to enhance or maintain fish runs, supply additional water for the region’s nonpotable uses, preserve environmental and aesthetic values and defer the need to develop new potable water supply projects.*
- Amended WRP-4 to ensure coordination of reclaimed water projects is carried out with affected water supply purveyors.
- Amended WRP-5 to further define the criteria to be used to evaluate nonpotable reuse projects, the elements to be included in project financial analysis, and to require new water reuse projects that require major capital funding be reviewed by RWQC and approved by the King County Council.
- Replaced the word “fund” in WRP-13 with “evaluate potential funding” and deleted the word “demonstration”, which preceded “water reuse projects”; the policy now reads: *King County shall continue to evaluate potential funding of pilot-scale and water reuse projects, in whole or in part, from the wastewater utility rate base.*



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## Chapter 8

# Wastewater Services Policies

The RWSP wastewater services policies are intended to guide King County in providing wastewater services to its customers and in operating and maintaining its system. The policies define the county's wastewater service area and provide direction on fulfilling contractual commitments. The policies also discuss measures to take to prevent sanitary sewer overflows and provide direction for actions to take in the event of an overflow.

The wastewater services policies recognize the region's investment in the regional wastewater system and the importance of ongoing maintenance and repair to protect this investment. To that end, the policies direct the county to establish and implement an asset management program to ensure continued reliability of the system's infrastructure. The policies also encourage county funding for research and development relating to water quality and technologies for the wastewater system. In addition, the policies recognize that the tribes have been providing important leadership and guidance in water quality stewardship and direct the county to continue its coordination with the tribes in efforts to protect water quality.

This chapter provides an overview on implementation of the RWSP wastewater services policies from 2004 through 2006. The chapter concludes with summary information on amendments to the RWSP wastewater services planning policies adopted by the King County Council in 2004–2006.

The complete text of all the wastewater services policies, including information on policy amendments and a summary of how each policy was implemented in 2004–2006, is provided in Appendix G.

## 8.1 Implementation of Wastewater Services Policies from 2004 through 2006

### 8.1.1 King County's Wastewater Service Area

In accordance with RWSP wastewater service policy (WWSP)-4, the perimeter of King County's wastewater service area is defined by the service areas of the component agencies in King, Pierce, and Snohomish counties that send their wastewater to the county's regional system for treatment and disposal (see Figure 8-1).

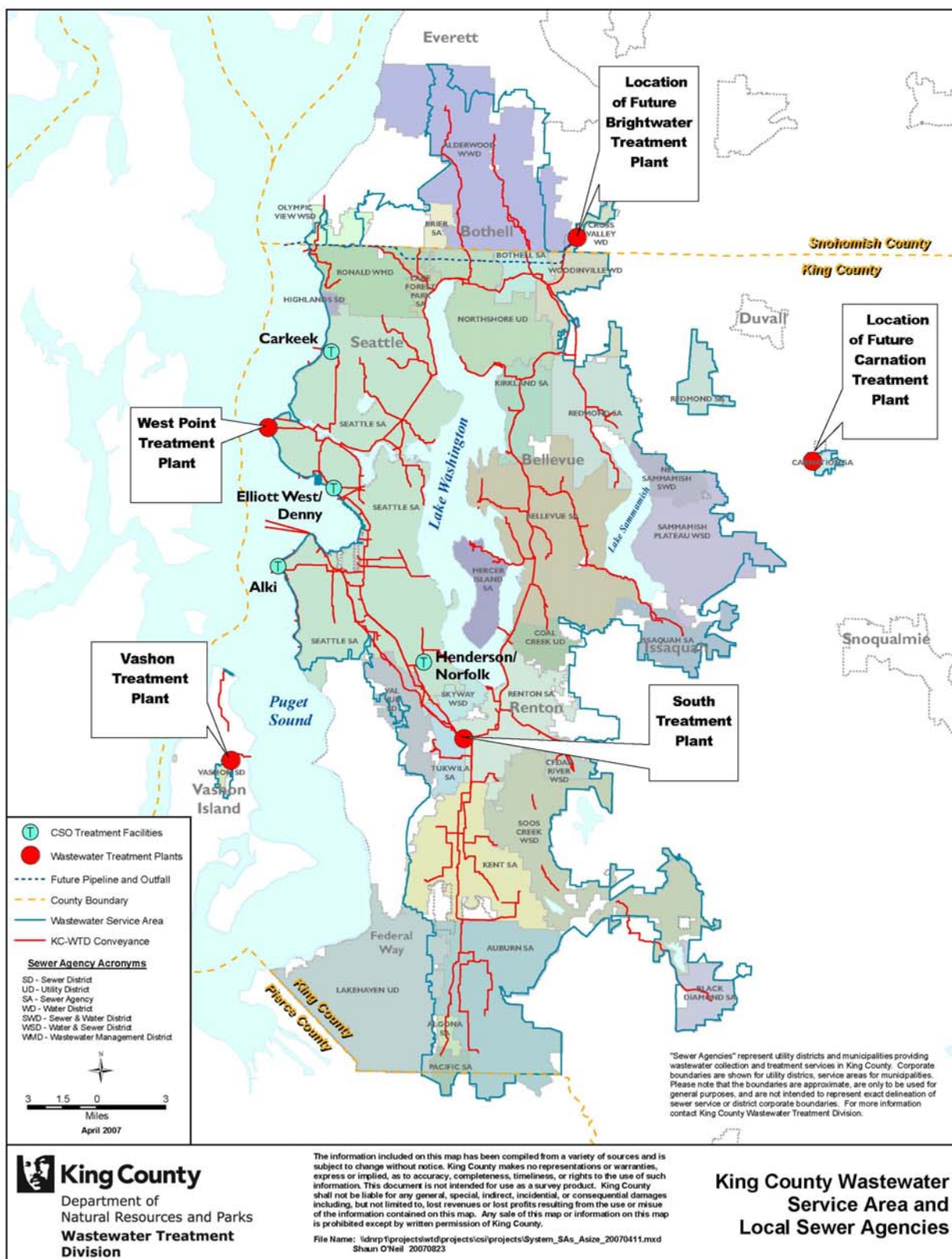


Figure 8-1. King County Wastewater Service Area and Local Sewer Agencies



The county's wastewater service area meets the requirements of the Washington State Growth Management Act (Chapter 36.70A RCW) and the King County Comprehensive Plan regarding the location and provision of sewer services.

### 8.1.2 Fulfilling Contractual Commitments

RWSP Wastewater Services Planning Policy (WWSP)-1 calls for the county to provide wastewater services to fulfill contractual commitments in a manner that promotes environmental stewardship, recognizes the value of wastewater in the regional water resource system, and reflects a wise use of public funds. Pursuant to long-term agreements and in accordance with Chapter 35.58 RCW, King County's Wastewater Treatment Division (WTD) provides wastewater treatment and disposal service to 17 cities, 16 sewer districts, and 1 Indian tribe.

Environmental stewardship is an important component of the county's wastewater treatment service. WTD's mission is to protect public health and enhance the environment by treating and reclaiming water, recycling solids, and generating energy. The county's treatment plants and associated facilities continue to meet or exceed the terms and conditions of their National Pollutant Disposal Elimination System (NPDES) permits.<sup>1</sup> WTD's vision of creating resources from wastewater is carried out in recognition of the overall value of wastewater.

King County provides high quality wastewater treatment in as cost-effective manner as possible. WTD routinely evaluates projects during the planning process and design phases to identify potential cost-savings. The division is also developing a formal and detailed asset management plan to optimize the useful life of the county's regional wastewater facilities; the efforts under way are described later on in this chapter. WTD's Productivity Initiative Pilot Program was developed to identify and implement ways to increase efficiency.<sup>2</sup> Through 2006, this pilot program has resulted in a \$42.8 million savings to ratepayers.

### 8.1.3 Protecting Public Health and the Region's Investment in the Wastewater System

The wastewater services policies call for the county to construct, operate, and maintain its regional wastewater system to prevent sewage overflows, protect public health and the environment, comply with regulations, and improve services in a fiscally responsible manner. To meet these goals, the policies also provide direction on establishing and implementing an asset management program and on actions for the county to carry out in the event of sewage overflows.

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<sup>1</sup> NPDES permits are issued by the Washington State Department of Ecology and set limits on the quality and quantity of effluent (treated wastewater) discharged from point sources such as treatment plants, CSOs, and industrial facilities.

<sup>2</sup> The Productivity Initiative Pilot Program is a ten-year incentive program that applies certain private-sector business practices to cut operating costs, increase productivity and continue a high level of service and environmental protection for WTD's customers. Chapter 13 provides more information on this program.

Chapter 9 (Water Quality Protection Policies) provides information related to sanitary sewer overflow prevention and containment, permit compliance, and source control programs designed to protect the public health and the environment. This section focuses on activities related to the planning and design of wastewater facilities, establishment and implementation of the asset management program in 2004–2006, and the county’s emergency response procedures in the event of overflows.

### Planning and Design of Wastewater Facilities

Implementation of the RWSP ensures that adequate wastewater capacity will be available when needed. WTD’s forecasting and demand-modeling capabilities, in-field flow monitoring, and ongoing facility inspections provide essential information to identify and address capacity, operational, and maintenance needs. WTD’s sections and work units coordinate to assess facility needs and prioritize projects to prevent overflows.

King County designs and constructs its facilities to meet or exceed regulatory and permit requirements. WTD applies good science and engineering to the planning, design, and construction of its facilities and follows industry-recognized standards. As a result, the county’s wastewater system exceeds the reliability standards of most major metropolitan areas and has been able to absorb record storm events in recent years with little effect on public health and safety. To ensure the county is keeping up-to-date with regulations and standards information, WTD participates in national organizations and associations that address issues such as pumping standards, treatment and odor control standards and technologies, and predictive modeling tools. In addition, WTD follows the guidelines in the *Criteria for Sewage Works Design* manual. The Washington State Department of Ecology prepares this manual, also known as the “Orange Book”. It serves as a guide for the design of wastewater collection, treatment, and reclamation systems and addresses requirements that will lead to approvable plans. State code (WAC 173-240-040) requires that sewer plans and specifications are reasonably consistent with the Orange Book.

### Protecting and Managing Capital Assets

A wastewater utility is an extremely capital-asset-intensive industry. King County is currently responsible for over \$3.8 billion of replaceable wastewater assets. By 2010, WTD expects to have over \$5.3 billion of replaceable assets. Nationwide, the wastewater industry is developing the tools for comprehensive asset management. The objective of an asset management program is to manage infrastructure capital assets to minimize the total costs of owning and operating them while delivering the service level that meets regulatory requirements and customer’s expectations.

WTD is developing a formal and detailed asset management plan to optimize the useful life of the county’s wastewater facilities. Since the *2004 RWSP Update*, WTD participated in a benchmarking process that compared the agency with 22 Australian and New Zealand utilities that are recognized world leaders in the institution of asset management practices. This process helped to identify what is working well in WTD’s asset management program and what areas need improvement. As a result, the asset management program is working in the following areas:

- Implementing a life-cycle cost economic analysis procedure; this procedure will help decide if an asset should continue to be repaired or replaced
- Conducting an extensive asset inventory audit on all treatment process equipment and facilities
- Defining minimum service levels for major processes and critical equipment
- Promoting continuous improvement and world-class best practices in our maintenance work practices, policies, and procedures
- Applying risk management concepts during project identification and prioritization
- Developing forecasted asset replacement plans for WTD's process equipment, facility structures, and conveyance system

WTD reports progress on the asset management program to the Regional Water Quality Committee on an annual basis.

Regularly scheduled condition assessments are performed on the county's conveyance system and facility structures. Findings and rehabilitation recommendations are reported in the facilities inspection annual report. Maintenance performs regularly scheduled condition assessments on critical treatment process equipment. A formal written annual reporting system to include these findings and recommendations is being developed. In addition, policies are being developed for replacing obsolete equipment that may still be useful, but for which manufacturers are no longer providing support.

An Asset Management Pilot Program began in 2005 as part of WTD's Productivity Initiative. The pilot program seeks to evaluate the cost savings from implementing asset management principles with a sample of 153 assets at the South Treatment Plant. The following progress was made through 2006 on this pilot program:

- Identified each asset's condition, age, service level, rebuild/replace intervals and costs
- Completed a financial analysis for pilot assets with rebuild or replacement costs scheduled for 2004–2007
- Deferred \$716,800 of capital renewal and replacement work based on detailed condition assessments to ensure system reliability and no reduction in service levels
- Developed guidelines to determine when actions have resulted in costs lower than the target cost

The pilot program is expanding its scope to include all raw sewage pumps. The results of the pilot program will be incorporated into the overall asset management plan.

A comprehensive asset management strategic plan is under way and anticipated to be complete by the end of 2007; this plan will be updated annually. The plan will include information on best management practices for all assets and refine the long-range capital replacement program to best predict which assets will need to be replaced, when they will need to be replaced, and a corresponding budget.

## **Emergency Response Procedures**

King County has established emergency response procedures in the event of sanitary sewage overflows. The 2006 rupture of a force main located in Lincoln Park in West Seattle illustrates how these procedures are implemented. Immediate action was taken to stop the leak by pumping out the force main and using tanker trucks to continue wastewater services while emergency repair and cleanup of the area was completed. The county fenced off the area around the leak and worked with City of Seattle Parks and Recreation staff to close the beach trail north of the Colman Pool. The Washington State Departments of Health and Ecology were promptly notified of the situation. In accordance with WTD's public and media notification procedures, staff posted the area to notify visitors and neighbors of the situation. WTD staff worked closely with nearby neighbors and neighborhood groups to keep them informed and updated during the repairs. Debriefings are conducted after each emergency response event to continually improve performance.

### **8.1.4 Conducting Research for the Wastewater System**

The wastewater services policies direct the county to continue its commitment to funding research and development relating to water quality and technologies for the wastewater system. WTD's technology assessment program continues to investigate new wastewater technologies with the potential to reduce costs, improve water quality, and/or enhance our ability to create resources from wastewater. In 2004–2006, the county conducted pilot-scale studies on the membrane bioreactor (MBR) technology being installed in the new Carnation and Brightwater treatment plants. The studies provided valuable information regarding process control, peaking capabilities, process optimization, and nutrient removal. In addition, the MBR studies provided an opportunity for operations and maintenance staff to become familiar with the technology.

As part of the University of Washington Fellowship Program funded by the county, graduate students are investigating the ability of ammonia oxidizing bacteria to biodegrade estrogen compounds, methods for evaluating digester capacity and stability and co-digestion of a biodiesel byproduct (glycerin) as a means to increase methane production.

A 1-megawatt fuel cell demonstration project was initiated at the South Treatment Plant in 2004 and completed in 2006. The fuel cell converted digester gas into electricity. The results of the demonstration project will be used to determine the use and scope of fuel cells in the future.

The county has also begun assessing the presence and fate of endocrine disrupting compounds (EDCs) in wastewater, surface waters, and soils and the analytical procedures necessary to detect minute quantities of these compounds; this work will continue in 2007.

A greenhouse was installed in 2007 at the South Treatment Plant as part of the county's resource recovery program to showcase the safe use of reclaimed water and biosolids compost in growing ornamental and horticultural plants. Researchers from the University of Washington will be able to use the greenhouse for on-site studies involving reclaimed water and biosolids. Much of their research will focus on answering questions from current and future customers of reclaimed water and will use water from South Plant's sand filters and from membrane bioreactor systems.

Studies currently under way include:

- Effects of reclaimed water on growth of golf course turfgrasses
- Fate and degradation of various organic compounds (pharmaceutical, anti-microbial, and estrogenic compounds) in soil irrigated with reclaimed water and in soil amended with biosolids

The research will also help to fine-tune operational practices.

### 8.1.5 Fostering Tribal Relations

The wastewater services policies call for the county to continue to foster tribal relations, as appropriate, to structure processes for joint water quality stewardship. WTD regularly works with tribes on its plans and projects. Activities that took place in accordance with this policy guidance in 2004–2006 are as follows:

- Entering into a sewage disposal agreement with the Muckleshoot Indian Tribe; the tribe took ownership over a portion of Auburn’s sewer service area
- Working with the Puyallup Tribe to address shellfish contamination of the Quartermaster Harbor area of Vashon-Maury Island
- Working with the Muckleshoot Indian and Suquamish Tribes in the decision process for cleaning up Duwamish River sediments
- Entering into agreements with the Suquamish Tribe and the Muckleshoot Indian Tribe regarding mitigation for the Brightwater project
- Carrying out research studies that are part of the Brightwater mitigation agreement with the Suquamish Tribe regarding marine habitat in Puget Sound; the results of these studies will be also be shared with the Tulalip Tribes
- Working closely with the Snoqualmie Tribe on the Carnation Treatment Plant and entering into an agreement with the tribe to accelerate the wetland discharge option for the Carnation plant
- Reviewing results of Sammamish River monitoring with the Muckleshoot Indian Tribe
- Coordinating with the Muckleshoot Indian Tribe to identify and address concerns regarding the design of the Ballard Siphon Repair project

## 8.2 Amendments to Wastewater Services Policies

In September 2006, the King County Council approved amendments to RWSP wastewater services policies via adoption of Ordinance 15602 in September 2006. The amendments are as follows:

- Amended Wastewater Services Policy (WWSP)-9 to specify the establishment of an asset management program; prior to being amended, the policy stated that ongoing maintenance and repair of facilities shall be a high priority of King County
- Replaced the words “King County” with “The asset management program” in WWSP-10, so that the policy now reads “*The asset management program shall establish a wastewater facilities assets management plan, updated annually, establishing replacement of worn, inefficient and/or depreciated capital assets to ensure continued reliability of the wastewater infrastructure.*”

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## Chapter 9

# Water Quality Protection Policies

RWSP water quality protection policies are intended to ensure that existing King County wastewater facilities and operations meet water quality standards and that planning for future facilities considers effects on the quality of the region's waters. The policies call for the county to participate in identifying and resolving regional water quality issues pertaining to public health and the environment to ensure protection of the public's investment in wastewater facilities and water resource management programs. The policies also call for the county to implement programs to support permit compliance, to forecast future aquatic resource conditions that may affect wastewater treatment decisions, and to participate with others in identifying ways to mitigate problems and enhance regional water quality.

In addition, RWSP water quality protection policy (WQPP)-5 specifies that the King County Executive implement a comprehensive water quality monitoring program of streams and water bodies that are or could be impacted by the wastewater system and that the executive submit summary reports and comprehensive reviews of this information to the King County Council as outlined in K.C.C. 28.86.165.<sup>1</sup> Appendix O contains the 2006 report.

This chapter provides an overview on implementation of the water quality protection policies from 2004 through 2006. In accordance with the RWSP reporting policies, this chapter also includes a summary of the activities carried out in 2006. The complete text of all the water quality protection policies, including information on policy amendments and a brief summary of how each policy was implemented in 2004–2006, is provided in Appendix H.

## 9.1 Implementation of Water Quality Protection Policies from 2004 through 2006

This section describes implementation of RWSP water quality protection policies in regard to identifying and resolving water quality issues, assessing risks, permit compliance, working with others to forecast future conditions and develop resource enhancement programs, and implementing a water quality monitoring program.

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<sup>1</sup> In September 2006, the King County Council adopted Ordinance 15384, which amended this policy to include information and results of the water quality monitoring program in RWSP annual reports instead of as a separate report.



### 9.1.1 Identifying and Resolving Water Quality Issues and Assessing Risks to Public Health and the Environment

WTD routinely samples its effluent and the quality of the water near treatment plant and CSO outfalls. This sampling is done not only to meet regulatory requirements but also to quickly identify effluent quality issues that may require adjustments to operations or investigations into sources of particular pollutants.

King County's Trouble Call Program investigates water quality complaints, including wastewater overflows and leaks, in the greater King County wastewater service area. Services include taking samples and implementing emergency responses such as notifying public health agencies and posting signs. The program responded to about 110 incidents each year for the years 2004–2006. In 2004 and 2005, nine of the incidents were WTD-related. In 2006, twenty-four incidents were WTD-related, primarily because of the Barton force main breaks and the December windstorm.

In response to listings of fish species as threatened under the Endangered Species Act (ESA), WTD voluntarily began to develop a Habitat Conservation Plan (HCP) for WTD activities that could have an effect on these species. Although WTD decided in 2005 that the commitment of resources required to match the level of uncertainty was too substantial to continue the HCP process, the studies done in support of the HCP provided valuable direction for WTD activities and future studies. WTD is now seeking individual ESA consultations for projects with a federal link. All the materials and agreements that were developed in the first phase of the HCP were used in completing the federal permitting processes for the Brightwater facilities, the Carnation Treatment Plant, and other WTD construction projects. In addition, a small portion of the HCP budget was allocated to pursue a Programmatic Biological Assessment (PBA) for WTD construction activities and reclaimed water uses. These more focused agreements will streamline the ESA consultation process by getting advance approval for the majority of best management practices and methods of construction.

WTD is following the scientific and technical developments for emerging chemicals of concern such as endocrine disrupting chemicals (EDCs). Some of these chemicals may be found in stormwater and treated wastewater. In 2004, staff attended technical meetings to learn more about these chemicals and their potential effects and created a Web site that gives general information on the topic.<sup>2</sup> To further add to its understanding of EDCs, King County undertook some initial screening level sampling of its surface waters in 2003 and 2004 to determine if there are measurable suspected EDCs present. A report that describes these findings in detail was published in April 2007.<sup>3</sup> The Industrial Waste Program has been investigating industrial sources of some EDCs in the basin that drains to the Lower Duwamish Waterway as part of the effort to reduce sediment contamination in the waterway.

King County assesses the risk to human health and the environment from wastewater treatment and conveyance activities and uses this information in evaluating water pollution abatement

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<sup>2</sup> <http://dnr.metrokc.gov/WTD/community/edc/index.htm>

<sup>3</sup> *Survey of Endocrine Disruptors in King County Surface Waters* is available at <http://dnr.metrokc.gov/wlr/waterres/streamsdata/reports/Endocrine-disrupting-compounds.htm>

control options. The Lower Duwamish Waterway Work Group (City of Seattle, Port of Seattle, Boeing, and King County) conducted human and ecological risk assessments as part of remedial investigation studies for the Lower Duwamish Waterway Superfund cleanup project. Phase 1 risk assessments were completed in 2003; draft Phase 2 baseline risk assessments were completed in 2006. The assessments will be used to evaluate the potential threat to human health and the environment from the waterway's contaminated sediment and water and to determine whether remedial action is necessary. King County completed a screening-level aquatic life risk assessment in 2005 for the Green River watershed as part of the Green-Duwamish Water Quality Assessment. WTD is using the results of the Green-Duwamish Water Quality Assessment in capital planning efforts, including planning for CSO control projects. The results are also contributing to salmon conservation planning and the Washington State Department of Ecology's (Ecology) Total Maximum Daily Load program. In addition, aquatic life, wildlife, and human health risk assessments in the greater Lake Washington watershed were completed in 2006.

### 9.1.2 Implementing and Maintaining Programs to Support Permit Applications and Compliance

WTD's core mission is to protect public health and the environment by collecting wastewater from local sewer systems and treating the wastewater to meet National Pollutant Discharge Elimination System (NPDES) limits before discharging the treated effluent to our water bodies.<sup>4</sup> To that end, WTD strives to design and operate its treatment and conveyance systems to meet or exceed standards and to prevent or minimize overflows of untreated or partially treated wastewater. The treatment plants and associated facilities continue to be in compliance with the terms and conditions of their NPDES permits and so are in compliance with the Washington State Water Pollution Control Act, the Federal Water Pollution Control Act, and the Federal Clean Water Act. The NPDES permits are renewed about every five to seven years; each renewal usually carries additional terms and conditions.

In 2006, a number of unusual events taxed the wastewater system. Early in the year, the Barton Force Main failed and was replaced. In November and December, extreme wind and rain storms—and associated power outages—occurred. During the November storms, the West Point and South treatment plants handled record flows without incident. Both plants reached or exceeded maximum capacity on several days. Many of the pump stations ran at capacity for days without any significant equipment failures. During the December storm, portions of the West Point plant were flooded and the plant lost treatment capability for several hours, 20 pump stations lost power and operated on emergency generators, and the North Mercer Interceptor ruptured.

Despite these conditions, neither West Point nor South plant experienced exceptions to NPDES secondary treatment permit limits in 2006. These plants also met their limits without exception in

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<sup>4</sup> NPDES permits are issued by the Washington State Department of Ecology and set limits on the quality and quantity of effluent (treated wastewater) discharged from point sources such as treatment plants, CSOs, and industrial facilities.

2004 and 2005. Both plants received the National Association of Clean Water Agencies (NACWA) Platinum Peak Performance Award for operating five consecutive years with no permit exceptions. The Vashon plant experienced eleven exceptions in 2006, two in 2005, and none in 2004. The upgraded Vashon plant, which went online in late 2006, is expected to eliminate these periodic exceedances.

The number of sanitary sewer overflows (SSOs), however, increased in 2006 because of these extreme events.<sup>5</sup> In 2004 and 2005, the numbers of SSOs were below the 15-year annual average of 15 occurrences (8 SSOs in 2004 and 10 in 2005). In 2006, the number was 27, half of which resulted from the December storm and the Barton Force Main failure. An SSO must be reported to Ecology within five days after WTD becomes aware of the SSO. Operators should know immediately whether there is an SSO at a pump station because each pump station has level indicators with alarms. That is not the case for leaks/SSOs from pipelines, siphons, and force mains. In these cases, WTD relies on staff reconnaissance and phone calls from the public or other utilities.

King County's combined sewer overflow facilities are regulated through West Point's NPDES permit. WTD submits a report to the Ecology each year on the volume and frequencies of CSOs and on progress made to control its CSOs. King County began to develop plans for controlling CSOs as early as 1979, after treatment plants and conveyance lines were in place. By May 2005, with completion of the projects specified in the 1988 CSO plan and the Mercer/Elliott West and Henderson/Norfolk facilities, about 17 of King County's 38 CSOs were controlled.<sup>6,7</sup> The remaining 21 uncontrolled CSOs will meet state standards as projects listed in the RWSP are completed between 2012 and 2030 (see Chapter 5). Figure 9-1 shows the estimated CSO reduction from 1988 through completion of the RWSP projects in 2030. Almost 20 years of record demonstrate progress toward the control goal. As shown in Figure 9-2, volumes of untreated CSOs, on the whole, have been decreasing despite fluctuations in rainfall from year to year.<sup>8</sup>

Five facilities provide CSO treatment—the equivalent of primary treatment—to combined flows: the West Point plant, the Alki and Carkeek CSO treatment plants, and the new Mercer/Elliott West and Henderson/Norfolk systems. At West Point, the primary-treated CSOs are blended with the secondary-treated effluent. The blended effluent consistently meets NPDES limits for secondary-treated flows. West Point's renewed NPDES permit, which became effective in January 2004, required that beginning in January 2006, the Alki and Carkeek CSO treatment plants dechlorinate treated CSOs before discharge. Modifications were made to the plants to

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<sup>5</sup> SSOs are discharges of wastewater from separated sewer systems and from combined systems when no rain is occurring. They can flow from manholes, broken pipes, or pump stations to city streets, water bodies, and basements. SSOs occur on rare occasions such as extreme storms and power outages.

<sup>6</sup> "Control" is defined as meeting the Washington State standard of an average of no more than one untreated discharge per year per outfall. An update and calibration of the hydraulic model, expected to be ready in 2007, will help to verify the control status of King County CSOs.

<sup>7</sup> See Chapter 5 for a description of the Mercer/Elliott West and Henderson/Norfolk facilities.

<sup>8</sup> The annual volume and frequency of combined sewer overflows (CSOs) are reported from the beginning of June in one year to the end of May in the next year. More information about specific CSOs can be found in the *Combined Sewer Overflow Program 2005–2006 Annual Report* at [http://dnr.metrokc.gov/wtd/cso/library/AnnualReport/2005-06\\_CSOAnnual.pdf](http://dnr.metrokc.gov/wtd/cso/library/AnnualReport/2005-06_CSOAnnual.pdf)

meet this requirement, the plants began dechlorination on schedule, and staff are using the startup experience to fine-tune the systems.

The first two wet seasons of operation of the Mercer/Elliott West system provided WTD staff with opportunities to troubleshoot the new system and make adjustments where necessary. Despite startup challenges, the Mercer/Elliott West facilities greatly reduced the volumes of untreated CSOs discharged from the Denny and Dexter Regulator Stations. Additional corrections are anticipated to be made before the start of the 2007–2008 wet season, with the goal of fully meeting permit requirements. The Henderson/Norfolk system began full operation in the second half of 2006 after programming errors were identified and corrected. The system operated with only minor problems during the 2006–2007 wet season.

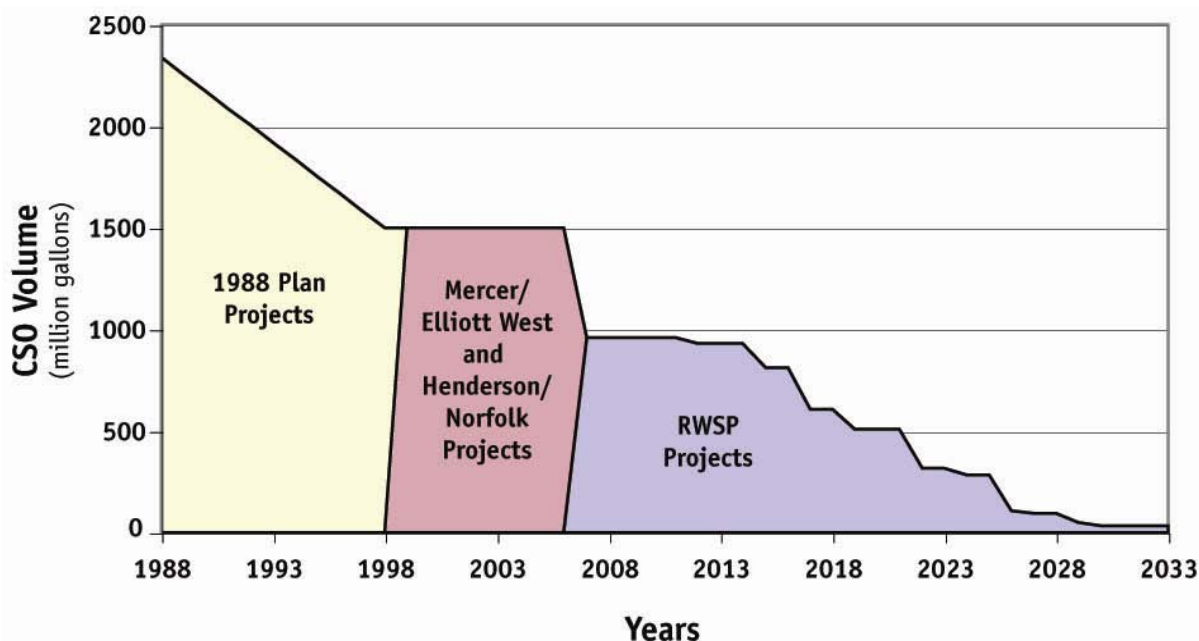


Figure 9-1. Actual and Planned CSO Reduction, 1988–2030

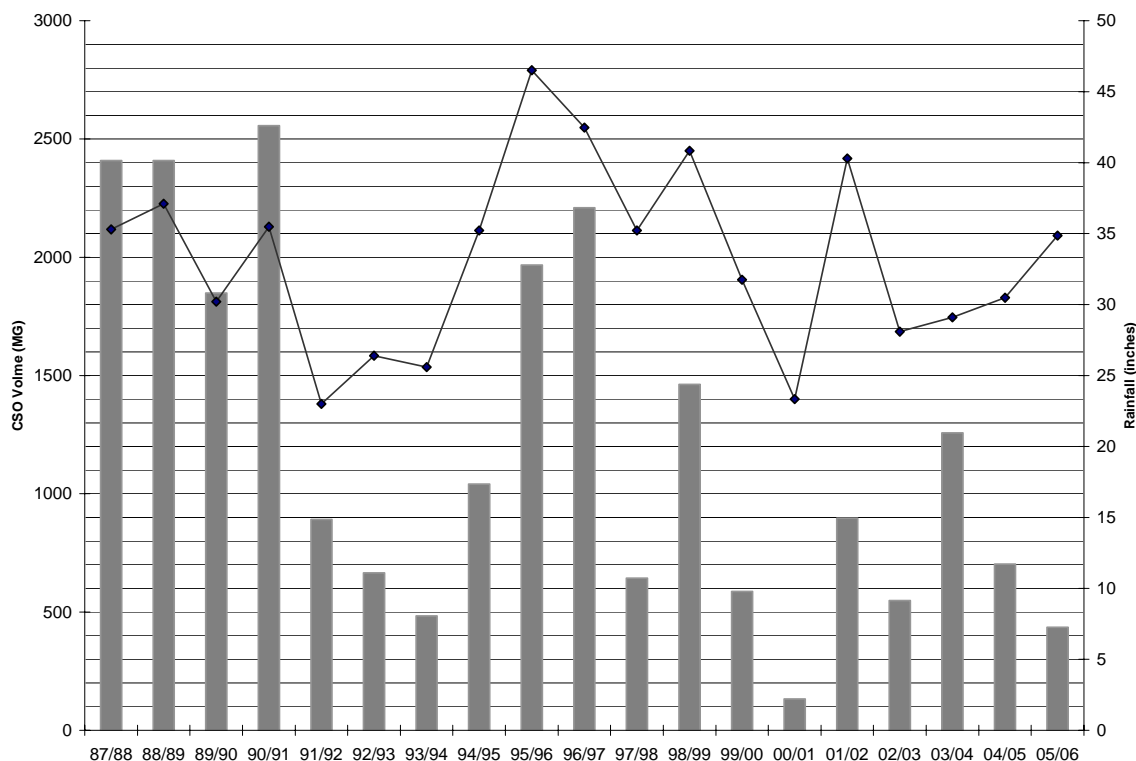


Figure 9-2. Annual CSO Volumes—1987 through 2006

The best way to protect our waterways is to control pollutants at their sources. Two programs work to prevent pollutants from reaching King County treatment plants—the Industrial Waste Program and the Local Hazardous Waste Management Program. Among other achievements, these programs have helped to reduce the levels of mercury in biosolids by 50 percent from levels in 2000 (Figure 9-3). The annual median concentration of mercury in South plant biosolids has continued to decline from 2004; the concentration at West Point has remained at about the 2004 level.

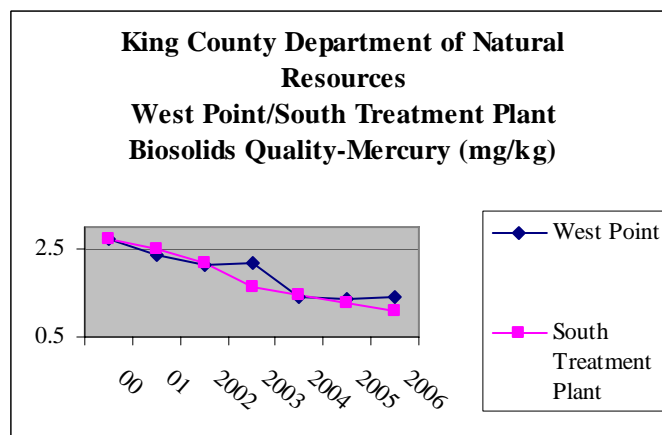


Figure 9-3. Decline of Mercury Concentrations in Biosolids, 2000 through 2006

### 9.1.3 Working with Others to Forecast Future Conditions and Develop Resource Enhancement Programs

King County routinely monitors and models the condition of county water resources and uses information from these efforts and from other programs in the region to identify trends.

In 2006, King County DNRP in partnership with Pacific Northwest National Laboratory completed an Integrated Water Resource Modeling System (IWRMS). The system integrates a collection of water resource models representing more than 60 watersheds, rivers, lakes, estuaries, and other water resources. It can predict the potential impacts of urban activities—including growth—on these resources. IWRMS will be used to evaluate diverse water, land use, population, and climate change scenarios and to inform decisions on complex issues such as drinking water withdrawal from urban lakes, instream flows for fish, wastewater capital project planning, and discharge of reclaimed water on agricultural fields.

In 2005, King County, in cooperation with other sponsors, held a climate change conference. Experts presented possible future effects of climate change on the region, including impacts on availability of water resources and on flood management. WTD may need to consider measures to prevent overflows, as evidenced in 2006, in light of possible increases in flooding and to further its mission to create resources from wastewater by exploring the reuse of treatment plant effluent. WTD will continue to monitor the growing information on climate change and sea-level rise and will accommodate this information in its plans as needed. For example, the design of new CSO control facilities or of modifications to existing facilities will consider climate impacts and sea-level change anticipated during the life of the facility. Possible accommodations could include increased sizing, higher facility elevations with respect to nearby water bodies, increased pumping, and enhanced flood and storm surge protections.

King County works with other entities in the region on water quality monitoring and protection programs, including studies done in support of salmon conservation in the two major watersheds in the county. King County works with Ecology and local jurisdictions on developing and implementing Total Maximum Daily Loads for impaired surface waters and to develop a more coordinated ambient monitoring program. It also participates in the Puget Sound Partnership—a public/private group convened by the Governor to develop an aggressive 15-year plan to solve Puget Sound’s most vexing problems—and works with University of Washington researchers to understand and plan for climate change.

In addition, the county has worked with other agencies on sediment remediation and source control projects in the Duwamish River. Since 2000, King County, Port of Seattle, City of Seattle, and Boeing have been involved in efforts under the federal Superfund program to better understand the human and environmental risks from contaminated sediments in the Lower Duwamish Waterway and to take actions where necessary. King County was the lead agency, with participation by the City of Seattle and funding from the Elliott Bay/Duwamish Restoration Program, for remediation of the Diagonal/Duwamish site, completed in 2004.

In 2005, King County convened a regional water resources planning process to integrate reclaimed water and instream flows into water planning in the region. Participants include

representatives from tribes, local water and wastewater utilities, elected officials, environmental groups, and governmental agencies. Technical committees were formed to produce information based on best available science on seven topics: water demand forecast, water supply assessment, climate change impacts, reclaimed water, tributary stream flows, source exchange strategies, and small water systems. The participants may choose whether or how to use the products as they see fit, and the work of the committees does not in any way affect the authority of any of the participants in the planning process.

### 9.1.4 Implementing a Comprehensive Water Quality Monitoring Program of Streams and Water Bodies

WTD supports a number of water and sediment quality monitoring programs to assess its compliance with NPDES permit limits; to track water quality trends in water bodies in King County, particularly those that cross wastewater conveyance lines; to protect public health, including monitoring swimming beaches; and to support capital projects, CSO control and sediment cleanup, and partnerships with others in watershed protection and salmon recovery programs. Table 9-1 lists monitoring programs that are ongoing or that were in progress in 2006. Appendix O describes results of these programs in 2006. Annual water quality reports describe other programs completed in 2004 and 2005.<sup>9</sup>

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<sup>9</sup> <http://dnr.metrokc.gov/wtd/rwsp/library.htm#ProgressReports>



Table 9-1. Summary of King County Water Quality Monitoring Programs

Program	Media and Locations	Parameters	Methods	Sampling Frequency	Program Purpose	Duration
<b>Ambient Monitoring</b>						
Marine monitoring	Water and sediments in areas of Puget Sound away from outfalls and CSOs; shellfish and algae from Puget Sound beaches	Water samples: temperature, salinity, clarity, DO, nutrients, chlorophyll, and bacteria Shellfish: lipids and metals	Water samples collected at multiple depths, ranging from 1 to 200 m Sediments and shellfish	Water samples: monthly Shellfish: annually; sediments: bi-annually	To assess potential effects to water quality from nonpoint pollution sources and to compare quality against point source data	Ongoing
Major lakes monitoring	Cedar-Sammamish Watershed (WRIA 08) only: Lakes Washington, Sammamish, and Union	Temperature, DO, pH, conductivity, clarity, phosphorus, nitrogen, and fecal coliform; microcystin is measured at select stations	Samples collected every 5 m from 1 m below the surface to bottom at one station in center of lake and from the surface around various locations around the shoreline	Biweekly during the growing season; monthly during the rest of the year	To monitor the integrity of the wastewater conveyance system and the condition of lakes	Ongoing
Small lakes monitoring	Volunteers monitor 51 small lakes in King County	Precipitation, lake level, temperature, Secchi depth, phosphorus, nitrogen, chlorophyll-a, phytoplankton	Single-point and vertical profiles	Rainfall & lake level: daily Temperature & Secchi depth: weekly Other parameters: every 2 weeks April to October	To characterize and identify trends in water quality	Ongoing

BMP = best management practices; BOD = biochemical oxygen demand; DNR = Washington State Department of Natural Resources; DO = dissolved oxygen; Ecology = Washington State Department of Ecology; HPA = Hydraulic Permit Approval; SAP = sampling and analysis plan; TMDL = total maximum daily load; TOC = total organic carbon; TSS = total suspended solids.

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Program	Media and Locations	Parameters	Methods	Sampling Frequency	Program Purpose	Duration
Rivers and streams monitoring	Rivers and streams of both watersheds; emphasis on those that cross wastewater conveyance lines or that could be a source of pollution	Baseflow and storm samples: turbidity, TSS, pH, temperature, conductivity, DO, nutrients, ammonia, bacteria Storm samples: trace metals Sediment quality at selected stations	Various	Monthly sampling under baseflow conditions; three to six times per year at mouth of streams under storm conditions	To monitor the integrity of the wastewater conveyance system and the condition of streams and rivers	Ongoing
Swimming beach monitoring	Cedar-Sammamish Watershed: Lake Washington, Lake Sammamish, and Green Lake	Bacteria	Water samples at swimming beaches	Summer	To evaluate human health risks and necessity for beach closures	Ongoing
Benthic macroinvertebrate monitoring	Wade-able stream sub-basins	Size and distribution of aquatic macroinvertebrate populations	Samples collected with a Surber stream bottom sampler	Annually	To establish a baseline for identifying long-term trends	Ongoing
<b>Wastewater Treatment Plant Outfall Monitoring</b>						
Marine wastewater plant outfall water column and beach monitoring	Puget Sound water column at treatment plant outfalls; water and shellfish at beaches near outfalls	Water samples: temperature, salinity, clarity, DO, nutrients, chlorophyll, and bacteria Shellfish: lipids and metals	Water samples at outfalls collected at multiple depths, ranging from 1 to 200 m Shellfish	Water samples: monthly Shellfish: annually	To assess potential effects to water quality from wastewater discharges	Ongoing

BMP = best management practices; BOD = biochemical oxygen demand; DNR = Washington State Department of Natural Resources; DO = dissolved oxygen; Ecology = Washington State Department of Ecology; HPA = Hydraulic Permit Approval; SAP = sampling and analysis plan; TMDL = total maximum daily load; TOC = total organic carbon; TSS = total suspended solids.

Program	Media and Locations	Parameters	Methods	Sampling Frequency	Program Purpose	Duration
Marine NPDES sediment monitoring	Sediments in Puget Sound near treatment plant outfalls and the Denny Way CSO	Grain size, solids, sulfides, ammonia-nitrogen, oil & grease, TOC, metals, organic compounds, and (at South and West Point plants) benthic infauna	Sediment samples in a grid pattern as defined in the SAP approved by Ecology	Sediment samples at outfalls once per permit cycle (about every 5 years)	NPDES permit requirement	Ongoing
<b>Special Studies</b>						
Sammamish-Washington Analysis and Modeling Project (SWAMP)	Water and sediments in major lakes and their inflowing streams	Broad spectrum of water quantity and quality, sediment quality, biological, and physical parameters	Various	1999--2003	To develop a computer model of the watershed	Completed in 2006
Ecological and Human Health Risk Assessment	Water bodies in Cedar-Sammamish watershed	Existing water, sediment, and tissue data	Various, using a tiered approach	Using existing data from other sampling efforts	To assess sampling program adequacy based on potential for chemicals to pose risks to aquatic life, wildlife, or human health	Completed in 2006
Green-Duwamish Water Quality Assessment (G-DWQA)	Water in Green and Duwamish Rivers and their inflowing rivers and streams	Broad spectrum of water quantity and quality, biological, and physical parameters	Various	Intensive	To develop models, evaluate BMPs, prepare risk assessments	Completed in 2006
Storm Impact Water Quality Monitoring	Water in Green and Duwamish Rivers and their inflowing rivers and streams under storm flow conditions	Broad spectrum of water quantity and quality, sediment quality, biological, and physical parameters	Various	Intensive	To evaluate conditions and to support modeling and WRIA planning	Completed in 2003; report issued in 2004

BMP = best management practices; BOD = biochemical oxygen demand; DNR = Washington State Department of Natural Resources; DO = dissolved oxygen; Ecology = Washington State Department of Ecology; HPA = Hydraulic Permit Approval; SAP = sampling and analysis plan; TMDL = total maximum daily load; TOC = total organic carbon; TSS = total suspended solids.

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Program	Media and Locations	Parameters	Methods	Sampling Frequency	Program Purpose	Duration
Loadings Calculations	Water in Green and Duwamish Rivers and their inflowing rivers and streams	Broad spectrum of water quantity and quality, sediment quality, biological, and physical parameters	Estimates based on water quality data and on literature reviews for land use classifications		To estimate chemical loading to surface waters	Completed in 2006
Temperature and DO Studies	Water in Green and Duwamish Rivers and their inflowing rivers and streams	Daily fluctuations in temperature and DO, especially in the summer	Continuously recording data loggers	Intensive	To evaluate conditions and to support modeling and WRIA planning	Completed in 2003; temperature report issued in 2004; DO report completed in 2006
Microbial Source-Tracking Study	Green River and its tributaries	Land uses and bacterial sources associated with bacterial populations		Intensive	To assist in setting and measuring TMDLs	Completed in 2004; report completed in 2006
Brightwater Outfall Studies	Water, sediment, and eelgrass for the Brightwater outfall site	Water quality: temperature, salinity, DO, nutrients, and fluorescence	Water column samples and continuous buoy readings	Annual	Regulatory—to meet HPA and DNR outfall lease requirements	Through 2014
	Upland soils at outfall Portal 19	Sediments: benthic community and chemistry	Surface sediments Eelgrass survey			
Brightwater Construction NPDES Stormwater Monitoring	Stormwater and surface water	Stormwater quality	Various	Intensive	To meet NPDES Construction Stormwater permit	Through 2010

BMP = best management practices; BOD = biochemical oxygen demand; DNR = Washington State Department of Natural Resources; DO = dissolved oxygen; Ecology = Washington State Department of Ecology; HPA = Hydraulic Permit Approval; SAP = sampling and analysis plan; TMDL = total maximum daily load; TOC = total organic carbon; TSS = total suspended solids.

Program	Media and Locations	Parameters	Methods	Sampling Frequency	Program Purpose	Duration
Denny Way/Lake Union pre-remediation sediment monitoring	Sediment near the Denny Way and Lake Union CSOs	Benthic communities, sediment chemistry	Sediment samples per approved SAP	Variable	Regulatory—under a NOAA Fisheries Section 7 ESA consultation	Through 2021
Diagonal/Duwamish post-remediation sediment monitoring	Sediments near the Seattle Diagonal storm drain (includes city and county CSO) and the county's Duwamish CSO	Sediment chemistry, turbidity, cap surveys	Sediment samples per approved SAP	Annual	Regulatory—under an EPA/Ecology Consent Order	Through 2013

BMP = best management practices; BOD = biochemical oxygen demand; DNR = Washington State Department of Natural Resources; DO = dissolved oxygen; Ecology = Washington State Department of Ecology; HPA = Hydraulic Permit Approval; SAP = sampling and analysis plan; TMDL = total maximum daily load; TOC = total organic carbon; TSS = total suspended solids.

## 9.2 Water Quality Protection Activities in 2006

RWSP reporting policies call for including in RWSP annual reports a summary of the Wastewater Treatment Division's water quality management programs and its compliance with the Endangered Species Act and with other agency regulations and agreements. This section reports on the progress of WTD's water management programs and compliance activities in 2006.

### 9.2.1 Wastewater Treatment Plant Capacity, Flows, and NPDES Compliance

On average, WTD's three secondary treatment plants process over 180 million gallons of wastewater each day. The quality of treated effluent from these plants remained high in 2006. Effluent values were typically far below the limits set in the wastewater discharge permits.

### 9.2.2 South Treatment Plant

The South Treatment Plant provides secondary treatment for wastewater flows from customers in the lower Green River basin, suburban cities east of Lake Washington, and Seattle's Rainier Valley, in addition to flows from parts of Snohomish and Pierce Counties. The South plant also treats septic tank solids from the region and sludge from treatment facilities in neighboring areas such as Snoqualmie Valley cities and Vashon Island.

The South Treatment Plant is designed to manage an average monthly wet-weather flow of 115 million gallons per day (mgd) with an effluent pumping capacity of 325 mgd. Its outfalls at Duwamish Head in West Seattle discharge secondary effluent into Puget Sound 10,000 feet from shore at a depth of 600 feet into the denser deeper water layer. The increasingly diluted effluent plume moves southward in the Sound, remaining at or below a depth of 390 feet.

Despite the fluctuation of flow volumes and influent composition, the South Plant's secondary treatment process consistently produces high quality secondary effluent. In 2006, the plant accepted 11.7 MG of septic tank solids. From November 2005 through April 2006, the plant managed an average wet-weather flow of 91 mgd.<sup>10</sup> Treatment efficiency remained high and consistent, even though primary and secondary treated effluent were blended for discrete periods of time during the high intensity and duration storms in November and December to maintain the optimum plant operation and to meet permit limits. No NPDES permit exceptions occurred during the year, and the plant earned the National Association of Clean Water Agencies

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<sup>10</sup> For the South and Vashon plants, the average wet-weather flow (AWWF) is the average flow during the wet season, between November and April, on days when no rainfall has occurred on the previous day. For the West Point plant, the "non-storm" AWWF is calculated without counting the flow on days when it rains or the days immediately following a rain event.

(NACWA) Platinum Peak Performance Award for operating five consecutive years with no permit exceptions.

### 9.2.3 West Point Treatment Plant

The West Point Treatment Plant provides secondary treatment for wastewater from customers located in the greater Seattle area and in southwest Snohomish County. West Point is the largest plant in the King County system. This plant is designed to manage an average non-storm wet-weather flow of 133 mgd and a peak wet-weather flow of 440 mgd. After treatment, the secondary effluent is discharged through an outfall near the plant into Puget Sound. The outfall discharges 3,650 feet from shore at a depth of 240 feet. The increasingly dilute effluent plume flows northward most of the year, out of Puget Sound.

West Point is designed to provide secondary treatment for up to 300 mgd of wastewater. Capacity between the 300-mgd capacity for secondary treatment (defined as 2.25 times the average wet-weather flow of 133 mgd) and the 440-mgd peak capacity is used to manage captured CSO flows. After receiving CSO treatment (equivalent to primary treatment), these flows are mixed with secondary effluent for disinfection, dechlorination, and discharge at the deep marine outfall. The blended effluent must meet secondary effluent quality limits.

From November 2005 through April 2006, the average wet-weather flow through the West Point Treatment Plant was 87 mgd. No NPDES permit exceptions occurred during the year, although there were a number of reported sanitary sewer overflows (see the section on sanitary sewer overflows). The plant earned the NACWA Platinum Peak Performance Award for operating five consecutive years with no permit exceptions.

### 9.2.4 Vashon Treatment Plant

The Vashon Treatment Plant was originally designed to manage a monthly average flow of 0.264 mgd and a peak flow of approximately 1.0 mgd. In November 2006, the newly upgraded plant with increased capacity, began full operation (see Chapter 2). An outfall, which was extended in 2004, discharges 2,900 feet offshore to Puget Sound at a depth of minus 200 feet mean lower low water (MLLW). Also in 2006, Ecology approved the revised NPDES permit application for the upgraded facility.

From November 2005 through April 2006, the average wet-weather flow at the Vashon plant was 0.19 mgd. The plant experienced 11 NPDES permit exceptions during the year, including maximum and minimum pH exceedances, several total suspended solids limit violations, and one fecal coliform bacteria exceedance. These exceptions occurred before the upgraded plant went online.

WTD also owns and operates the Beulah Park/Cove Treatment Facility on Vashon Island. This facility collects wastewater from approximately 60 residences via a vacuum system and pump station; treats the wastewater with a series of septic tanks, recirculating sand filters, and ultraviolet disinfection; and then pumps the effluent to a drip field for percolation to subsurface

soils. King County reports quarterly on the operation of this facility. No violations of permit limits occurred in 2006.

## 9.3 Sanitary Sewer Overflow Prevention and Containment

Extensive resources have been committed to maintaining the integrity of the system and preventing sanitary sewer overflows (SSOs). WTD's Maintenance and Asset Management groups regularly inspect, maintain, and repair existing facilities to prevent mechanical failures and SSOs. In addition, WTD regularly updates its conveyance system improvement program to ensure that conveyance facilities keep pace with projected needs for increased capacity.

Table 9-2 provides details on SSOs that occurred in 2006. A total of 27 SSOs were reported during the year. The overflows ranged in size from 100 gallons to 25 million gallons. Eleven of the 27 SSOs resulted from the significant precipitation, severe winds, and ensuing power outages that occurred between December 14 and 16. Loss of power to pump stations caused several of these overflows. A series of ruptures and subsequent replacement of the Barton Force Main, which carries wastewater underground through Lincoln Park in Seattle, was responsible for three other SSOs during the year. Crews installed and operated a bypass line for over a month during force main replacement.

Six of the non-storm related SSOs occurred at the West Point Treatment Plant. On three occasions, a small volume of primary treated effluent was diverted around secondary treatment because of mechanical problems and then subsequently blended back into the secondary flow prior to discharge. The discharged blended effluent stayed within permit limits. The plant also experienced two brief periods when disinfection was not provided. On another occasion, primary effluent leaked to the ground as a result of a clogged valve that was stuck in the open position during digester tank refilling. The leak was contained and easily remediated. Finally, in December, mechanical problems at the plant prompted the discharge for a few hours of untreated or partially treated wastewater to Puget Sound. The causes of the mechanical problems are still being investigated.

While there may be some short-term risk to public health and the environment from SSOs, these volumes of releases do not produce long-term effects. In all cases, WTD overflow response procedures were implemented: posting the area, cleaning up the area as appropriate, and monitoring water quality in the vicinity of the overflow to determine when pollutant concentrations have returned to levels consistent with state Water Quality Standards.



Table 9-2. Sanitary Sewer Overflows in 2006

Date	Location	Estimated Volume (gallons)	Duration	Discharge Type	Receiving Water	Reason for Overflow
Jan. 8	West Point Treatment Plant	350,000	Unknown	Primary effluent	Onto the ground	A pressure relief valve was open, probably from debris, during digester refilling.
Jan. 15	Denny Way Regulator Station	110,000	1.7 hours	Untreated wastewater	Elliott Bay	Outfall gate was opened by vandals.
Jan. 17	Barton Pump Station	1,850,000	4 days	Untreated wastewater	Puget Sound	Break in Barton Force Main in Lincoln Park.
Jan. 24	West Point Treatment Plant	< 100,000	0.2 hour	Treated and disinfected wastewater	Diversion around secondary and blended with fully treated effluent	False reading because of faulty air valve in the influent pump station caused CSO gates to open about 55 percent.
Feb. 4	Barton Pump Station	Unknown	~2 days	Untreated wastewater	Puget Sound	Second break in Barton Force Main.
Feb. 17	Pacific Pump Station	1,000	~0.4 hour	Untreated wastewater	Into a resident's yard	Wet-well alarm caused pumps to shut down; possibly the result of a power failure.
Mar. 10	Barton Pump Station	180,000	3 hours	Untreated wastewater	Puget Sound	Emergency construction work to replace and connect the Barton Force Main to the pump station.
April 5	York Pump Station vault	100,000	0.75 hour	Untreated wastewater	Overland to Sammamish River	Guide that holds the float valve broke in the force main air/vacuum relief valve.
April 10	Barton Pump Station	13,000	0.25 hour	Untreated wastewater	Puget Sound	Emergency construction work to replace the Barton Force Mains required moving the temporary pump station connection to allow for welding.
April 18	West Point Treatment Plant	Unknown	0.75 hour	Treated effluent without disinfection	Puget Sound	Disinfection failure; lead chlorinator was not working.
Sept. 1	West Point Treatment Plant	300,000	5 min	Partially treated effluent	Puget Sound	False signal from corroded wire on level controller.
Sept. 14	South Michigan Regulator Station	500,000	~1 day	Combined wastewater and stormwater	Duwamish River	Stoplog failure; possibly triggered by high storm flow or by workers during stoplog replacement.
Oct. 7	West Point Treatment Plant	57,000	8 min	Partially treated effluent	Puget Sound	A pump failed at Influent Pump Station; variable speed drive was tripped by power supply alarm; could not identify the cause.
Nov. 6	Elliott West treatment facility	25,000,000	6.5 hours	Primary effluent with partial or no disinfection	Puget Sound	Late delivery of sodium hypochlorite; flow was discharged without chlorination for a portion of a discharge day.
Nov. 6	West Point Treatment Plant	Unknown	~0.5 hour	Treated effluent without disinfection	Puget Sound	Chlorine residual dropped below 0.05 mg/L during high flows; could not identify the cause; situation is being monitored.
Nov. 30	Interurban Pump Station	100	< 1 day	Untreated wastewater	Onto the ground near the Starfire Sports complex	Leak from the air/vacuum relief structure; relief valve obstructions were removed.

## Chapter 9. Water Quality Protection Policies

Date	Location	Estimated Volume (gallons)	Duration	Discharge Type	Receiving Water	Reason for Overflow
Dec. 14-21	North Mercer Interceptor	~307,000	7 days	Untreated wastewater	Overflow on land	Major wind/rain storm and power outages; failure in area where pipe had been patched; flows were bypassed during repair.
Dec. 14	Elliott West treatment facility	Unknown	~1–2 hours	Combined wastewater and stormwater	Over land and into Elliott Bay	Major wind/rain storm and power outages; manholes near Denny structure popped; flow ceased when pressure was reduced.
Dec. 14	Juanita Bay Pump Station	2,000,000	5.5 hours	Untreated wastewater	Lake Washington	Major wind/rain storm tripped off the pumps.
Dec. 14	Hidden Lake Pump Station	~39,000	~2 hours	Untreated wastewater	Puget Sound	Pump station exceeded its capacity during major wind/rain storm; flow sent to a Ronald pump station.
Dec. 14-15	Yarrow Bay Pump Station	250,000	3.5 hours	Untreated wastewater	Lake Washington	Major wind/rain storm and power outages; operated with mobile generator.
Dec. 14-15	Medina Pump Station	1,000,000	6 hours	Untreated wastewater	Lake Washington	Major wind/rain storm and power outages; failure of wet-well level switch; because of conditions, travel time increased for workers to reach the station; operated with auxiliary generator.
Dec. 14-15	Murray Pump Station	3,400,000	10.5 hours	Untreated wastewater	Puget Sound	Major wind/rain storm and power outages; operated with mobile generator.
Dec. 14-15	Barton Pump Station	5,000,000	28 hours	Untreated wastewater	Puget Sound	Major wind/rain storm and power outages; inundated pumps and motors; operated diesel-powered temporary pump station and rebuilt one pump.
Dec. 14-15	West Point Treatment Plant	~66,200,000	3 hours	Untreated or partially treated wastewater	Puget Sound	Major wind/rain storm and power outages; raw sewage pumps failed, causing a cascade of shutdowns and the opening of emergency overflow gates; a second event triggered problems with the primary gates and major flooding in the plant; working to identify the causes.
Dec. 16	Kirkland Pump Station	60,000	2 hours	Untreated wastewater	Lake Washington	Major wind/rain storm and power outages; generator tripped off and was restarted.
Dec. 17	Sunset/Heathfield Pump Station	~1,500,000–2,000,000	5.5 hours	Untreated wastewater	Lake Sammamish	Major wind/rain storm and power outages; mechanical failure of emergency generator; lake water entered station from manhole opening.

## 9.4 Combined Sewer Overflow Reduction

King County reports CSO data from the beginning of June in one year through the end of May in the next year. The following sections report untreated and treated CSO volumes and frequencies for the 2005–2006 reporting period.

### 9.4.1 Frequencies and Volumes of Untreated CSOs

During the June 2005–May 2006 wet season, the total volume of untreated CSOs was 435.78 MG (256.39 MG in the South Service Area; 135.30 MG in the North Service Area; and 44.09 MG in the Alki Service Area). This volume represents an 81 percent reduction over the 1981–1983 baseline volume of 2,339 MG.<sup>11</sup>

There were a total of 216 untreated CSO events (158 events in the South Service Area; 53 events in the North Service Area; and 15 events in the Alki Service Area) during this period.<sup>12</sup> This total represents a 54 percent reduction in frequency over the 1981–1983 baseline of 471 overflows.

Table 9-3 shows the 2005–2006 volumes and frequencies of untreated CSOs as compared to the baseline volume and frequency.

**Table 9-3. Untreated CSO Volumes and Frequencies, 2005-2006**

	CSO Annual Volume (MG)	CSO Annual Frequency (Events)
Baseline (1981–1983) at start of 1988 control plan	2,339	471
2005–2006 Northern Service Area	135.30	53
2005–2006 Southern Service Area	256.39	158
2005–2006 Alki Service Area	44.08	15
2005–2006 Total System	435.78	216

### 9.4.2 Frequencies and Volumes of Treated CSOs

Table 9-4 shows the volumes and frequencies of treated CSOs in 2005–2006. The discussion that follows the table provides more information on these discharges.

<sup>11</sup> King County uses the period between 1981 and 1983 as the baseline for measuring progress in controlling CSOs. Baseline volumes were determined using computer modeling.

<sup>12</sup> An overflow event is defined by the length of the dry period (“inter-event interval”) after and before the overflow. Each “event” may last from a few minutes to many hours. This definition of an event reflects the expectation that all overflows resulting from a single rainstorm should count as only one overflow. The County uses a 24-hour interval.

**Table 9-4. Treated CSO Volumes and Frequencies, 2005–2006**

	CSO Annual Volume (MG)	CSO Annual Frequency (Events Treated)	CSO Annual Frequency (Events Untreated)
West Point Secondary/CSO Plant	546.98	32 <sup>a</sup>	
Alki CSO Plant	59.4	4	
Carkeek CSO Plant	54.72	6	
Mercer/Elliott West CSO Treatment Facilities	315.6	8	7 at Denny Regulator Station
Henderson/Norfolk CSO Treatment Facilities	0	0	0 at Norfolk CSO outfall

<sup>a</sup> Number of days when flows received CSO treatment and were blended with flows that received secondary treatment

### **Carkeek and Alki CSO Treatment Plants**

Starting January 1, 2006, additional permit limits went into effect for total residual chlorine and fecal coliform at the Carkeek and Alki CSO Treatment Plants. Dechlorination systems were installed and hypochlorite dosage controls were modified at the plants to prepare for these new limits. Six discharge events with a total discharge volume of 54.72 MG occurred at the Carkeek plant and four events with a total discharge volume of 59.4 MG occurred at the Alki plant during the 2005–2006 reporting period. Discharge effluent limits were met at both plants, except for fecal coliform during one event at Alki. These events provided staff with startup experience to help identify problems and make refinements to the dechlorination and hypochlorite systems.

### **Mercer/Elliott West CSO Treatment Facilities**

The Mercer/Elliott West CSO Treatment Facilities began operating in May 2005. From June 2005 through May 2006, eight treated discharge events with a total discharge volume of 315.6 MG occurred at the Elliott West CSO outfall. Operation of the facilities has reduced the number of untreated discharges at the Denny Regulator Station from 32 to just 7 small discharges per year. This decrease represents a significant improvement, but the station has not yet reached the control goal of an average of one event per year. Operation of the facilities did not change the number of discharge events at the Dexter Regulator Station—also intended to be controlled by the facilities—but the volume of discharge was much smaller than before the facilities went online. Seventy-four percent of the volume that had previously been discharged untreated at the Dexter Regulator Station received full secondary treatment at the West Point Treatment Plant. An investigation into refinements to bring the station into full control identified some promising control changes, such as reprogramming setpoints. A new programmable logic controller will be installed and the programming changes will be made before the 2007–2008 wet season.

Of the volume of combined sewer flows to be managed at these facilities, 38.4 percent was transferred to West Point, 61.4 percent received primary treatment and disinfection at the

facilities, and only 0.2 percent was discharged untreated at the Denny Regulator Station. The ratio of treated discharge to transferred flow is greater than planned, likely because of the hydraulic problems discovered later during the unusually large storms in November and December 2006. Because of these hydraulic problems—along with problems with the samplers and with the disinfection and dechlorination systems that may have been exacerbated by the hydraulic problems—discharge effluent limits for the Elliott West Treatment Facility were not met.

The hydraulic problems prompted modifications to facilities and procedures. The duck bill valve on the deeper outfall was removed because it appeared to have caused unanticipated loss of pressure. A flapgate installed during construction had made the valve unnecessary. Modifications to the samplers and flow meters are in progress. Other modifications are planned to improve the inadequate air release from the dechlorination structures that caused damage to the Denny Regulator plaza during the storms.

In addition, the efficacy of the screens at the Elliott West facility is being evaluated. The purpose of the screens is to prevent solids and floatable materials from going through the outfall. Since coming online, the screens have been adversely impacted both by storm flows and by non-storm base flows entering the Mercer Tunnel from the City of Seattle's East Lake Union system. In spring 2006, Seattle cleaned pipelines that were causing backup of flow to the tunnel. The cleaning decreased but did not eliminate base flow to the tunnel. Seattle is inspecting additional lines to identify possible causes. Decisions on next steps, including modifications to weirs, will be made after the inspections. Seattle and King County will try to complete these corrections before the start of the 2007–2008 wet season, with the goal of meeting permit requirements.

### **Henderson/Norfolk CSO Treatment Facilities**

The Henderson/Norfolk CSO Treatment Facilities began operating in May 2005. Because of programming errors, the Henderson Treatment Tunnel did not operate during the June 2005–May 2006 period and, as a consequence, staff gained limited startup experience. No discharges occurred at any of the CSO locations controlled by this project. All of the untreated CSO volumes that would have previously discharged at these locations were transferred to South plant for full secondary treatment and disinfection. After the errors in programming were identified and corrected, the tunnel operated in the second half of 2006.

## **9.5 Industrial Waste Program**

### **9.5.1 Permits, Authorizations, and Enforcement**

The Industrial Waste Program (IWP) regulates industrial wastewater discharged into the King County wastewater system. The purpose of these activities is to ensure that industries treat wastewater for harmful substances such as metals, oils, acids, flammables, organic compounds, gases, and solids before discharging the wastewater to sewers. This program protects surface water and biosolids quality, the environment, public health, and the wastewater system and its workers.

IWP may regulate any industry, from largest to smallest, if the industry discharges to the wastewater system. To do this, the program issues three main kinds of discharge approvals: permits, discharge authorizations, and letters of authorization. Letters of authorization are issued for limited duration construction dewatering discharges. Discharge authorizations are issued to smaller industries. Permits are issued to industries that discharge more than 25,000 gallons per day and/or that are included in federally regulated categories. The Environmental Protection Agency (EPA) requires at least 20 categories of industries to get permits, whatever their size or quantity of wastewater. Permits have more comprehensive operating and self-monitoring requirements than discharge authorizations.

Discharge of fats, oil, and grease from a petroleum or mineral origin (nonpolar FOG) is limited to 100 mg/L. Industries must use oil/water separators to pretreat oily wastewater to prevent harm to the biological phase of wastewater treatment and must submit plans for the separators to the local sewer utility or to IWP for review and approval before installing the separators. FOG from an animal or a vegetable origin (polar FOG) can block sewer lines. Although polar FOG has no numerical limit, dischargers are required to minimize free-floating polar FOG and may be required to complete a FOG control plan for King County's review and approval.

IWP investigators inspect facilities before issuing discharge approvals and also inspect facilities with approvals to see that they are complying with regulations. Most companies are required to self-monitor their discharges. Industrial waste specialists take verification samples at facilities with permits to see whether wastewater discharges comply with regulations. If they find violations, the specialists conduct follow-up inspections and sampling.

The program issues a Notice of Violation when a company discharges more contaminants or volume than allowed, violates conditions of its discharge approval, or fails to submit required reports. For enforcement, IWP uses tools such as compliance schedules, fines, charges for monitoring and inspections, and cost recovery for damages.

In 2006, 128 permits and 302 industrial waste discharge authorizations were in effect and 376 inspections were conducted. Table 9–5 shows the number of compliance samples collected versus the number of violations detected. During 2006, IWP issued Notices of Violation to 39 companies for 70 violations. These violations consisted of the following (with several companies having multiple violations in more than one category):

- Twenty-four companies had 41 discharge violations, including those based on self-monitoring data
- Five companies had 8 permit/code violations
- Thirteen companies had 21 reporting violations

The company with the most discharge violations (13) was Puget Sound Recycling, a centralized waste treatment facility located in Auburn. This company was fined \$2,300, constituting the major portion of the \$2,800 in fines issued during the year. Also in 2006, Argent Laboratories started making monthly payments on a \$23,894 fine issued in 2005. Argent Laboratories placed an appeal before the King County Hearing Examiner, but subsequently withdrew the appeal before it could be heard.

None of the violations in 2006 caused NPDES exceptions at King County treatment facilities.

**Table 9-5. Number and Type of Compliance Samples of Industrial Wastewater Collected in 2006**

	Compliance Monitoring	Post-Violation	Discharge Violation <sup>c</sup>
Cyanide amenable to chlorination	28		
Total cyanide	140		2
Metals	490	3	6
Organics			
BNA	53		5
VOA	155		
Fats, oils, and grease			
Total	0		
Polar <sup>a</sup>	24		
Nonpolar	355		
pH (Field) <sup>b</sup>	539	1	11
Surcharge	263		

<sup>a</sup> The polar fats, oils, and grease (FOG) analyses are for the visual free-floating FOG test, not laboratory analyses.

<sup>b</sup> The number of pH samples is somewhat misleading because it shows only discrete pH samples collected and analyzed in the field. The number does not include readings from continuous pH measurements.

<sup>c</sup> The discharge violations do not include those based on self-monitoring data.

## 9.5.2 Categorical Pretreatment Regulation Activity

IWP staff have been devoting significant time to addressing the issues involved in implementing the *Final Pretreatment Streamlining Rule* issued by the EPA in 2005. The rule has the potential to reduce the costs both for regulatory agencies such as IWP and for the regulated community. Its purpose is to reduce the burden of and to provide flexibility in technical and administrative requirements while continuing to protect the environment. For example, one provision has the potential to reduce IWP monitoring from twice per year to once every other year or to once per year, depending on the industrial discharger, which could lower fees of permit holders receiving the reduced monitoring. While parts of the rule were effective immediately, others will require revisions to King County Code and IWP public rules before they can be enacted. These revisions are expected to occur late in 2007.

One of the amended sections of the rule requires that permitting authorities evaluate whether each permitted facility needs a slug (spill) discharge control plan and/or takes other related actions to control slug discharges. In July 2006, IWP sent letters to all significant industrial dischargers (permit holders) notifying them of the requirement to file a Slug Discharge Control Plan by October 15, 2006. All dischargers complied with this requirement.

### 9.5.3 Dental Waste Program

About half of the metal in dental amalgam, the silvery material used to fill cavities in teeth, is mercury. An estimated 300,000 amalgam fillings (representing more than 250 pounds of mercury) are replaced each year by King County dentists. IWP's Dental Waste Program allows dentists to install an approved pretreatment unit commonly known as an amalgam separator unit (ASU) to demonstrate their compliance with the county's mercury limits without having to sample their wastewater and submit periodic self-monitoring reports. To ensure that the program is working, IWP performs random inspections of dental offices and monitors the levels of mercury in the biosolids produced at the regional wastewater treatment plants.

In 2006, IWP inspected 107 dental offices. Less than five of the offices were out of compliance and needed to install or maintain the appropriate pretreatment devices. King County also continued its participation in a national study of mercury concentrations in the treatment plant influent, effluent, and biosolids under the auspices of NACWA.

While it is difficult to precisely quantify the benefits of this program, there has been over a 50 percent reduction in the amount of mercury in King County biosolids from 2000, the year before IWP began implementing the program, to 2004, the year in which 97 percent compliance was achieved. The annual median concentration at the West Point and South treatment plants in 2006 was between 1.0 and 1.25 milligrams per kilogram (mg/kg), which is far below the federal standard of 17 mg/kg. Concentrations of other metals in biosolids are also below federal standards (see Chapter 6).

### 9.5.4 Lower Duwamish Waterway Source Control Project

Since 2002, the Industrial Waste Program has been working on the Lower Duwamish Waterway (LDW) Source Control Project in support of the WTD's Sediment Management Program. IWP has been coordinating with sediment cleanup efforts to help identify and manage sources of chemicals that reach site sediments.<sup>13</sup> Its goals are to minimize the potential for chemicals in sediments to exceed the state's Sediment Management Standards (WAC 173-204) and the LDW sediment cleanup goal. (See Chapter 5 for more information on the Sediment Management Program and Lower Duwamish Waterway cleanup efforts.)

#### Lower Duwamish Basin

- **Sampling of Industrial Sewer Dischargers for Phthalates.** Between March and November 2006, IWP collected 34 samples from industrial dischargers in the Lower Duwamish drainage basin. The chemicals of concern for the sampling were two phthalates: bis-2-ethylhexyl phthalate (BEHP) and butylbenzyl phthalate (BBzP). IWP will explore whether there are controllable industrial sources of these chemicals and will report results of the sampling and analyses in 2007.

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<sup>13</sup> Investigations have determined that sediment in the Lower Duwamish Waterway contains phthalates (plasticizers) as well as polychlorinated biphenol (PCBs), polynuclear aromatic hydrocarbons (PAHs), metals (arsenic and mercury), and other organic compounds.



- **Air Deposition Sampling.** IWP is collecting rainwater samples at five locations in the Lower Duwamish drainage basin: Beacon Hill, Duwamish Industrial Area, Georgetown, King County Airport, and South Park. The samplers collect both rainfall and dry dust that falls into the sampler. Staff are measuring the amount of chemicals that deposit into the sampler over time (the rate of deposition) and analyzing samples for specific chemicals, including phthalates, polycyclic aromatic hydrocarbons (PAHs), and polychlorinated biphenyls (PCBs). The current phase of sampling started in October 2005 and is scheduled for completion in March 2007. So far, nine rounds of samples have been collected and analyzed.
- **Duwamish River Festival.** IWP played an important role in organizing King County's participation in the Duwamish River Festival held on August 12, 2006, at Duwamish River Park in the South Park neighborhood of Seattle.

### **Duwamish/Diagonal Sub-Basin**

- **CSO Characterization.** In late March and early February 2006, IWP collected one round of samples at two locations in the Duwamish/Diagonal CSO/storm drain basin in order to characterize the water quality of CSO events. Additional CSO characterization sampling is planned for 2007.

### **Slip 4 Outfall Sub-Basin**

- **Source Tracing at King County International Airport.** IWP collected samples in areas of the King County Airport that drain to Slip 4. The purpose of the sampling was to determine if existing sources of contamination are sufficiently controlled to allow a proposed sediment remediation project to proceed at Slip 4 in 2007–2008.

### **Work Group Participation**

- **Lower Duwamish Waterway – Source Control Work Group.** IWP continued its participation in the Lower Duwamish Waterway Source Control Work Group—a group consisting of King County, Port of Seattle, City of Seattle, and the two agencies with regulatory responsibility for different aspects of Lower Duwamish Waterway sediment remediation (Washington State Department of Ecology and EPA). This ongoing group was formed to discuss source control issues that can affect the sediment remediation of the Lower Duwamish Waterway.
- **Lower Duwamish Waterway – Source Control Focus Group.** IWP continued its participation in the Lower Duwamish Waterway Source Control Focus Group. This ongoing group was formed to provide a forum for members of the Source Control Work Group to discuss source control issues with Lower Duwamish Waterway stakeholders.
- **Sediment Phthalate Work Group.** IWP is participating in an interagency work group to evaluate the potential of phthalates to contaminate sediments in fresh and marine sediments of Washington State. The group is looking at environmental occurrence,

sources, risks and receptors, source control and treatment, and regulatory aspects of phthalate sediment contamination. The work is expected to be completed by mid 2007.

## 9.6 Local Hazardous Waste Management Program

The Local Hazardous Waste Management Program (LHWMP) in King County is a regional program that complements WTD's efforts to protect water quality. LHWMP brings together resources from four local government agencies and 37 suburban cities to protect and enhance public health and environmental quality by helping citizens, businesses, and government reduce



the threat posed by the production, use, storage, and disposal of hazardous materials. The program is a regional partnership comprising King County Water and Land Resources Division and Solid Waste Division, Seattle Public Utilities, Public Health–Seattle & King County, and the Suburban Cities Association. In 2006, WTD paid more than \$2 million into the Local Hazardous Waste Fund to support LHWMP. This contribution comes from King County Board of Health fees levied per million gallons of wastewater treated at wastewater treatment plants in King County's service area.

The Program provides collection and recycling services for household hazardous materials and wastes and offers public outreach aimed at proper handling and reduction in use of hazardous products. It also provides technical assistance, incentives, and recognition to businesses that generate small quantities of hazardous waste.

### 9.6.1 Waste Disposal and Recycling

LHWMP provides King County residents with household hazardous waste collection services at the Household Hazardous Wastemobile, which travels throughout the county and at three fixed facilities located in Factoria (Bellevue), North Seattle, and South Seattle. In 2006, the Program collected 2,970 tons of household hazardous waste from more than 52,400 customers at these collection facilities:

- 16,225 customers brought 943 tons into the North and South Seattle sites
- 17,930 customers brought 832 tons into the Factoria drop-off site
- 18,260 customers brought 1,025 tons to the Wastemobile

The Program's suburban city partners sponsored 47 events that resulted in the collection of an additional 184 tons of waste. Also, more than 260,400 gallons of used motor oil were collected at public and private collection sites throughout the county. Were it not for LHWMP's collection services, much of this waste could have ended up in regional landfills, sewers, storm drains, and the environment.

In addition, program staff responded to 143 complaints regarding abandoned or improperly stored/disposed of hazardous waste.

Several LHWMP projects work to reduce the use of mercury and ensure its proper disposal. In 2006, LHWMP spurred the collection and appropriate disposal or recycling of at least 268 pounds of mercury through the following activities:

- The EnviroStars program recognizes businesses that have taken steps to reduce pollution and to properly manage their hazardous wastes. During 2006, four King County dentists became new EnviroStars in recognition of their efforts to prevent discharge of mercury to sewers. Currently, a total of 81 dentists in the county are EnviroStars.
- Between 3.5 and 6.5 million fluorescent lamps, containing 132 to 321 pounds of mercury, are disposed of in King County each year. An estimated 37 percent of the mercury is recycled. In 2006, approximately 1.3 million lamps were recycled as the result of LHWMP outreach efforts and incentives to businesses and others.
- LHWMP is working with other local organizations to expand the Take-It-Back Network. This network, composed of a group of retailers, repair shops, charitable organizations, and others, provides residents and businesses with options for recycling fluorescent tubes and other wastes—and their hazardous components—in a safe and cost-effective manner. In 2006, the Take-It-Back Network collected 8,290 fluorescent bulbs and tubes.
- Program staff participated with six other Washington jurisdictions in a five-state pilot project to determine the feasibility of collecting mercury-containing thermostats at local household hazardous waste collection facilities. The Product Stewardship Institute and the Thermostat Recycling Corporation coordinated the project, which ran from May to December 2006. Because of the project's success, the corporation agreed to make the program permanent and extend it to all household hazardous waste programs nationwide.

In addition, LHWMP is participating in a statewide medicine take-back pilot project. The project began in October 2006. There are 11 sites in operation, all at Group Health clinics. Since the project was launched, more than 1 ton of unused medicines has been collected. More information on this project is available at <http://www.medicinereturn.com/>

### 9.6.2 Community Outreach/Technical Assistance, Recognition, and Incentives for Businesses

During 2006, the Local Hazardous Waste Management Program provided a wide range of services to businesses and residents throughout King County. The Program reached approximately 58,000 residents with information on ways to reduce their use of hazardous products. Program staff also worked one-on-one with more than 1,800 businesses in King County. Highlights include:

- Teaching garden clubs, community groups, nursery staff, and landscape professionals about natural yard care and integrated pest management techniques.
- Offering new parents, community groups, and other residents information about green cleaning techniques and how to provide toxic-free homes and gardens.
- Teaching students and educators about hazardous products and ways to reduce them.

- Providing guidance to the community through the Household Hazards Line and the Natural Lawn & Garden Hotline.
- Providing technical consultations, fact sheets, brochures, and the Business Waste Line to help small businesses understand how to properly use, store, manage, and dispose of hazardous products and wastes. The Business Waste Line assisted more than 1,700 callers in 2006, and field staff made over 1,800 technical assistance visits to approximately 1,300 businesses.
- Offering industry-specific information about ways to reduce the use of toxic and hazardous materials.
- Giving limited financial assistance to qualified businesses to facilitate waste disposal/reduction. The Voucher Incentive Program will reimburse businesses for half of their disposal/reduction costs, up to a total of \$500. In 2006, the program reimbursed 204 businesses a total of approximately \$84,000.
- Recognizing businesses, through the EnviroStars program, for their efforts to reduce pollution. In 2006, thirty-six businesses became new EnviroStars and twelve businesses increased their EnviroStar rating. As of the end of 2006, there were 367 EnviroStar businesses.
- Operating the Industrial Materials Exchange (IMEX), which matches businesses that no longer need a hazardous material with businesses that have a need for that material. IMEX has an online listing of available and wanted materials.<sup>14</sup> During 2006, IMEX documented 73 exchanges of 55.8 tons of material, which saved King County businesses approximately \$272,800.

## 9.7 Compliance with the Endangered Species Act

### 9.7.1 Programmatic Biological Assessment Agreements

The listings of chinook salmon, bull trout, and now Puget Sound Steelhead as “threatened” and the Orca as “endangered” under the Endangered Species Act (ESA) require that many WTD projects that need a federal permit go through an ESA Section 7 consultation process with NOAA Fisheries and U.S. Fish and Wildlife Services (“the Services”).

After the Habitat Conservation Plan effort was halted in 2005, WTD continued to pursue focused programmatic agreements on specific WTD activities and to continue meetings and dialogue with the Services to ensure that the Section 7 consultation processes are as streamlined and as timely as possible. WTD has developed an agreement on construction activities and is currently working on a technical memorandum regarding the impact of the use of reclaimed water on listed species.

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<sup>14</sup> <http://www.govlink.org/hazwaste/business/imex/index.html>

The results of these activities continue to provide a benefit to the ESA consultations required for the Brightwater System, the Carnation Treatment Plant, pending CSO projects, and other large WTD construction projects that require a federal permit.

### 9.7.2 Endocrine-Disrupting Chemicals

Endocrine-disrupting chemicals (EDCs) are natural or synthetic chemicals that interfere with or mimic the hormones responsible for growth and development of an organism. Information is continually emerging about these natural and synthetic chemicals that people and industries use every day and dispose of down their drains and toilets. Because the potential impact of EDCs on aquatic life and wildlife is an issue of national and international scope, it is beyond the capability of a local agency or utility to solve alone. Studies will continue for many years before definitive answers are known and regulations adopted.

King County scientists are tracking this issue carefully to keep up-to-date on new findings. King County's Environmental Laboratory is investigating new analytical methods for the complex testing of some of these chemicals. Sampling for 15 suspected EDCs in the county's marine and fresh waters found low levels of five types of EDCs: natural estrogen (estradiol), synthetic estrogen (ethynylestradiol), plasticizers (phthalates), surfactants from soaps (nonylphenol), and epoxy compounds (Bisphenol A). A report titled *Survey of Endocrine Disruptors in King County Surface Waters* that describes these findings in detail was published in April 2007. More information about this work can be found at

<http://dnr.metrokc.gov/wlr/waterres/streamsdata/reports/Endocrine-disrupting-compounds.htm>.

Conventional secondary wastewater treatment, designed to remove solids and biodegradable organic material from wastewater, removes from 50 to 90 percent of many compounds known to be or suspected of being EDCs. Controlling chemicals at their source is the easiest and least expensive way to protect the environment and people from the harmful effects of all pollutants, including EDCs. WTD will continue its efforts to protect water quality and will adapt its programs, if needed, as more definitive information on EDCs emerges. For more information, visit WTD's EDC Web site at <http://dnr.metrokc.gov/WTD/community/edc/>



# Wastewater Planning Policies

To protect public health and water quality, it is essential to plan wastewater facilities before they are needed. The RWSP wastewater planning policies are intended to guide King County in its long-term comprehensive planning to meet the regional wastewater needs of the county's service area. The policies direct the county to make a long-term assessment of wastewater needs when planning for future wastewater systems and to take into account full build-out when considering the sizing of facilities. They also call for the county to coordinate with other local jurisdictions and look for opportunities to save costs. In addition, the policies call for review of RWSP implementation and the assumptions that guide the RWSP.

This chapter provides an overview on implementation of the wastewater planning policies and summary information on amendments to the policies adopted by the King County Council in 2004 through 2006. The complete text of all the wastewater planning policies, including information on policy amendments and a brief summary of how each policy was implemented in 2004–2006, is provided in Appendix I.

## 10.1 Implementation of Wastewater Planning Policies from 2004 through 2006

### 10.1.1 Reviewing Planning Assumptions

The RWSP reporting policies and wastewater planning policies call for the RWSP comprehensive review reports to review assumptions on the rate and location of growth, on the rate of septic conversions, and on water conservation efforts. This document provides a comprehensive review of RWSP implementation in 2004–2006. As reported in the conveyance policies chapter (Chapter 3), WTD projects future wastewater flows by first using population and employment forecasts provided by the Puget Sound Regional Council (PSRC).<sup>1</sup> PSRC data are provided in two levels of detail—the more geographically broad forecast analysis zones (FAZ) and the more detailed traffic analysis zones (TAZ). To forecast wastewater flows, WTD uses the TAZ information and allocates the population estimated by TAZ to each of the county's wastewater hydraulic model basins according to the number of developed parcels in each TAZ and model basin.

PSRC provided updated TAZ information in 2003, based on the 2000 census. This information was used to update the 1998 RWSP population and employment growth and flow projections as

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<sup>1</sup> The Puget Sound Regional Council was created in 1991 as an association of governments working together on planning issues of regional significance.

documented in the *2004 RWSP Update*.<sup>2</sup> There have been no updates made to the data that was presented in the 2004 update because no new PSRC TAZ data are available. Projections reported in the 2004 update confirmed the need for the major treatment and conveyance improvements that are under way and planned through 2030. The process to update the conveyance system improvement (CSI) yielded information from the component agencies that prompted changes in some of the estimated dates that 20-year peak flow volumes will exceed the capacity of regional conveyance facilities (see Chapter 3). However, the overall projections for the 20-year peak flow in 2050 did not change.

The key planning assumptions used to determine flow projections and facility sizing remain as follows:

- **Extent of Eventual Service Area.** The assumed extent of the planning area is the sewerable areas within Urban Growth Areas of King, Snohomish, and Pierce counties where King County WTD has sewage disposal contracts.
- **Future Population.** PSRC 2003 TAZ data, which is forecasted out to 2030, is allocated to sewer basins to determine future flow projections. The maximum wastewater system service area population is a straight line extrapolation of the growth rate between 2020 and 2030 out to 2050.
- **Water Conservation.** WTD continues to assume a 10 percent reduction in per day water consumption between 2000 and 2010, with no additional reduction after 2010.
- **Septic Conversion.** The current planning assumption is that 90 percent of the unsewered area (in year 2000) with potential for sewers will be sewered by 2030 and that 100 percent of this area will be sewered by 2050.
- **Infiltration/Inflow (I/I) Degradation.** WTD assumes that I/I degradation starting in 2000 would be 7 percent per decade, with a limit of 28 percent over a 40-year period; for new construction, the degradation assumption of 7 percent per decade will start after the decade of construction, to a maximum of 28 percent. Future monitoring and modeling may provide refinements to this estimate.
- **Design Standard.** In accordance with RWSP Conveyance Policy (CP)-1, the 20-year peak flow storm in 2050 is used as the design standard for the separated regional conveyance system.
- **Planning Horizon.** The year 2050 is used to represent the projected date that the regional wastewater service area will be fully built out and all sewerable portions of the service area will be connected into the wastewater system. WTD extrapolates the PSRC population forecasts linearly from 2030 to 2050 for each of the wastewater basins. RWSP WWPP-4 calls for facility sizing to take into account the need to accommodate build-out population.

WTD will continue to review and analyze future information that could affect RWSP planning assumptions and make adjustments, if needed, to flow projections and facility needs and sizing. For example, in spring 2007, the City of Seattle revised its water conservation assumptions and

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<sup>2</sup> The *2004 RWSP Update* provides a comprehensive review of RWSP implementation from 1999 through 2003, and is available at <http://dnr.metrokc.gov/wtd/rwsp/library.htm#ProgressReports>



is now projecting greater conservation through 2010 and additional conservation between 2010 and 2020. WTD is in the process of analyzing Seattle's revised water conservation assumptions to determine the effect, if any, on future flow projections and facility needs.

Other factors are also important and therefore considered in planning for wastewater facilities. These include flow monitoring data, results of inspections of existing facilities, information provided in component agency comprehensive plans, potential for new regulations, new technologies, and potential effects of climate change. These factors, along with changes or updates to planning assumptions, may affect the need, timing, phasing, or sizing of future RWSP planned projects.

### 10.1.2 Coordinating with Local Jurisdictions in Planning Wastewater Facilities

The RWSP wastewater planning policies recognize the importance of coordinating with other jurisdictions to minimize construction-related disruption to neighborhoods. In addition, the policies acknowledge that collaboration with local jurisdictions can lead to cost saving opportunities.

WTD regularly works with local jurisdictions and affected neighbors during the planning, design, and construction of projects to minimize construction-related disruptions. Agreements related to hours of construction, parking for construction workers, noise control, and traffic control result from these efforts. More information on how the county mitigates construction related impacts is provided in the Environmental Mitigation Policies chapter (Chapter 11). The Public Involvement Policies chapter (Chapter 12) includes information on how King County involves local jurisdictions and affected neighbors in the planning, design and construction of the county's regional wastewater facilities.

Examples of activities in 2004–2006 that could lead to potential cost-savings are as follows:

- **Executive's Recommended I/I Program.** The recommendations in this King County Council approved program represent the consensus reached by the county and component agencies throughout the six-year program development process. Implementation of this program is under way and will help determine if enough I/I can be cost-effectively removed from the collection system to delay, reduce, or eliminate some otherwise needed conveyance improvement project.
- **Partnership with Ducks Unlimited.** King County is partnering with Ducks Unlimited, a nonprofit organization dedicated to wetland conservation, to design the Carnation Treatment Plant wetland discharge project. This partnership will help reduce costs and expedite implementation of the project.
- **Brightwater Backbone.** Building the reclaimed water pipes during construction of the Brightwater conveyance tunnels and providing reclaimed water to the Sammamish Valley from the backbone are more cost-effective than building and operating a stand-alone satellite facility in the Sammamish Valley. Building the backbone now is less expensive and less disruptive to the local jurisdictions than building it in the future.

- **Conveyance System Improvement (CSI) Program Update.** During the process to update the CSI program, King County and the Metropolitan Water Pollution Abatement Advisory Committee (MWPAAC) worked collaboratively to identify and analyze alternative cost containment strategies, such as delaying or phasing project construction. To assist in identifying the most pressing conveyance system needs, prioritization criteria were jointly developed and applied to planned conveyance projects.
- **Ballard Siphon Replacement Project.** Coordination within WTD also provides opportunities for cost-savings. The Ballard Siphon Replacement Project—initiated in 2006 and scheduled for completion in 2010—will protect water quality in the Lake Washington Ship Canal by replacing the 70-year-old wooden sewer pipe that extends across the floor of Salmon Bay near the Hiram M. Chittenden Locks. In addition, the project is being designed to bring the CSO at the Ballard Regulator Station under control and, thus, eliminate the need for the CSO storage project at this location scheduled in the RWSP for completion in 2029. The project also holds the potential to reduce CSOs at the 11th Avenue Regulator Station and thus reduce the size of the CSO storage project planned for completion at this location in 2030.

### 10.1.3 Monitoring RWSP Implementation

The wastewater planning policies call for the county to monitor the implementation of the RWSP and conduct reviews of the RWSP in accordance with the RWSP reporting policies.

Implementation of the RWSP is monitored in a number of ways. WTD works with and seeks advice from with MWPAAC on major program efforts, as exemplified by the six-year I/I study and the CSI Program Update. The Regional Water Quality Committee (RWQC) reviews RWSP projects and programs and recommends policy amendments as needed. In addition, the King County Council reviews RWSP capital projects during the council's budget process.

The King County Council and RWQC also review RWSP comprehensive reviews and annual reports. The RWSP reporting policies require the King County Executive to document each year's progress on RWSP implementation in an annual report until the facilities identified in the RWSP are operational. RWSP annual reports have been provided to the King County Council and RWQC for their review each year since 2000. The policies also call for a comprehensive review report to be prepared every three to five years to review the effectiveness of RWSP policy implementation and RWSP planning assumptions. Comprehensive reviews are to include all elements of the RWSP annual report, replacing it for that year.

This *RWSP 2006 Comprehensive Review and Annual Report* is intended to meet the comprehensive review report requirements for 2004–2006. The *2004 RWSP Update* provided a comprehensive review of RWSP implementation from 1999 through 2003.

RWSP annual reports and comprehensive review reports are available on the RWSP Web site at <http://dnr.metrokc.gov/wtd/rwsp/library.htm>

## 10.2 Amendments to Wastewater Planning Policies

The King County Council approved amendments to wastewater planning policy (WWPP)-5 relating to the RWSP review reports via adoption of Ordinance 15384 in March 2006. The amendments consolidated all RWSP review and reporting requirements into a new reporting policies section of King County Code Chapter 28.86. The policy amendments in Ordinance 15384 eliminated redundancies in the reporting requirements, adjusted the due dates to reflect the availability of information, and consolidated the reporting requirements into fewer but more comprehensive reports. In addition, consolidating RWSP reporting requirements in one section of the King County Code (28.86.165) facilitates future changes or additions to these requirements.



# Environmental Mitigation Policies

The RWSP environmental mitigation policies are intended to guide King County in developing mitigation measures for environmental impacts from the construction and operation of its regional wastewater facilities. The policies recognize that construction and operation of these essential facilities can cause impacts to nearby neighbors and confirm the county's pledge to be a good neighbor. The policies also reinforce the county's responsibility to conduct environmental reviews consistent with the State Environmental Policy Act (SEPA) and to carry out mitigation measures to address the specific impacts identified in an environmental review.

The goal of the environmental mitigation policies is for the county to construct regional facilities that enhance the quality of life in the region and in the local community. They call for the county to work with affected communities in the development of mitigation measures. They also require the county to mitigate the short-term and long-term impacts of its wastewater facilities on the communities in which the facilities are located.

This chapter provides an overview on implementation of the RWSP environmental mitigation policies from 2004 through 2006. There were no amendments to these policies in 2004–2006.

The complete text of all the environmental mitigation policies and a summary of how each policy was implemented in 2004–2006 are provided in Appendix J.

## 11.1 Implementation of Environmental Mitigation Policies from 2004 through 2006

### 11.1.1 Identifying and Incorporating Mitigation Measures Consistent with the State Environmental Policy Act

RWSP environmental mitigation policies (EMP) call for the county's mitigation process to be consistent with the State Environmental Policy Act (SEPA). In addition, EMP-2 calls for mitigation measures identified through SEPA to be incorporated into design plans and construction contracts.

King County routinely seeks ways to mitigate adverse impacts at each stage of a project. WTD's environmental planning group is responsible for ensuring the division complies with state and federal Environmental Policy Acts (SEPA and NEPA) and the federal Endangered Species Act (ESA).

WTD's environmental planners prepare SEPA checklists that include mitigation measures for a project's potential environmental impacts. The planners also review project construction plans and specifications to ensure the mitigation measures identified in the checklists are included in these documents.

During construction and operation, proven methodologies, including best management practices and careful monitoring, are used to protect the environment. Typical mitigation measures for WTD projects are as follows:

- Temporary erosion and sedimentation control measures to prevent pollution of water bodies during project construction; typical measures include filter fabric fences, hay bales, and use of settling tanks
- Measures to avoid or control ground settlement from construction dewatering; such measures could include limiting dewatering to the area and depth necessary for construction, recharging groundwater, or freezing the soil
- Dust control measures, such as watering construction areas to wet bare soils and cleaning roadways around the construction area
- Monitoring of construction-related vibrations and, if necessary, modifying construction activities to prevent damage to nearby structures
- Measures to minimize noise, such as using mufflers or sound barriers, locating pumps and motors below ground level, strategically placing walls and landscaping
- Actions to minimize light and glare, such as angling light in the direction of work or shielding to reduce glare
- Best management practices and other measures to prevent pollution of water bodies, such as monitoring and treating dewatering water and restoring disturbed areas
- Landscaping and architectural treatments to help the facility blend into surrounding area
- Traffic control measures and parking plans, such as the use of flaggers, minimizing truck traffic during rush hours, developing traffic control plans

### Definitions of State Environmental Policy Act terms

**SEPA** is a state law (RCW 43.21C) that requires state and local agencies to consider the likely environmental consequences of a proposal before approving or denying the proposal.

**SEPA rules** describe how SEPA is to be implemented (Chapter 197-11 WAC).

**Threshold Determination** is the decision by an agency's SEPA responsible official on whether or not a proposal will have significant environmental impacts.

**DNS** is a threshold determination that a proposal will not have significant environmental impacts, so an EIS is not required.

**DS** is a threshold determination that a proposal will have significant environmental impacts, so an EIS is required.

**EIS** is a detailed report on the potential significant environmental impacts of a proposal and alternatives. It also describes possible mitigation measures that would minimize these impacts.

**SEPA Checklist** is a form provided in the SEPA rules to help agencies make threshold determinations. The form asks for information on how the proposed project could affect various elements of the environment. A completed SEPA checklist usually accompanies a DNS and sometimes accompanies a DS.

The planners also prepare or oversee preparation of SEPA documents, such as determinations of non-significance (DNS) and environmental impact statements (EIS), as well as NEPA and ESA documents. In 2004–2006, WTD issued 28 wastewater facilities-related SEPA documents (Table 11-1).

**Table 11-1. SEPA Documents Prepared by Wastewater Treatment Division in 2004-2006**

<b>Project</b>	<b>SEPA Document Prepared</b>	<b>Issue Date</b>
Brightwater Regional Wastewater Treatment System	Final EIS Addendum No. 1	1/27/2004
Juanita Bay Pump Station Replacement Project	DNS	2/11/2004
Barton Street Pump Station Emergency Generator Project	DNS	2/25/2004
Hidden Lake Pump Station Replacement and Sewer Improvement Project	DNS	3/24/2004
Brightwater Regional Wastewater Treatment System	Final EIS Addendum No. 2	4/2/2004
Murray Avenue Pump Station Emergency Generator Installation and Odor Control System Upgrade Project	DNS	4/6/2004
Brightwater Regional Wastewater Treatment System	Final EIS Addendum No. 3	4/30/2004
Densmore Stormwater System Improvements	DNS	5/28/2004
Carnation Wastewater Treatment Facility	Draft EIS	6/28/2004
West Point Treatment Plant Solids Handling and Odor Control Improvements	DNS	7/21/2004
Brightwater Regional Wastewater Treatment System	Final EIS Addendum No. 4	9/1/2004
Carnation Wastewater Treatment Facility	Final EIS	10/15/2004
Hidden Lake Pump Station Replacement and Sewer Improvement	DNS Addendum	1/31/2005
Vashon Treatment Plant Upgrade Project	DNS Addendum	2/8/2005
Brightwater Regional Wastewater Treatment System	Draft Supplemental EIS	4/11/2005
Brightwater Regional Wastewater Treatment System	Final Supplemental EIS	7/19/2005
Brightwater Regional Wastewater Treatment System	Notice of Action taken	8/11/2005
Bellevue Pump Station Upgrade	DNS	9/19/2005
53rd Avenue Pump Station Upgrade Project	DNS	11/22/05
West Point Odor Improvements	DNS	3/21/06
South Plant Odor Improvements	DNS	3/24/06
Sweyolocken Outfall Maintenance Project	DNS	4/21/06
Hollywood Facility Improvements Project	DNS	4/28/06
South Treatment Plant New Administration Building	DNS	5/9/06
Brandon Outfall Repair Project	DNS	8/24/06
King Street Odor Control Project	DNS	9/18/06
Barton Street Pump Station Upgrade Project	DNS	9/28/06
Carnation Wastewater Treatment Facility	Final EIS Addendum	11/15/06

In 2004, WTD also issued the Biological Assessment for the Brightwater Treatment System and obtained approval of the project under ESA Section 7.

### 11.1.2 Working with Affected Communities to Develop Mitigation Measures

A cornerstone of the RWSP environmental mitigation policies is ensuring the participation of affected communities in developing mitigation measures. The policies also direct that such measures be reasonable in terms of cost and magnitude as measured against severity and duration of impact. RWSP Environmental Mitigation Policy (EMP)-4 confirms the county's goal is to construct regional wastewater facilities that enhance the quality of life in the region and local community.

WTD works with local jurisdictions, affected residents and businesses, and permitting and regulatory agencies during the planning, environmental review, design, and construction of its projects to develop mitigation measures and ensure its facilities are good neighbors. Examples of mitigation-related activities that occurred in 2004–2006 are as follows:

- **Brightwater System.** In December 2005, the county completed a Brightwater systemwide mitigation package. The package is the result of many meetings with the public and negotiations with jurisdictions, tribal governments, and permitting agencies. The measures in the systemwide package will help reduce Brightwater's impacts, protect the quality of life in communities hosting Brightwater facilities, and ensure that this new treatment system is a good neighbor. Some of the mitigation addresses the short-term impacts of construction; other measures are intended to cover long-term impacts, such as the visible impacts that facilities like the treatment plant will have on the community landscape. In addition, the northern 43 acres of the treatment plant site are being redeveloped as a restored and enhanced salmon habitat and reforestation area that will include publicly accessible open space.
- **Hidden Lake Pump Station/Boeing Creek Trunk Sewer Project.** This project is located in the City of Shoreline. King County and the city worked together on an agreement that includes mitigation measures related to transportation management, odor control, landscaping, and temporary park access during project construction. The agreement also includes stormwater and water quality improvements at Shoreview/Boeing Creek Park, a restoration and park access plan for Richmond Beach Saltwater Park; and a pavement restoration plan and pedestrian pathway along the route of the sewer pipe. In addition, based on public input, the county adjusted the design features of the Hidden Lake Pump Station to meet community concerns and ensure that the facility fits into its residential setting. Adjustments include increasing the roof pitch, using landscaping for aesthetics and screening and building materials such as tile roof and earth tones for the exterior.

To minimize community impacts, the county is also coordinating with the Ronald Wastewater District and Seattle Public Utilities (SPU) to make improvements to local sewer and water lines in coordination with this project. These include replacing and



constructing new manholes and sewer pipes for the Ronald district, and replacing about 5,000 feet of water mains for SPU.

- **Juanita Bay Pump Station Replacement Project.** Mitigation measures during construction of this project include building sound walls on the portions of the site that are near apartment buildings and condominiums, implementing temporary erosion and sediment control measures, and implementing traffic control measures. In response to community concerns and comment, the proposed design for the Juanita Bay Pump Station reduces the building mass to preserve views from neighboring properties and includes landscaping for aesthetics and screening. In addition, the facility will include sustainable “green-building” elements.

The policies also recognize the long-term impacts of constructing new regional treatment plants and major expansions of existing regional plants. RWSP EMP-5 provides direction on the mitigation associated with Brightwater and the future expansion of South plant—that such mitigation is at least 10 percent of the project costs or a cumulative of ten million dollars for each plant, whichever is greater, provided that the mitigation is consistent with all applicable local, state, and federal restrictions and laws. The Brightwater systemwide mitigation package meets this threshold.



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## Chapter 12

# Public Involvement Policies

The RWSP public involvement policies are intended to guide King County in maintaining public information and education programs and to engage the public and component agencies in the planning, designing, and operating decisions that affect them. The policies direct the county to involve public officials and citizens of affected jurisdictions early and actively in the planning and decision-making process for wastewater capital projects. They include direction on disseminating information and providing education on the status, needs, and potential future of the region's water resources. The policies also provide specific guidance on implementing a public education program regarding infiltration and inflow. Lastly, the public involvement policies call for the county to support regional water supply agencies in their public education campaign to conserve water and to promote pilot projects that support water conservation.

This chapter provides an overview of implementation of the RWSP public involvement policies from 2004 through 2006. There were no amendments to these policies in 2004–2006.

The complete text of all the public involvement policies and a summary of how each policy was implemented in 2004–2006 are provided in Appendix K.

## 12.1 Implementation of Public Involvement Policies from 2004 through 2006

King County places a high priority on educating and engaging the public in decisions that affect them. Because wastewater facilities are often “out of sight and out of mind,” the county recognizes the importance of carrying out programs and activities to inform the public about the need for these facilities and the role they play in protecting public health, the environment, and economic development.

The county values public input, opinions, and recommendations in the planning, siting, design, and construction of its wastewater facilities. Engaging and involving the public are fundamental to ensuring the county's wastewater facilities meet the county's goal to construct facilities that enhance the quality of life in the region and in the local community, and are not detrimental to the quality of life in their vicinity.<sup>1</sup>

This section provides an overview of major efforts carried out in 2004–2006 in accordance with the RWSP public involvement policies. The activities are as follows:

- Engaging the public, local jurisdictions, and component agencies in the decision making process

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<sup>1</sup> This goal is stated in RWSP Environmental Mitigation Policy-4 (Chapter 11).

- Promoting awareness and education of infiltration and inflow (I/I)
- Supporting public education campaigns on the need and ways to conserve water

### 12.1.1 Engaging and Informing the Public, Local Jurisdictions, and Component Agencies in the Decision-Making Process

Engaging the public, local jurisdictions, and component agencies in the decision-making process is a key component in assuring successful implementation of wastewater programs and projects. A high level of public involvement in wastewater programs has been a standard operating procedure for the regional wastewater system since its development in the late 1950s.

WTD routinely solicits public feedback and opinion in its public meetings, open houses, informational booths, project and program related mailings, and through the annual water quality surveys and annual surveys of near neighbors of the regional treatment plants. Opportunities for public comment are also provided via WTD project Web sites, emails, letters, or phone calls. Information from these activities is incorporated into project planning, design, construction, or operations as appropriate. Pre-construction surveys and construction hotlines provide WTD and its contractors with important information in preparation for and during construction. The surveys provide information on how people want to be kept informed, or whether they need materials provided in alternative formats or a different language, and whether special needs should be considered in the development of traffic control and other construction-related plans. Calls to the construction hotline serve to alert WTD staff about construction-related concerns that can often be resolved.

Although not every comment, idea, or suggestion is implemented, WTD considers each one seriously. As shown in the list that follows, public comment and input from local jurisdictions have helped to identify project needs, improve project design, and minimize project related impacts.

Examples of activities in 2004–2006 that illustrate the county’s commitment to continuing a high level of public engagement are as follows:

- The agricultural design for the future Carnation Treatment Plant was selected based on input from the public and Carnation City Council.
- In response to community concerns, the design of the new Hidden Lake Pump Station was changed to ensure that it architecturally fits in its residential neighborhood.
- In response to suggestions made at community meetings, the design of the new Juanita Bay Pump Station will protect sight lines from neighboring residences to the extent possible. In addition, native plant landscaping, building perimeter, and sidewalks will complement the neighborhood and nearby park.
- In 2004, a series of meetings were held around the Brightwater Treatment Plant and portal areas to update community members on design and mitigation issues and to solicit

their ideas and feedback. Many of the suggestions from those meetings were incorporated into the systemwide mitigation package for Brightwater.

- Representatives from various groups, including Woodinville Chamber of Commerce, Tulalip Tribes, Brightwater Teacher's Task Force, and local school districts and environmental education organizations in the Brightwater service area, participated in the Brightwater Education Center/Community Center Advisory Group to provide input on the architectural design of the center directly to the county's design team.
- To implement the *Executive's Recommended Regional Infiltration and Inflow (I/I) Control Program* approved by the King County Council in May 2006, WTD worked with the Metropolitan Water Pollution Abatement Advisory Committee's (MWPAAC) Engineering and Planning Subcommittee to develop selection criteria for the I/I initial reduction projects. Based on the criteria, four projects were selected by MWPAAC to move forward into predesign.
- During preparation of the conveyance system improvement (CSI) update, WTD staff met with staff from individual component agencies to discuss regional conveyance system needs in their areas.
- As a part of the process to update the CSI program, WTD and MWPAAC developed prioritization criteria that address factors such as public health risks, coincident benefits, costs, and rate impacts; these criteria were used to rank planned CSI projects identified in the 2007 CSI Program Update as high, medium, or lower priority (Chapter 3).
- WTD staff met with staff from the cities of Auburn, Kent, Algona, and Pacific to help determine the preferred locations for the pipelines associated with the Kent-Auburn Conveyance System Improvement project. WTD conducted interviews of environmental and community groups, key stakeholders, schools, and commercial and institutional establishments for input on level of interest, issues, and preferred communication methods. WTD held a workshop attended by local jurisdictions and key property owners to evaluate alignment alternatives and tradeoffs. In conjunction with environmental review, county staff will hold community meetings so that residents and businesses can learn more about the project and discuss ways to minimize construction impacts.

### 12.1.2 Promoting Awareness and Education on Infiltration and Inflow

RWSP Public Involvement Policy (PIP)-7 calls for the county to implement a public awareness and education program regarding the environmental impacts and costs to ratepayers of infiltration and inflow (I/I) in the local system. The policy direction specified that such a program begin in 2001 in conjunction with the I/I pilot projects. The *2004 RWSP Update* discussed the public involvement efforts that were part of the I/I pilot programs in 2000 through 2003. This section focuses on activities carried out in 2004–2006 in accordance with this policy.

In November 2004, in preparation of the Alternatives/Option Report that was published in March 2005, a telephone survey regarding I/I was conducted within the county's wastewater service

area.<sup>2</sup> This survey included 400 homeowners in the general service area plus 100 from three of the I/I pilot project areas. They were asked about their role as a property owner in implementing solutions to reduce I/I, whether they preferred having voluntary and/or mandatory property owner actions, their willingness to pay to reduce I/I, and what would be acceptable community options to reduce I/I.

The county and the component agencies participating in the initial I/I projects as part of the *Executive's Recommended I/I Program*, adopted by the King County Council in May 2006, will carry out a comprehensive public involvement effort associated with the field testing and predesign work for the initial I/I reduction projects. The program recognizes that public education is an important element in implementing long term I/I control measures. WTD public involvement staff is working closely with the component agencies to develop general public information materials about I/I as well as materials specific to each initial project.

WTD's I/I Web site is updated on a regular basis. WTD serves as a clearinghouse regarding information on technologies related to I/I reduction; this information is made available to MWPAAC members. Chapter 4 provides more information on implementation of the RWSP I/I policies.

### 12.1.3 Supporting Public Education Campaigns on the Need and Ways to Conserve Water

RWSP PIP-8 calls for King County to support regional water supply agencies in their public education campaign on the need and ways to conserve water. The policy also states that the county should promote pilot projects that support homeowner water conservation in coordination with water suppliers and purveyors, emphasizing strategies and technologies that reduce wastewater flow.

The following are examples of how King County has supported campaigns on the need and ways to conserve water in 2004–2006:

- Signing a Memorandum of Understanding in February 2005 with the Cascade Water Alliance to address water supply needs
- Participating with multiple agencies and organizations in a regional water supply planning process
- Participating in activities to increase water conservation with the Water Conservation Coalition of Puget Sound (now called Partnership for Water Conservation)
- Coordinating the 2005 *King County Climate Change Conference*
- Implementing a drought response plan in March 2005, which directed King County facilities to use less water in their operations
- Providing educational information on the county's water conservation Web site <http://dnr.metrokc.gov/wtd/waterconservation/index.htm>

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<sup>2</sup> The *Alternatives/Option Report* presented a set of alternative approaches to controlling regional I/I.

- Participating as a co-sponsor along with other water and wastewater utilities of a reclaimed water conference held in June 2007 sponsored by the Pacific Northwest Clean Water Association

In accordance with policy direction to promote pilot projects that support water conservation, the King County Council approved a five-year water conservation program through 2005 that emphasized water conserving retrofit projects. While no additional funding was allocated in the 2006 budget, the program was extended by one year to complete several projects that began in 2005. The projects are as follows:

- **Public Health—Seattle & King County Facilities.** The toilets and faucets in the White Center and Renton public health facilities were upgraded and will lower water and sewer costs, freeing up financial resources for other community services.
- **West Point Treatment Plant.** A partnership was formed with Seattle Public Utilities (SPU) to install a second filtration system for backup to the existing system and provide additional capacity to cover high reuse process water demand. The project was completed in December 2006, and is expected to save about 29,736 ccf of water per year and \$72,854 in potable water costs.<sup>3</sup>
- **Harborview Medical Center.** Eleven new water-saving autoclaves, used for sterilizing medical instruments, were installed at Harborview Medical Center. This project is expected to save more than 5 million gallons of water and \$60,000 a year.
- **King County Correctional Facility.** This facility houses an average of 2,300 inmates a day who use about 33 million gallons of water a year in showers alone. In partnership with SPU, King County replaced more than 50 percent of the old inefficient shower valves with new low-flow shower valves. This project is expected to save 4.5 million gallons of water and \$60,000 per year.
- **King County Animal Services.** Efficient washing machines and dishwashers were installed in the Kent and Bellevue animal shelters. This project will save 190,000 gallons of water per year.
- **King County Department of Youth Services.** Water-efficient washing machines were installed, and toilets, urinals, and faucets were retrofitted. The project will save 24 million gallons of water annually and more than \$250,000 a year in operating costs.
- **Weyerhaeuser King County Aquatic Center.** The final phase of the water saving retrofits at this world class facility were completed in summer 2004. More than 500,000 people use this facility every year, and water savings from the 83 upgraded toilets, urinals, faucets, and showers are expected to exceed 2.25 million gallons of water and more than \$7,000 a year in water and sewer costs.

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<sup>3</sup> ccf = 100 cubic feet.

## 12.2 Ongoing Public Information and Education Programs

The Wastewater Treatment Division (WTD) conducts a variety of general public information and outreach activities in support of the county's wastewater programs and the needs and potential future of the region's water resources, including:

- **Speaker's bureau.** WTD staff is available to speak to schools and community, business, environmental and neighborhood groups. Popular topics include wastewater treatment basics, creating energy resources from wastewater, marine science and water quality, planning for wastewater needs, controlling combined sewer overflows, recycling biosolids, water conservation and reclaimed water, and industrial and residential waste disposal.

During the siting, design, and construction of its facilities, WTD staff seeks out groups, businesses, and residents that may be affected by its facilities to ensure they have as much information as possible on specific projects.

- **Community open houses.** The two regional treatment plants, South plant in Renton and West Point plant in Seattle, host open houses each year that feature water conservation, water quality, and wastewater treatment information; several hundred people attend each year. Between October 2005 and August 2006, both treatment plants held 40th Anniversary Celebrations, which were widely attended and involved numerous community groups and King County schools.
- **Wastewater treatment plants and facilities tours.** WTD's robust tour program introduces over three thousand students and hundreds of other interested parties annually to the wastewater treatment process and the importance of protecting our region's water resources and water quality.
- **Informational booths at community fairs, festivals, and other events.** WTD's public involvement and project staffs participate in these kinds of activities to inform and educate community members about the county's wastewater programs and projects.
- **Web site.** WTD's Web site is updated regularly and includes information on the county's wastewater system and process, programs planned for the future, projects in design and construction, and sewer rates and the capacity charge. WTD also hosts Web sites that offer information on ways to conserve water, to dispose of trash properly to help protect the region's wastewater infrastructure, and to eliminate fats, oils, and grease from our sewers.
- **Duwamish River Educational Events.** Events in 2006 included (1) a fall habitat restoration day where hundreds of volunteers worked on seven habitat restoration projects along the Duwamish River, and (2) a *Duwamish Alive! Earth Day* event where over 800 volunteers helped with plantings and other activities and learned about actions they could take to help restore five areas along the Duwamish. In addition, the county has been a sponsor of the annual Duwamish River Festival that began in 2005. The festival



includes live music, activities for children, kayak tours, and updates on the Duwamish River Superfund cleanup efforts.

- **Working with businesses to protect the wastewater system.** WTD's industrial waste program helps businesses meet regulations by educating them about pollution prevention, waste reduction, and water reuse. The program's advisory committee meets on a quarterly basis; it was formed in 2000 to exchange ideas among representatives of industrial wastewater dischargers, sewer agencies, environmental groups, and Industrial Waste staff about ways to protect water quality and the wastewater system, as well as the services and work of the Industrial Waste Program.
- **Keeping local news media informed.** WTD's media relations keep local news media informed about WTD projects and programs that affect the neighborhoods they serve and about general information on the county's wastewater system.
- **Project-specific activities.** WTD staff seeks out groups, businesses, and residents that may be affected by its facilities and provides them with as much information as possible on specific projects. Staff keeps people informed about regional wastewater projects in their neighborhoods through mailings, door hangers, e-mail alerts, neighborhood meetings, and signage. WTD staff also responds to letters, e-mails, and phone inquiries in a timely manner. In addition, staff works with local jurisdictions on decisions related to project permitting, traffic control and planning, coordination of city and county projects, landscaping, and architectural treatments.
- **Emergency responses.** In the case of emergency repairs, such as the Lincoln Park Sewer Line project in early 2006 or the North Mercer Interceptor Emergency Repair in early 2007, WTD staff employs emergency response procedures, such as posting and canvassing the affected area to notify visitors and neighbors of the situation. WTD staff works closely with the local jurisdictions and nearby neighbors to keep them informed and updated during these kinds of activities.
- **Water quality surveys.** King County conducts an annual water quality survey to measure WTD's performance as an agency and to learn about concerns or questions regarding the county's wastewater services. The survey asks people whether they are aware that King County provides a certain service and then gives people an opportunity to rate our performance in several areas, including wastewater treatment, combined sewer overflow control, water quality management, and salmon and habitat protection. The survey also asks respondents their opinions on the use of biosolids and reclaimed water.

For more information on WTD's public involvement program, visit the program's Web site at <http://dnr.metrokc.gov/wtd/community/involved.htm>



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## Chapter 13

# Financial Policies

The RWSP financial policies are intended to guide King County on the long-term financing of its wastewater capital program and preserve the financial security and bonding capacity for the wastewater system. The policies provide direction for establishing annual sewer rates and capacity charges, and for allocating the wastewater system costs between existing and new customers.

The RWSP financial policies require the county to maintain a multiyear financial forecast and cash-flow projection of six years or more and to estimate service growth, operating expenses, capital needs, reserves, and debt service. The policies also call for maintaining an ongoing program of reviewing business practices with the goal of identifying and realizing potential efficiencies and cost-savings. In addition, the policies provide guidance on the financing of water quality improvement programs and projects.

This chapter provides an overview on implementation of the financial policies and summary information on King County Council adopted amendments to the policies in 2004–2006. This chapter also includes information on assumptions that affect the financing of the RWSP. Finally, in accordance with the RWSP reporting policies, this chapter includes the RWSP cost estimates through 2030 for the year 2006.

The complete text of all the financial policies, including information on policy amendments and a brief summary of how each policy was implemented in 2004–2006, is provided in Appendix L.

## 13.1 Implementation of Financial Policies from 2004 through 2006

This section provides information on implementation of the major components of the financial policies in 2004–2006.

### 13.1.1 Establishing Annual Sewer Rates and Capacity Charge

RWSP Financial Policy (FP)-15 provides direction on meeting the costs of constructing and operating the county's wastewater system. The policy calls for existing customers to pay a monthly sewer rate to cover the portion of the existing and expanded system that serves existing customers. New customers are to pay costs associated with the portion of the existing system that serves new customers and costs associated with expanding the system to serve new customers.

The charges for new customers are collected through a combination of the monthly sewer rate and the capacity charge.

Implementation of this policy puts into action the guiding principles and points of consensus for funding the RWSP that were agreed to during a retreat held by the King County Executive and the Regional Water Quality Committee in October 1998, at the Robinswood Conference Center in Bellevue, Washington. The points of this agreement are collectively known as the “Robinswood Agreement.” The principle that “growth pays for growth” is the cornerstone of the Robinswood Agreement and RWSP FP-15, which provide for the following:

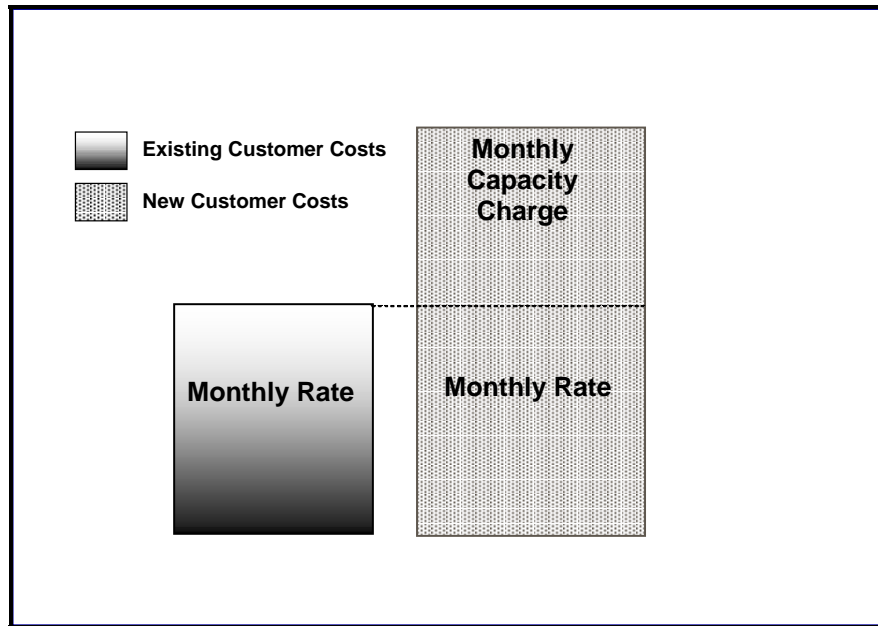
- All customers with new connections will pay a uniform capacity charge.
- System costs will be defined over the life of the RWSP.
- Costs will be allocated among three categories: growth-related, existing, and shared.
- Customers with new connections will pay both the monthly sewer rate and the capacity charge.
- Rate and capacity charge revenues from customers with new connections will recover 95 percent of total growth costs during the period.

In accordance with the Robinswood Agreement, the Seattle Combined Sewer Overflow benefit charge was discontinued in 2002; these costs are now allocated to all of the region’s ratepayers. The total amount of revenue the CSO benefit charge would have generated since its discontinuation in 2002 through 2006 is \$8.4 million. Discontinuing the CSO benefit charge during 2002–2030 is estimated to result in an approximate \$210 million net reduction in costs for Seattle ratepayers.

The letter documenting the points of the Robinswood Agreement is located in Appendix P.

### **Annual Sewer Rate and Capacity Charge**

Factors that affect the sewer rate and capacity charge include the Residential Customer Equivalent (RCE) forecast, wastewater operating expenditures, capital program expenses, number of new connections, and debt financing. In addition, these charges are affected by the allocation of capital program costs. Figure 13-1 illustrates the relationship between the monthly rate and the capacity charge.



**Figure 13-1. Relationship Between the Monthly Rate and Capacity Charge**

### Residential Customer Equivalents

King County uses RCEs as a means of charging component agencies for wastewater services. In this arrangement, agencies are charged a single RCE for each single detached housing unit, regardless of size or water consumption. For multifamily dwellings and commercial and industrial establishments, agencies are charged on the basis of water consumption. For each 750 cubic feet of water per month consumed, the agency is charged one RCE.

It should be noted that local agencies employ a variety of means of allocating these costs to their customers. For example, in the City of Seattle, the charge for all customers—single-family, multifamily, commercial, and industrial—is based on water consumption.

Table 13-1 shows RCEs by category for 1993 to 2006. During this period, total RCEs increased by a little over 34,000. This aggregate change masks the underlying differences among the categories of customers. For example, from 1993 to 2006, single-family residential RCEs increased by 64,000, which was partially offset by a decrease in commercial and multifamily RCEs of nearly 30,000.

As noted in the *2004 RWSP Update*, a notable change occurred in 2002 as commercial and multifamily RCEs decreased by 21,000 and total RCEs fell by approximately 17,000. The main causes of this drop in 2002 RCEs were large revisions in the number of customers by several agencies, increased water conservation during a period of drought, and a sustained economic downturn. Additionally, the continued reduction in water use leads to lower projections of customer growth in the near term for commercial and multifamily customers. It is assumed that RCEs will grow slowly from 2006, increasing at approximately 0.5 percent growth in 2007 to 2010 before returning to a longer-term average of approximately 0.9 percent per year. Due to the

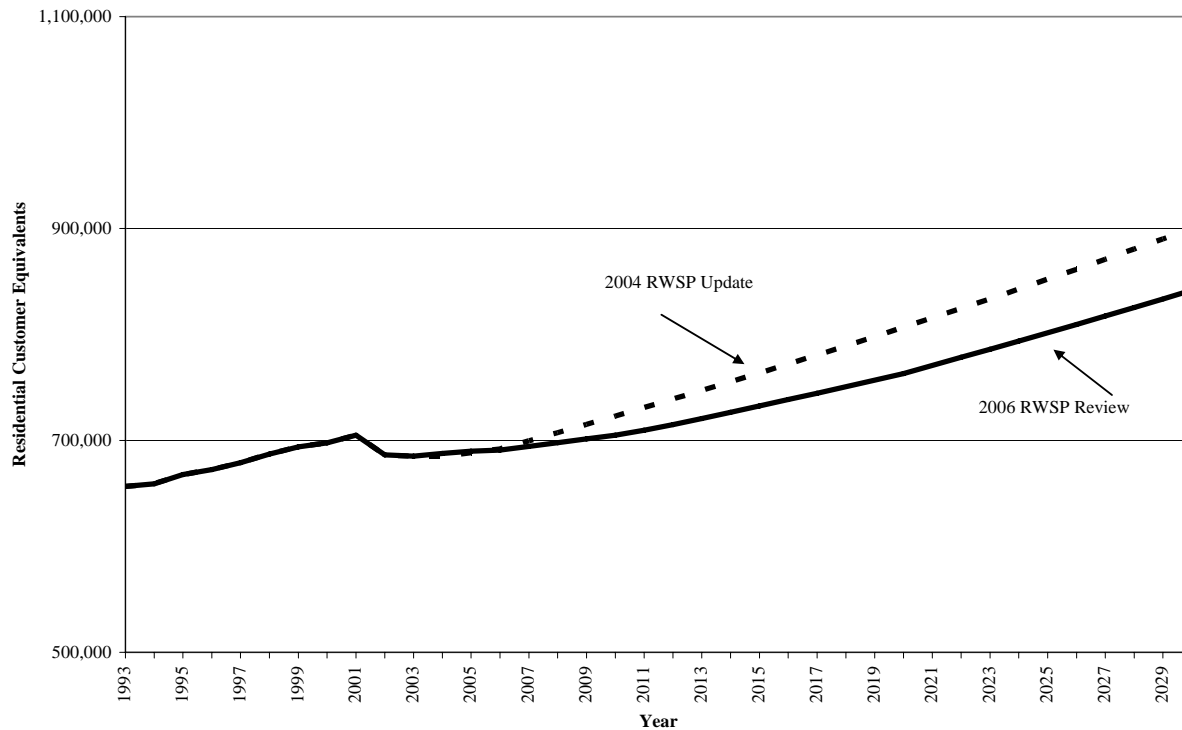
combination of the decrease in the initial customer base and a period of slow growth, there is upward pressure on rates. The county continually monitors for changes in underlying assumptions and will adjust these projections accordingly.

**Table 13-1. Residential Customer Equivalents (1991–2006)**

<b>Year</b>	<b>Single Family Residential</b>	<b>Commercial &amp; Multifamily</b>	<b>Total</b>
1993	293,011	363,737	656,748
1994	296,757	362,300	659,057
1995	299,963	367,829	667,791
1996	303,292	367,894	671,186
1997	307,340	371,514	678,854
1998	310,878	376,426	687,304
1999	315,885	378,212	694,097
2000	320,117	376,705	696,822
2001	325,125	377,235	702,360
2002	329,265	355,830	685,095
2003	334,555	350,,578	685,133
2004	342,582	345,327	687,909
2005	349,535	340,282	689,817
2006	357,487	333,447	690,934

The *2004 RWSP Update* compared the 1998 RCE projections (1993–2030) to 2003; this review report focuses on the period of 2004 through 2006. Figure 13-2 compares the RWSP RCE projections for 2003 that were shown in the *2004 RWSP Update* as compared to 2006.

The long-term projection of RCEs is a trend projection intended to provide a conservative financial forecast for the county's wastewater utility. As such, it does not attempt to reflect swings in the business cycle or reflect the basis of capacity needs and timing. Because forecasts are uncertain, the RCE forecast is conservative (relatively low steady growth) to avoid underestimating sewer rates, especially in the near term. It should be noted that RCEs are a billing construct, which, for the majority of our customer base, is independent of wastewater flows. Each single family housing unit is counted as one RCE regardless of the amount of wastewater flow generated. Additionally, RCEs can be affected by short-term swings due to the economic climate. For example, commercial RCE growth was significantly affected by the 2001–2002 recession.



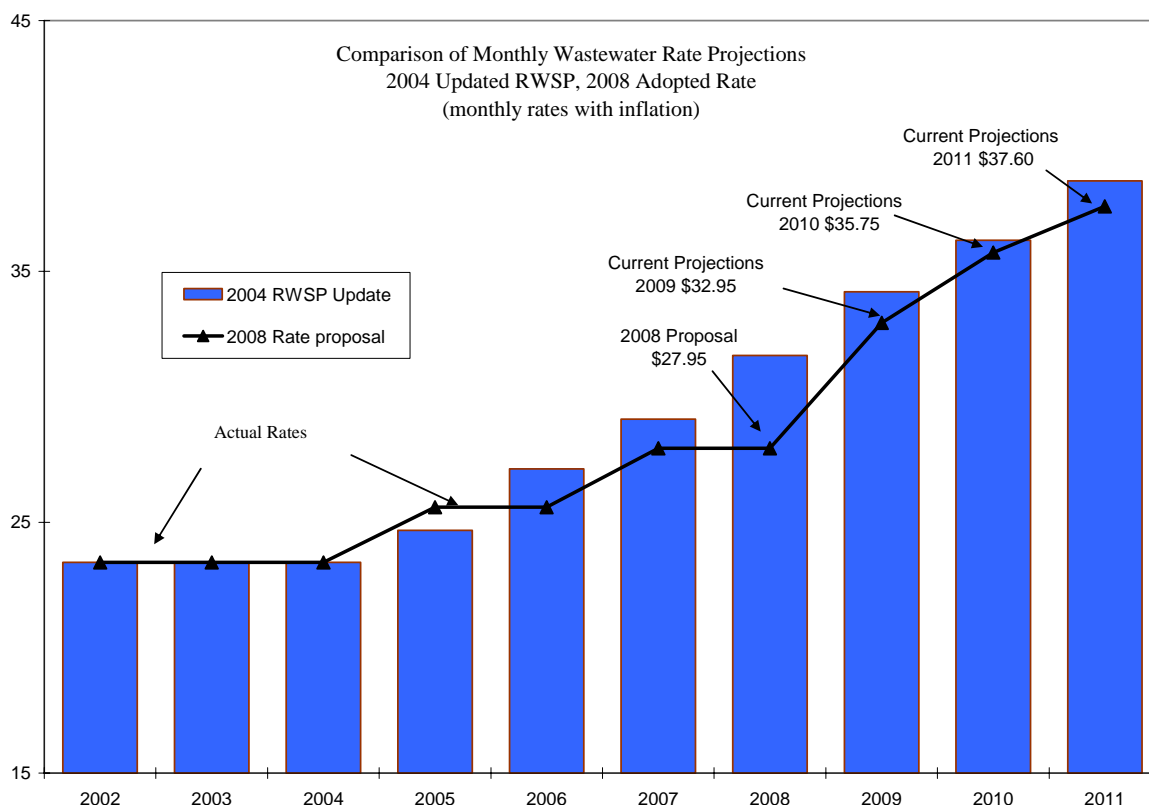
**Figure 13-2. Residential Customer Equivalent Projections (1993 to 2030)**

## Sewer Rate and Capacity Charge Projections

### Sewer Rate

Long-term projections of the monthly sewer rate are not strictly comparable to those presented each year in the annual rate process. The rates presented during the annual rate process incorporate the most up-to-date data and the assumption that not all of the capital improvement program (CIP) budget will be expended during the year. Historically, in a given year, actual capital spending is 10 to 25 percent less than budgeted for the entire program. Much of this is because projects are delayed for a variety of reasons, including permitting issues, unknown geotechnical conditions, and unforeseen construction delays. Accounting for this actual spending lowers the proposed rate compared with assuming a 100 percent expenditure. However, long-term planning assumes that 100 percent of the costs are incurred, because the projects will eventually be completed. Consequently, the long-run rate projections in this section reflect an assumption that 100 percent of the annual CIP budget is expended each year.

Figure 13-3 presents the most current mid-term view of the rate projections, the rate projections from the *2004 RWSP Update*, and the actual rates through 2008 (all rates include inflation). The chart indicates that the most current rate projections are somewhat lower than those associated with the *2004 RWSP Update*.



**Figure 13-3. Sewer Rate Projections with Inflation (2002–2011)**

Figure 13-4 presents long-term sewer rate projections from the *2004 RWSP Update* and updated RWSP sewer rate projections with inflation (2002–2030). Figure 13-5 presents the sewer rate projections, without inflation, in constant 2006 dollars. In this chart, when the line decreases, it means the rate of change in the projected sewer rates is less than the assumed rate of inflation of 3 percent.

Actual monthly sewer rates have closely tracked, if not remained slightly below, the long-run projections associated with the 2004 update through 2008. The main determinant of the pattern of monthly rates is the annual capital spending patterns, as shown in Figure 13-6. This chart shows capital spending for the wastewater program from 1990 to 2030. It highlights the relative amount of spending for the Brightwater Treatment System during the 2003 to 2010 period, with peak capital expenditure in 2009 and 2010. Past 2010, capital spending is projected to return to a more normal long-run level of approximately \$100 to \$150 million in 2006 dollars.



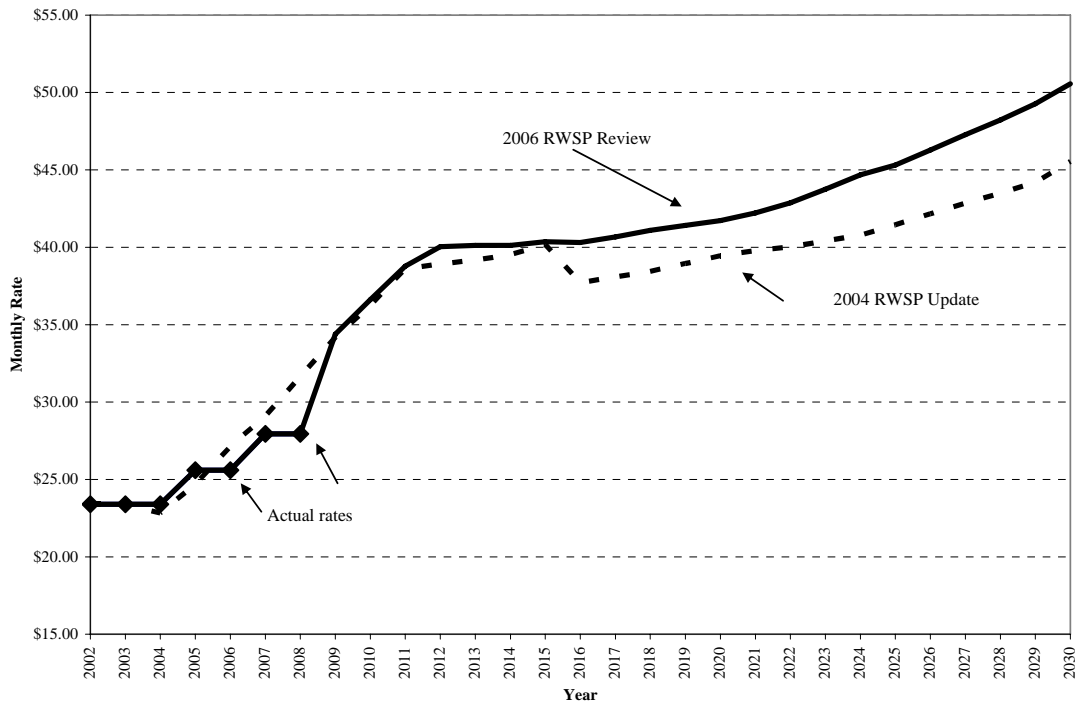


Figure 13-4. Sewer Rate Projections with Inflation (2002–2030)

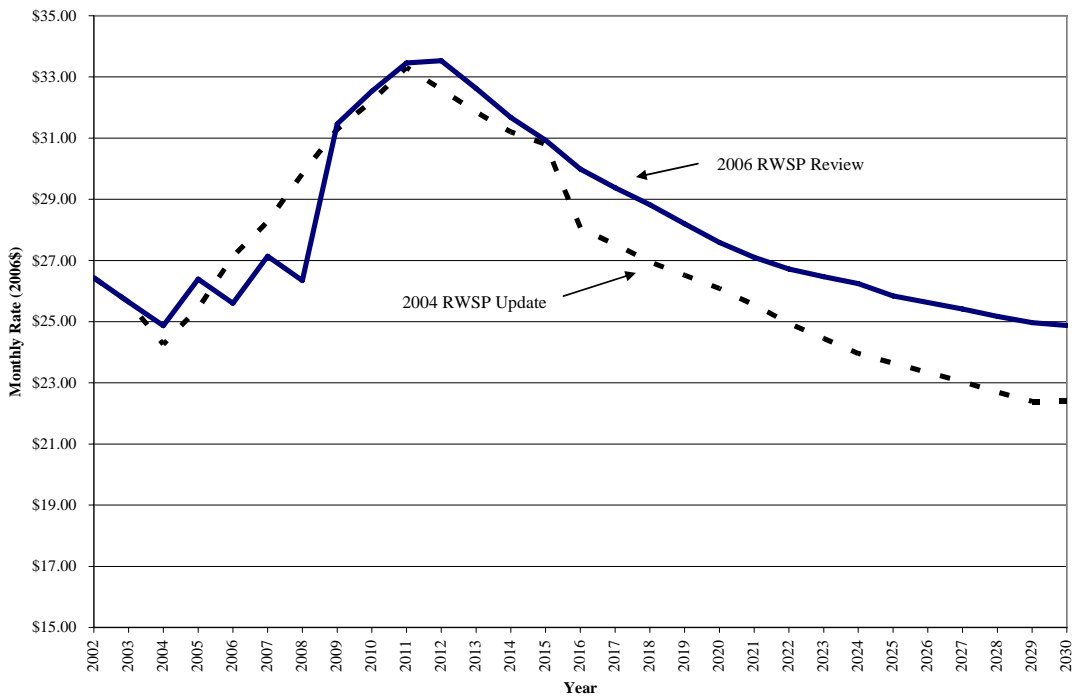
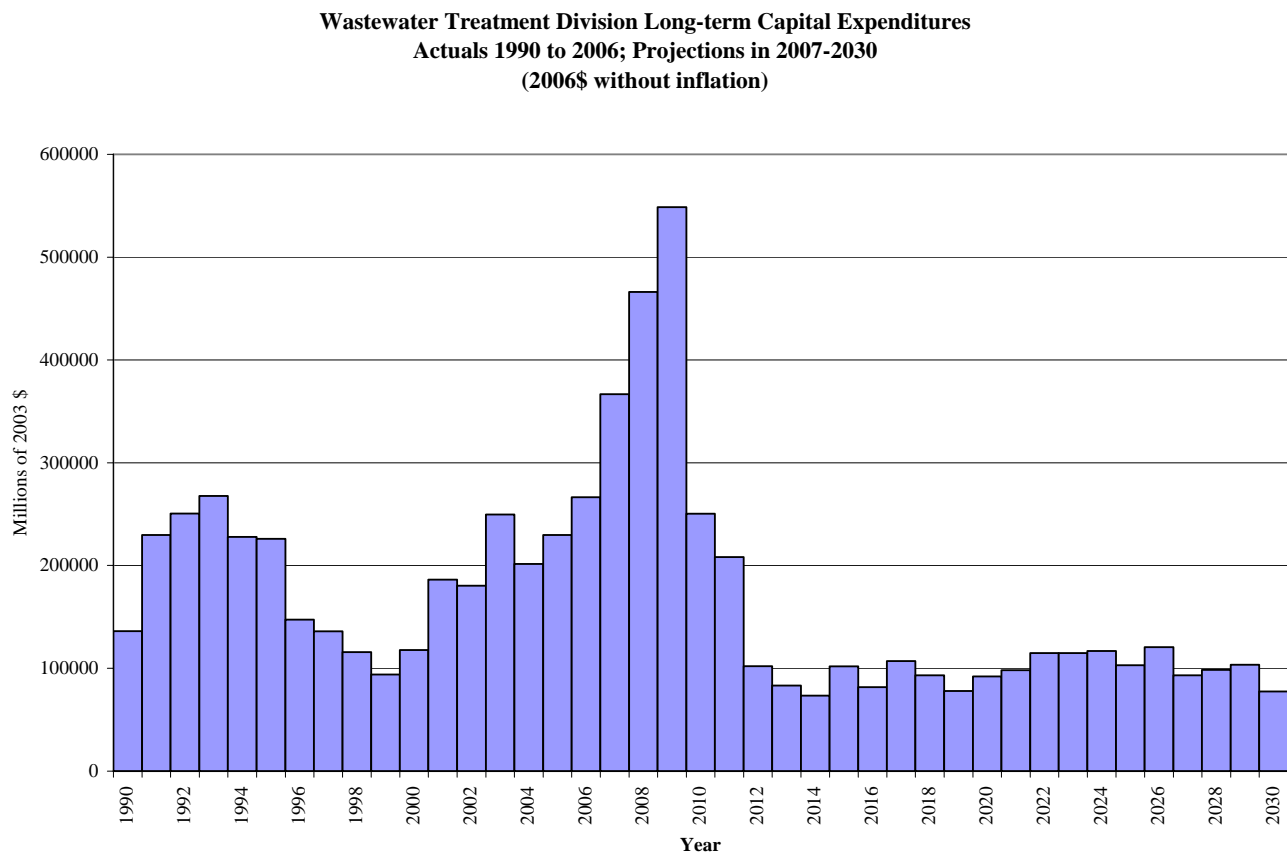


Figure 13-5. Sewer Rate Projections without Inflation (2006 dollars)

Comparing the rate projections of the RWSP 2006 comprehensive review and the 2004 RWSP update, reveals a similar pattern of rate change in the earlier years of the time period. Monthly sewer rate projections for both sets of projections increase relatively rapidly to a peak in 2010–2011, followed by a period of significantly smaller increases, reflecting the capital-spending chart (Figure 13-6). However, the rate projections for the 2006 review show a different out-year pattern (specifically 2015–2016) than that shown in the 2004 update. In the 2004 update there was a marked decrease in 2015–2016 rates, reflecting a projected drop in debt service requirements as earlier bond series were retired. The 2006 review projections do not show this same drop. The projections underlying the 2006 review reflect financing strategies pursued during the last several years to produce a relatively flat rate pattern in the 2015–2016 period. The strategies include issuing deferred-principal bonds and increasing the terms of bonds, which are described later on in this chapter. The goal is to achieve more level or equal debt service payments over time in order to stabilize rates through 2030 and spread systemwide costs out in a more even manner.



**Figure 13-6. Annual Capital Spending for the Wastewater Treatment Division (1990 to 2030)**

### Capacity Charge

The increases in capital costs associated with new capacity have a direct and significant effect on the capacity charge. This is shown in Table 13-2, which compares the capacity charge estimate contained in the *2004 RWSP Update* with the updated estimates for the 2008 capacity charge for both lump sum and monthly payments.

**Table 13-2. Effects of Capital Cost Increases on the Estimated Capacity Charge for 2008**

	Projected 2008 Capacity Charge		
	Monthly	Lump Sum Payment <sup>a</sup>	Total When Paid Monthly
<b>2004 RWSP Update Estimate</b>	<b>\$39.90</b>	<b>\$4,981</b>	<b>\$7,182</b>
Brightwater capital cost increase associated with Route 9 site selection	+\$8.60	+\$1,074	+\$1,548
Extended bond term and lower interest rates, other impacts	-2.25	-\$281	-\$405
<b>2006 RWSP Review Estimate</b>	<b>\$46.25</b>	<b>\$5,774</b>	<b>\$8,325</b>

Note: This table presents the capacity charges in 2008 as an example of the effects of increases in capital costs associated with new growth. It is assumed the charge increases in subsequent years through inflation at 3 percent per year.

<sup>a</sup>Current policy discounts lump sum payments at 5.5% percent.

The largest component of change in the capacity charge projections is the increase in the capital cost of Brightwater. Because Brightwater is allocated exclusively as a growth cost, the impact to the charge is direct and accounts for more than the total change, which was offset partially by the Wastewater Treatment Division (WTD) extending bond terms and continuing favorable interest rates.

The county will continue to pursue cost containment strategies for Brightwater. In addition, it is expected that continued implementation of the Productivity Initiative, annual reviews of program priorities and cash flow, and ongoing analysis of financing strategies and policy changes will lower overall program costs.

Although total RCEs (new plus existing) have grown at a relatively slow rate recently, the number of newly connecting customers has maintained or surpassed originally expected levels. While new connections have averaged more than 9,500 RCEs per year since the beginning of the capacity charge program in 1990, they have averaged over 11,500 per year since 2000. This level of activity is not expected to continue indefinitely. The forecast begins with a conservative assumption on the potential impact of a softer housing market on new connections in 2007–2008. This is followed by a recovery to 10,200 connections annually from 2013 to 2020, a level supported by longer-term demographic and employment trends for the county's wastewater service area. The projections decrease to approximately 9,600 per year after 2020, reflecting a slowing in projected population growth.

Along with cost control measures, financial strategies to reduce sewer rate and capacity charge impacts are being evaluated. In long-term WTD financial planning, it is assumed that annual debt service payments associated with a bond issue are constant, consisting of a principal and interest component in all periods of the bond term. New debt forms and structures may allow WTD to defer payments and lower rates. The decision to use these new forms and structures must be balanced with the risks of lowering the bond rating, which would increase borrowing costs and rates. The following are examples of financial strategies that are under way or are being considered:

- **Increase the term of bonds.** In 2007, WTD increased the term of bonds issued to 40 years. In addition to moderating the impact to current sewer rates, this provides a better match between the life of the facilities and the debt financing their construction.
- **Issue deferred-principal bonds.** This practice has been used by the county on prior bond issues to achieve level debt service payments over time. In the 2007 rate ordinance transmittal, additional deferred-principal bonds were assumed.
- **Selectively issue zero coupon bonds.** This option defers both principal and interest payments.

Decisions regarding the type of debt WTD can offer must be made based on the economic and financial conditions at the time the debt is being issued. The degree to which these financial strategies can be applied depends on these factors.

### Reducing Administrative Barriers to Capacity Charge

Ordinance 14942, which established the 2005 sewer rate and capacity charge, required the King County Executive to provide to the King County Council and Regional Water Quality Committee a report on methods to reduce or eliminate administrative barriers to notifying new ratepayers about their option to make a single payment of the capacity charge. This report was provided to the council in October 2004.

Efforts continue to reduce these administrative barriers and to provide more information on the capacity charge program. These efforts include the following.

- **Meetings with component agencies.** Beginning in mid-2006, capacity charge program staff initiated meetings with component agencies to discuss the capacity charge program and how new connections are to be reported to King County. In addition, King County provides information on the capacity charge program to be shared with the agencies' customers who are obtaining sewer permits. The county has seen significant improvement in the timeliness of reporting of new hookups as a result of these meetings.
- **Informational Materials.** WTD regularly updates a pamphlet and Web site that provides frequently asked questions about the capacity charge and responses to those questions. These pieces include information about potential benefits of paying the charge in a lump sum and including the charge as part of the mortgage. Since September 2006, over 15,000 pamphlets have been distributed to developers, component agencies, escrow companies, and real estate companies. Additionally, pamphlets are mailed to all customers with new accounts.

- **Working with escrow companies.** Escrow companies request a final bill for the seller of a property as part of the closing process for a home sale. Historically, these companies contact the local utility agencies for this final bill to assure that all outstanding utility bills are paid at the time the sale closes. WTD is encouraging them to do the same with its capacity charge program. WTD has developed a form for these companies to use and provides them with the amount due, total remaining balance, and the amount required to pay off the seller's account in a lump sum. A designated email account has been established for escrow requests. As a result of these efforts, about 120 requests are received daily, in comparison with 60–70 more than a year ago.

Capacity charge program staff is offering to provide presentations to escrow associations and real estate agent associations to keep them informed about the capacity charge program. A presentation was made to the Greater Seattle Escrow Association in June 2006.

Visit the capacity charge program's Web site for more information:

<http://dnr.metrokc.gov/wtd/capchrg/index.htm#5>

### 13.1.2 Ensuring Financial Security and Bonding Capacity of the Wastewater System

The RWSP financial policies provide guidance to ensure the financial security and bonding capacity of the wastewater system. The RWSP policies address county borrowing terms, the use of long-term general obligation or sewer revenue bonds, and the use of short-term borrowing. King County remains committed to rate stability, predictability, and equity while providing the revenues and debt service coverage needed to preserve the utility's credit rating and assure continued access to capital markets.

Reflecting this continuing commitment, the utility was recognized in 2006 with a bond rating upgrade to AA from Standard and Poor's, and its A1 rating was reaffirmed by Moody's, the nation's two premier rating agencies. Our continued favorable debt ratings are essential to minimizing the costs of the planned borrowing needed to finance the RWSP.

### 13.1.3 Maintaining an Ongoing Program of Reviewing Business Practices

RWSP FP-3 directs the King County Executive to maintain an ongoing program of reviewing business practices and potential cost-effective technologies and strategies for savings and efficiencies. To meet this policy guidance, the WTD Productivity Initiative Pilot Program was developed to identify and implement ways to increase efficiency. This 10-year incentive program applies certain private-sector business practices, including an incentive-based cash payment to employees in the wastewater program, to cut operating costs, increase productivity, and continue a high level of service and environmental protection for WTD's customers. This program was approved by the King County Council in 2001.

The Productivity Initiative Pilot Program identifies specific levels of service, cost reductions and efficiencies over the period 2001–2010 that will result in an estimated \$75.9 million savings for ratepayers, while increasing levels of service to these same customers. Savings are achieved by undertaking an intensive review of current business practices, identifying and implementing cost-saving practices, working to increase employee involvement in business decisions, and ensuring that the wastewater program receives the best possible services from its partner agencies within and outside the agency.

The basic goals and objectives of this program are as follows:

- Improve efficiency and reduce cost within the wastewater program
- Move to operate the utility more like a business
- Maintain the wastewater utility as a public utility
- Meet or exceed all regulatory requirements
- Incur no loss of service, reduction in safety standards or effluent quality

The Productivity Initiative was first launched as a pilot program for WTD's operating program. It has expanded to include three smaller pilot programs within WTD's capital program. Through 2006, the Productivity Initiative Pilot Program has resulted in a \$42.8 million savings to ratepayers.

WTD produces an annual report on the Productivity Initiative. These annual reports are available on the program's Web site at <http://dnr.metrokc.gov/wtd/productivity/>

### 13.1.4 Financing Water Quality Improvement Activities

RWSP FP-8 permits funding assistance from sewer revenues of water quality improvement activities, programs, and projects if they meet certain criteria. One of the criteria is that the project is in a watershed served by the county's regional wastewater system and activities associated with the project are intended to reduce water pollution or help preserve or enhance fresh and marine water resources. The total funding of these programs is limited to 1.5 percent of the annual wastewater system operating budget. These funds are commonly referred to as "Culver" funds; in 2006, they amounted to about \$1.4 million.

Culver allocations have provided funding for water quality related education, outreach, planning, staffing, and projects. For example, the Waterworks Grant Program, which is funded through Culver allocations, grants up to \$50,000 for community projects that protect or improve watersheds, streams, rivers, lakes, wetlands, and tidewater. Other Culver funded programs provide information on how to protect water resources and reduce the discharge of pollutants from entering water bodies and endangering water quality.

In September 2006, the King County Council amended FP-8 via adoption of Ordinance 15602. The amendment calls for information that outlines alternative funding options for these programs within seven months of adoption of the policy. The King County Executive transmitted a report

on alternative funding options to the King County Council and Regional Water Quality Committee in April 2007 to meet this policy direction.

The alternative funding options discussed in the report are as follows:

- **General Fund.** This option would include projects typically funded by Culver funds as an expense of general government. Funding would come out of King County's Current Expense fund, which is composed of property and sales tax revenues and currently used for services related to areas such as public health, criminal justice and economic development.
- **Levy Lid Lift.** This option requires a public vote, and would function similarly to other levies that have been placed on the ballot to raise funds for schools, affordable housing, parks, and emergency services.
- **Endowment Fund.** This option would require about \$20 million in seed money in order to generate interest income equivalent to current Culver allocations. The report does not identify potential sources of the seed money other than wastewater or current expense funds; however, the report does mention that private and/or public grant funds could be solicited for this purpose.
- **Flood Control Zone District Funding.** State law permits that up to 10 percent of Flood Control Zone District funds can be used toward "water supply, water quality and water resource and habitat protection and management." The King County Flood Control Zone District was established in April 2007 to protect public health and safety, regional economic centers, public and private properties, and transportation corridors by addressing the backlog of maintenance and repairs to levees and revetments, acquiring repetitive loss properties and other at-risk floodplain properties, and improving countywide flood warning and flood prediction capacity.

In addition to discussing alternative funding options, the report also discusses options for the overall future of Culver allocations. They are as follows:

- **Status quo.** Maintain Culver funding to the current allocation of 1.5 percent of the wastewater operating budget.
- **Cap.** Cap future Culver allocations to 1.5 percent of the 2007 wastewater operating budget (approximately \$1.4 million) with annual inflationary adjustments based on an established index.
- **Replace.** Discontinue Culver allocations and replace funded activities with one of the other revenue options discussed in the April 2007 report.

The report also included a summary of Culver allocations from 1997–2007. It is anticipated that further discussions and possible actions regarding Culver funds will occur after the Regional Water Quality Committee completes its review of the report.

## 13.2 RWSP Cost Estimates

RWSP reporting policies call for including in the RWSP annual reports an update of the RWSP cost estimates through the year 2030. The cost estimates presented in this report include estimates for projects in various stages of development including planning, predesign, final design, and construction. Costs of completed RWSP projects are also included.

The accuracy of cost estimates increases as projects progress through the project life cycle and become more defined. Often the scopes of work and estimated costs for projects in planning will change as more detailed information becomes available over time. For example, planning-level cost estimates are based on generic facility concepts. Specific details of a project such as location, technologies, and environmental impacts and potential mitigation of such impacts are determined later during project predesign. Costs for projects in planning can have a rough order-of-magnitude estimate in the range of -50 to +100 percent.<sup>1,2</sup> By the time a project enters the construction phase, estimates typically narrow to a range of -10 to + 15 percent.

In the past few years, costs for construction materials increased at unprecedented rates, resulting in volatile cost estimates for capital projects. In addition, the Puget Sound region is facing an increasingly competitive construction market. An analysis of bid results published in the *Daily Journal of Commerce* showed that of 32 recent public bids in this region, all but one of the bids came in over the estimated budget.<sup>3</sup> The bids were high by 25 percent on average but came in with a range of 10 to 150 percent over the estimated budget. Other factors, such as new regulations, also affect cost estimates.

King County assumes a standard increase of 3 percent per year in projecting costs for its wastewater capital projects to account for price increases in project components such as materials, labor, equipment, supplies, and contractor markups. This rate is used because it closely approximates the actual rate of inflation over a long period of time. However, per the *Engineering News-Record's* Construction Cost Index (CCI), construction-related inflation averaged 4.1 percent in 2006. For the coming year, forecasters predict that price changes for many construction materials will moderate to long-run levels after the significant increases experienced in 2004 and 2005. However, the easing of price increases for construction materials may be partially offset by increased wage rates due to labor shortages.

This section provides a brief history of RWSP cost estimates. It then presents a summary table of the updated 2006 RWSP cost estimates as compared to the 2005 estimates, followed by an explanation of the components in the table.

Details on RWSP capital projects in design and construction are provided as Appendix Q. In accordance with RWSP reporting policies, the appendix presents a project schedule, an expenditures summary, a description of any adjustments to costs and schedules, and a status of the project contracts for each project.

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<sup>1</sup> Project Management Institute's *A Guide to the Project Management Body of Knowledge*, third edition, 2004

<sup>2</sup> Order-of-magnitude estimates are estimates without detailed engineering data; they are often referred to as "ball park" estimates.

<sup>3</sup> Matson Carlson & Associates. *2007 Bid Crisis or How to Survive Today's Bid Climate Part 2*. Sandra Matson..



### 13.2.1 History of RWSP Cost Estimates

The first RWSP cost estimate was developed in 1998 and reflected planning-level cost estimates for capital projects adopted in Ordinance 13680 and outlined in the 1999 RWSP Operational Master Plan.<sup>4,5</sup> An update to these original estimates, reflecting cost information as of December 31, 2003, was included in the *2004 RWSP Update*.<sup>6</sup> In addition to updating the cost of projects included in the 1998 estimate, the 2003 cost estimates included anticipated costs for projects and programs that resulted from implementing RWSP policies but were not identified or included in the 1998 RWSP cost estimates. Such projects include the Carnation Treatment Plant, upgrades to the Vashon Treatment Plant, odor control improvements at the West Point and South plants, and acquisition of and improvements to Snohomish County interceptors. The *RWSP 2005 Annual Report* included an update to the 2003 cost estimates.<sup>7</sup> The 2005 estimates included adjustments for inflation, including cost increases that have occurred as the result of unforeseen circumstances such as the recent increases in global commodities. The estimates also reflected modifications to projects resulting from information gathered through flow monitoring, modeling, and cost analysis after 2003.

### 13.2.2 2006 RWSP Cost Estimates

#### How costs are presented in Table 13–3

Table 13-3 presents a comparison of 2006 RWSP cost estimates to 2005 RWSP cost estimates. A complication to providing a meaningful comparison of costs is the RWSP is an ongoing plan that includes expenditures incurred in the past plus expenditures that are planned for the future. In presenting this comparison, expenditures that have occurred through 2006 are included at their original cost and future expenditures, planned for 2007 to 2030, have been adjusted for inflation to a base year of 2006. In order to make this comparison, previously reported 2005 RWSP cost estimates were adjusted to be consistent with this approach.

WTD is exploring alternative ways in which to present and compare costs in the most informative manner. These could include showing planning level costs in ranges; presenting RWSP costs by different groupings and units of costs, such as expended costs, costs currently in the wastewater capital budget, and future planned costs; and establishing a baseline budget in which to compare final costs.

#### Overview of 2006 RWSP Cost Estimates

The 2006 cost estimate for implementing the projects and programs associated with the RWSP through 2030 is approximately \$3.14 billion in 2006 dollars, an increase of about \$98 million from the 2005 RWSP cost estimate of \$3.04 billion in 2006 dollars.

<sup>4</sup> Ordinance 13680 adopted the Regional Wastewater Services Plan and was approved by the Metropolitan King County Council in November 1999.

<sup>5</sup> The Operational Master Plan explains how King County will implement the RWSP.

<sup>6</sup> The *2004 RWSP Update* is available at <http://dnr.metrokc.gov/wtd/rwsp/library.htm#3yrupdate>

<sup>7</sup> The *2005 RWSP Annual Report* is available at <http://dnr.metrokc.gov/wtd/rwsp/library.htm#ProgressReports>

Total project cost estimates reflect anticipated costs from the initial planning stage through construction and startup. The estimates also include the costs for RWSP projects that have been completed and projects that are in the planning, design or construction phase. Nearly one-third of the total 2006 RWSP cost estimate represents planning-level costs. As noted earlier in the chapter, planning level cost estimates have a rough-order-of magnitude estimate in the range of - 50 to +100 percent.

More details on the 2006 RWSP cost estimates and changes in costs by program are provided in the section following Table 13-3.

Table 13-3. Comparison of 2005 and 2006 RWSP Cost Estimates (1999–2030)

RWSP Element	2005 RWSP Cost Estimates (2005\$ x 1M)*	2005 RWSP Cost Estimates (2006\$ x 1M)	2006 RWSP Cost Estimates (2006\$ x 1M)	Cost Change (2006\$ x 1M)
<b>Total RWSP</b>	<b>\$2,950</b>	<b>\$3,039</b>	<b>\$3,137</b>	<b>\$98</b>
<b>Total Brightwater Treatment &amp; Conveyance</b>	<b>\$1,621</b>	<b>\$1,670<sup>a</sup></b>	<b>\$1,664<sup>a</sup></b>	<b>(\$5)</b>
Brightwater Treatment Plant	\$529	\$545 <sup>a</sup>	\$587 <sup>a</sup>	\$43
Brightwater Conveyance	\$853	\$879 <sup>a</sup>	\$835 <sup>a</sup>	(\$43)
Land and Right-of-Way	\$98	\$101 <sup>a</sup>	\$97 <sup>a</sup>	(\$4)
Mitigation	\$141	\$145 <sup>a</sup>	\$145 <sup>a</sup>	(\$1)
<b>Total Treatment &amp; Odor Control Improvements (Non-Brightwater)</b>	<b>\$146</b>	<b>\$150</b>	<b>\$163</b>	<b>\$13</b>
Odor Control at South Plant	\$4	\$5	\$7	\$3
West Point Odor Control	\$1	\$1	\$1	--
West Point Digestion Improvements	\$4	\$4	\$6	\$2
King Street Regulator Odor Control Project	\$1	\$1	\$3	\$2
South Plant Expansion	\$103	\$106	\$106	--
Vashon Treatment Plant Upgrade	\$19	\$20	\$20	--
Carnation Treatment Plant	\$13	\$14	\$19	\$6
<b>Total Conveyance (Non-Brightwater)<sup>b</sup></b>	<b>\$648</b>	<b>\$667</b>	<b>\$754</b>	<b>\$87</b>
Completed CSI projects, acquisitions, and planning			\$143	
CSI projects in design or construction in 2006			\$197	
Planned CSI projects, planning, and reporting			\$414	
<b>Total Infiltration/Inflow (I/I)</b>	<b>\$45</b>	<b>\$46</b>	<b>\$49</b>	<b>\$4</b>
<b>Total Combined Sewer Overflow</b>	<b>\$427</b>	<b>\$440</b>	<b>\$444</b>	<b>\$4</b>
CSO Control Program	\$377 <sup>d</sup>	\$388	\$388 <sup>d</sup>	--
CSO Planning & Updates	\$6	\$6	\$6	--
Sediment Management/Lower Duwamish Superfund	\$44	\$46	\$49	\$4
<b>Total Reclaimed Water</b>	<b>\$35</b>	<b>\$36</b>	<b>\$36</b>	<b>--</b>
Technology Demonstration (completed 2004)	\$1	\$1	\$1	--
Future Water Reuse	\$3	\$3	\$3	--
Water Reuse Satellite Facility (cancelled in 2003)	\$5	\$5	\$5	--
Reclaimed Water Backbone	\$24	\$25	\$25	--
RWSP Water/WW Conservation (completed in 2005)	\$1	\$1	\$1	--
<b>Water Quality Protection (completed in 2006)</b>	<b>\$15</b>	<b>\$16</b>	<b>\$16</b>	<b>--</b>
<b>Habitat Conservation Plan (HCP)/Programmatic Biological Assessment</b>	<b>\$10</b>	<b>\$10</b>	<b>\$8</b>	<b>(\$2)</b>
<b>RWSP Planning and Reporting</b>	<b>\$3</b>	<b>\$3</b>	<b>\$3</b>	<b>--</b>

\* The 2005 cost estimate that was included in the RWSP 2005 Annual Report has been revised so that future expenditures, planned for 2006 to 2030, are adjusted for inflation to a base year of 2005 (see Section 13.2.2). This lowered the estimate by about \$18 million.

**Notes:** All costs in 2006 column are as of December 31, 2006; projects shown are not exhaustive, but are listed to illustrate changes. Totals may not add due to rounding. Expenditures that have occurred through 2006 are included at their original value.

<sup>a</sup> The 2006 Brightwater cost estimates are shown in constant 2006 dollars to provide a consistent comparison of total RWSP costs.

Section 13.2.3 discusses presenting Brightwater costs in nominal dollars, consistent with the Brightwater Cost Update, January 2007.

<sup>b</sup> RWSP conveyance project needs and costs were updated in June 2007 as part of the CSI update. The difference in total 2006 costs shown in this sheet from the update is that estimates in this sheet were revised so that future expenditures, planned for 2007 through 2030, are adjusted for inflation to a base year of 2006; total costs also include expended and future planning costs; the planning costs are not included in the CSI update.

<sup>c</sup> The I/I costs include \$45 million for the six-year study that was completed in 2005. The additional \$4 million covers flow monitoring costs associated with the I/I initial projects, ongoing modeling, analysis, and reporting, public education, and other program related costs; the I/I initial project design and construction costs are funded by the CSI program in accordance with the recommended program approved by the King County Council in 2006, therefore, these costs are not shown in this line item.

<sup>d</sup> The 2005 and 2006 cost estimates for the CSO control program are the 1998 planning-level estimates adjusted for inflation. CSO control program cost estimates will be updated after completion of the hydraulic model update and will be provided with the 2010 CSO program review.

### 13.2.3 Explanation of RWSP Cost Estimate Summary Table

Table 13-3 presents a summary of the 2005 and 2006 RWSP cost estimates. The table includes four columns:

- **2005 Cost Estimates (2005\$ x 1M) column.** This column shows the 2005 RWSP cost estimates in 2005\$ dollars. The 2005 cost estimates include costs expended through 2005 at their original cost and costs anticipated 2006 through 2030 adjusted for inflation to a base year of 2005.
- **2005 Cost Estimates (2006\$ x 1M) column.** This column shows the 2005 RWSP cost estimates adjusted to 2006 dollars to show how the updated 2006 cost estimates compare to the 2005 cost estimates adjusted for inflation. Adjustments for inflation are based on the assumption of a standard increase of 3 percent per year. Expenditures that occurred through 2005 are included at their original cost and not adjusted for inflation.
- **2006 Updated Cost Estimates (2006\$ x 1M) column.** This column shows the updated 2006 cost estimates in 2006 dollars that were developed based on project details as of December 31, 2006. Future expenditures—costs anticipated 2007 to 2030—have been adjusted for inflation to a base year of 2006. Expenditures that occurred through 2006 are included at their original cost.
- **Cost Change (2006\$ x 1M) column.** This column shows the changes in cost estimates for each line item and total category cost from the 2005 cost estimates to the 2006 cost estimates in 2006 dollars.

Table 13-3 presents the total cost estimates for each RWSP category first, followed by the cost estimates for specific projects or programs within the category. The RWSP categories are as follows:

- Brightwater Treatment and Conveyance
- Treatment and Odor Control Improvements (Non-Brightwater)
- Conveyance (Non-Brightwater)
- Infiltration/Inflow
- Combined Sewer Overflow
- Reclaimed Water
- Water Quality Protection
- Habitat Conservation Plan
- RWSP Planning and Reports

The following sections provide more detail on each category.

## Brightwater Treatment System

The Brightwater cost estimates in Table 13-3 are shown in 2006 dollars to provide a consistent comparison with total RWSP costs. In other words, future Brightwater costs planned to occur in 2007 through 2011 have been adjusted to 2006 dollars.

In the *Brightwater Cost Update, Current Conditions, and Trends*, January 2007, Brightwater costs are now being reported in nominal or inflated dollars. The Brightwater 2007 trend report cost estimate of \$1.767 billion is \$14 million (0.8 percent) than the 2005 Brightwater cost estimate (Table 13-4). This reflects that some project elements are now expected to be completed later in the 2007-2011 construction period. However, as shown in Table 13-3, when adjusted for inflation, the 2007 trend estimate is \$1.664 billion (2006\$) which is \$5.3 million (0.3 percent) less than the 2005 estimate of \$1.670 billion (2006\$). This indicates that the changes to the project plan reflected in the trend estimate resulted in cost increases that are slightly less than what is expected from inflationary effects. Therefore, adjusting for inflation yields a slightly lower overall cost estimate.

The remainder of this section explains the reasons for presenting Brightwater costs in nominal dollars, and shows changes in Brightwater costs in nominal dollars.

### ***Explanation of Presenting Brightwater Cost Estimates in Nominal Dollars***

Generally speaking, the estimated cost of a capital project is the product of the price times the quantity of the elements that make up the project. However, for a multi-year project like Brightwater, presenting this information is complicated by the fact that these costs are incurred over time during which conditions change, most notably prices. In the initial planning phase of the Brightwater project, cost estimates were presented in present value terms, which provided a consistent means of comparing the various alternatives. Once the current project configuration was adopted, cost estimates were presented in constant dollars; that is, dollars adjusted for inflation (deflated) to reflect base-year prices. For example, a cost estimate in 2004 constant dollars reflected the cost of the project in the prices available in 2004. Another reason constant dollars were used is because it avoided having to forecast future prices in addition to estimating quantities.

In the December 2005 Trend Report, the future costs in constant 2005 dollars were spread over the remaining project lifetime by year and inflation was added at 3 percent per year to develop total lifetime costs in nominal (inflated) dollars. This 3 percent inflation rate was applied to all of the construction costs and future allied costs, primarily staff labor and consultant costs. Consequently, the January 2007 cost trend reflects a blend of inflated costs, including the following:

- Actual costs through December 2006, which include inflation occurring since the start of the project
- Conveyance construction contract costs for awarded contracts, which incorporate the contractor estimates of inflation
- Increases in general and extraordinary inflation on construction costs for both the treatment plant and conveyance system
- Inflation on the remaining allied costs of 3 percent per year

The Brightwater project is now transitioning to construction, and King County is awarding contracts based on contractor bids that identify the cost of the various work packages, including inflation. These nominal costs are now the most reliable source for creating the Brightwater cost estimate. Table 13-4 compares the Brightwater December 2005 cost estimate to the current cost estimate; the costs are shown in nominal dollars.

**Table 13-4. December 2005 Brightwater Estimate Compared to the Current Cost Estimate (millions)**

<b>Brightwater Component</b>	<b>December 2005 Inflated</b>	<b>January 2007 Inflated</b>	<b>Cost Change Dec. 05-Jan. 07</b>
Treatment Plant	\$ 584.0	\$ 629.4	\$ 45.4
Conveyance	926.5	891.2	(35.3)
Land/ROW	97.6	97.1	(0.5)
Mitigation	145.0	149.7	4.7
<b>Total<sup>a</sup></b>	<b>\$1,753.0</b>	<b>\$1,767.3</b>	<b>\$14.3</b>

<sup>a</sup>Totals may not add due to rounding.

### ***Brightwater Treatment Plant***

The current cost estimate for the Brightwater Treatment Plant is \$629 million, an increase of \$45 million from the 2005 cost estimate. The increase is the result of higher-than-anticipated inflation, design refinements, and allied costs that were partially offset through the use of project contingency.

### ***Brightwater Conveyance***

The current cost estimate for Brightwater conveyance is \$891 million, a decrease of \$35 million from the 2005 cost estimate. This decrease is a result of the following:

- An increase of \$45 million in construction costs for the conveyance system since December 2005. This increase is primarily due to general and extraordinary inflation as well as additional insurance costs over those estimated previously.
- A decrease of \$80 million in non-construction costs for the conveyance system since December 2005. This decrease is primarily a result of the use of project contingency, which is appropriate use of contingency now that the construction costs for the major segments of the project are known. In addition, an evaluation of the engineering costs allowed a reduction in allied costs related to design and geotechnical work.

### ***Land and Right-of-Way***

The current cost estimate for land and right-of-way expenses is \$97 million, a decrease of about \$0.5 million from the 2005 cost estimate. The process of acquiring land and rights-of-way is almost complete. With the exception of a remaining payment to acquire Portal 19 (Point Wells Portal) and the sale of surplus equipment from the Stockpot property, which is credited against the treatment plant cost, there should be no further changes to this cost element.

***Mitigation***

The current cost estimate for mitigation is approximately \$150 million, an increase of about \$5 million from the 2005 cost estimate. The primary reason for this increase is a final cost for the land associated with mitigation. The original estimate of mitigation land costs was based on a prorated allocation of acreage for the total cost of land. The final costs reflect the actual expenditures after reviewing the acquisition costs of each specific parcel of land. This increase was partially offset by a reduction in mitigation-specific contingency for the treatment plant of \$2.95 million because the contingency use was not required as a part of the Binding Site Plan process. Mitigation costs for the project are now fixed (other than inflation on King County constructed mitigation items) and all final mitigation payments should be complete by early 2008.

Chapter 2 provides more information on the Brightwater Treatment Plant; Chapter 3 provides more information on Brightwater conveyance.

**Treatment and Odor Control Improvements (Non-Brightwater)**

The costs in Table 13-3 for non-Brightwater treatment and odor control improvements include treatment plant improvements and specific odor control improvements that result from implementing RWSP policies. The 2006 cost estimates for these projects is \$163 million, an increase of \$13 million from the 2005 cost estimates.

***Odor Control at South Plant***

The cost estimate for odor control improvements at South plant increased by approximately \$3 million from the 2005 estimate. This increase is primarily due to increased construction costs for structural modifications to improve worker safety by improving accessibility to the odor control equipment.

***West Point Odor Control***

There have not been any significant changes to the cost estimates from the 2005 estimate for the West Point Odor Control project. The project was substantially complete in early 2007.

***West Point Digestion Improvements***

The 2006 cost estimate for West Point Digestion Improvements increased by about \$2 million from the 2005 estimate. The need for additional structural work associated with installing the new digester mixing systems along with rising inflation and construction costs contribute to this increase.

***King Street Odor Control Project***

The 2006 cost estimate for the King Street Odor Control Project increased by about \$2 million from the 2005 estimate due to design changes and rising inflation and construction costs. The changes address the concerns of involved stakeholders, including the Washington State Department of Transportation, Amtrak, Pioneer Square Preservation Board, and First and Goal.

### ***South Plant Expansion***

Because the South plant expansion is planned for 2029, the cost estimates for this project have not been updated since the 1998 RWSP cost estimate. The current estimate of \$106 million reflects the 1998 preliminary planning-level estimate adjusted for inflation to 2006 dollars.

### ***Vashon Treatment Plant Upgrade***

There were no significant cost increases to the Vashon Treatment Plant Upgrade from the 2005 cost estimate. However, costs could increase in the future due to a construction claim that was received in June 2007.

### ***Carnation Treatment Plant***

The 2006 cost estimate for the Carnation Treatment Plant project increased by \$6 million from the 2005 estimate. Raising the elevation of the plant site to prevent flooding based on a new floodplain study that was released after the planning phase of the project, changes to odor control to meet community concerns, and significant increases in the cost of construction materials contribute to the increase.

More information on these treatment and odor control projects is provided in Chapter 2.

### **Conveyance (Non-Brightwater)**

Table 13-3 shows the 2006 cost estimate for non-Brightwater conveyance increased by \$87 million from the 2005 estimate. As noted in the *RWSP 2005 Annual Report*, conveyance system improvement (CSI) project cost estimates were being updated as part of the CSI Program Update, which was completed in summer 2007. The update identified new projects as well as modifications to projects that were previously identified in the technical memorandum entitled *Summary of Non- Brightwater Conveyance Cost Increases from the 1998 Regional Wastewater Services Plan to the 2004 Regional Wastewater Services Plan Update* (June 2004).

The CSI program update identified conveyance improvement needs through 2050, which is when the regional wastewater service area is projected to be fully built out and all sewerable portions of the service area will be connected into the wastewater system. Because the RWSP's planning horizon is through 2030, the conveyance cost estimates discussed in this section and shown in Table 13-3 reflect conveyance capital projects and associated planning from 1999 through 2030.<sup>8</sup>

The CSI program update identified 13 new projects, with an overall planning-level cost estimate of approximately \$127 million. There was an increase of approximately \$21 million in cost estimates of projects identified in the 2004 technical memorandum that are now in design; a decrease of approximately \$12 million in cost estimates of projects that were identified in the memorandum and are now completed; and an increase of about \$14 million in cost estimates for projects in construction. Some projects have been eliminated from the CSI program cost estimates because the update process confirmed they are no longer needed or are not capacity related; the cost estimates for eliminated projects total approximately \$67 million.

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<sup>8</sup> The 2007 CSI Program Update is available on the Web at <http://dnr.metrokc.gov/wtd/csi/library.htm>



The 2006 cost estimate shown in Table 13-3 for non-Brightwater conveyance is \$754 million. This estimate includes the capital project estimates from the 2007 CSI program update with future expenditures adjusted to 2006\$, planning and other related costs that have been expended since RWSP adoption to develop the CSI program, and future planning costs. Planning costs include costs associated with staff labor, consultant labor, modeling, flow monitoring, alternatives analyses, and cost analysis. Over one-half of the total conveyance costs represent planning level estimates.

More information on the conveyance system improvement program is provided in Chapter 3.

### **Infiltration/Inflow**

The costs of the infiltration/inflow (I/I) control program increased by \$4 million from the 2005 estimate. The 2005 estimate of \$45 million represents costs associated with the comprehensive six-year I/I control study, which was completed in 2005. As a result of this study, and recommendations made by the Metropolitan Water Pollution Abatement Advisory Committee, the King County Executive submitted a recommended I/I control program to the King County Council, which was approved via Motion 12292.

The increase in the 2006 estimate represents new costs that were not previously a part of the RWSP I/I control program. These costs are associated with carrying out the recommended I/I program that was approved in 2006 and include costs related to flow monitoring for the I/I initial projects; ongoing modeling, cost-benefit analysis, planning, and reporting; public education; and regional I/I clearinghouse and other program related costs.

It is important to note that the purpose of the recommended I/I control program is to invest in I/I reduction in lieu of investing in larger conveyance system improvements when it is cost-effective to do so. In accordance with the recommended program, the I/I initial project design and construction costs (\$25 million) are funded by the CSI program and not included as part of I/I program costs.

More information on the I/I control program is provided in Chapter 4.

### **Combined Sewer Overflow Control**

The total combined sewer overflow (CSO) cost estimate includes costs associated with the CSO control program, CSO planning and updates, Sediment Management Program, and the Lower Duwamish Waterway Superfund project. The 2006 total CSO cost estimate is \$444 million, an increase of \$4 million from the 2005 cost estimate.

The \$4 million increase in the Sediment Management Program is due to the delay of several cooperative cleanup projects and additional work associated with the Puget Sound Partnership efforts.

The CSO control program cost estimates represent the 1998 RWSP cost estimates of the 21 planned CSO control projects adjusted for inflation to 2006 dollars. As noted in Chapter 5, additional analysis of CSO planned project costs have not been done because the update of the

hydraulic model will likely change sizes, definitions, and thus costs of several planned control projects. Cost estimates may also increase as the result of design changes made to accommodate evolving regulations, potential effects of climate change, odor control to meet the RWSP odor control policies adopted in 2003, and increases in materials, labor, and contractor costs in this competitive construction environment. New cost estimates will be developed when the hydraulic model is updated and should be available for discussion in the next CSO control program review in 2010.

More information on the CSO control program is provided in Chapter 5.

### Reclaimed Water

The total 2006 cost estimate for the Reclaimed Water Program is \$36 million; this is the same amount as the 2005 cost estimate adjusted to 2006\$. The projects and programs that make up the total reclaimed water cost estimate are as follows:

- **Technology Demonstration Project.** This project was complete as of December 31, 2004. The 2006 cost estimate represents the total expenditures for this project and is the same as the 2005 cost estimate.
- **Future Water Reuse.** This program includes activities to implement the RWSP water reuse plan that was submitted to the council in December 2000 and to support water conservation opportunities within WTD programs. The costs associated with the Reclaimed Water Feasibility Study are included in this program.
- **RWSP Water/Wastewater Conservation Program.** This project has been completed; there is no change from the 2005 cost estimate.
- **Sammamish Valley Reclaimed Water Facility.** This project was cancelled in favor of the reclaimed water capabilities at the Brightwater Treatment Plant. The costs expended prior to cancellation of this project will continue to be included as part of the RWSP cost estimate.
- **Reclaimed Water Backbone.** This project will add reclaimed water pipes in the Brightwater conveyance tunnels and convert an existing wastewater pipe to carry reclaimed water from Bothell to the York Pump Station in the Sammamish Valley. Design was completed on the backbone in 2006. There is no change from the 2005 cost estimate.

More information on the reclaimed water program is provided in Chapter 7.

### Water Quality Protection

The Water Quality and Protection Program—a water resource modeling and monitoring program—provides scientific information on water quality and hydrologic conditions in both the Lake Washington and Green River watersheds. This project was complete as of December 2006. The \$1 million change shown in the 2006 cost estimate from the 2005 estimate is due to rounding.

### **Habitat Conservation Plan/Programmatic Biological Assessment**

As reported in the *RWSP 2005 Annual Report*, the majority of the funds allocated to the Habitat Conservation Plan have been expended. The remaining funds are being directed to pursuing a Programmatic Biological Assessment with NOAA Fisheries and U.S. Fish and Wildlife Services, which is expected to be complete in 2008. Total costs are now expected to be approximately \$8 million instead of approximately \$10 million.

### **RWSP Planning and Reporting**

The RWSP reporting policies call for RWSP annual reports and comprehensive reviews. The costs associated with these reporting requirements have not changed from the 2005 cost estimate.

## **13.3 Amendments to Financial Policies**

The King County Council approved amendments to the RWSP treatment policies via adoption of Ordinance 15602 in September 2006. The amendments are as follows:

- Divided FP-2 into two separate policies (FP-2 and FP-3); no changes were made to the text
- Added a policy (FP-4) that requires reporting to the Regional Water Quality Committee and including in the RWSP annual reports information on new technologies or practices that differ significantly from existing technologies or practices, including the projected costs for such changes
- Added a policy (FP-5) that provides direction for new capital and operational initiatives that are not within the current scope of the RWSP nor included in the RWSP, or are required by new state or federal regulations, to be reviewed by the RWQC and approved by the King County Council
- Amended FP-8 to require information on alternative funding methods for water quality improvement activities be provided to the RWQC and King County Council in April 2007 (see Section 13.1.4 in this chapter)



## Reporting Policies

The reporting policies were added to the RWSP via King County Council adoption of Ordinance 15384 in March 2006. Adding a reporting policies section to the RWSP and the King County Code (28.86.165) eliminated redundancies in reporting requirements that were previously included in several RWSP policies, adjusted the due dates to reflect the availability of information, and consolidated the reporting requirements into fewer, but more comprehensive, reports. The reporting policies call for the King County Executive to review the implementation of the RWSP on a regular basis and submit specific reports to the King County Council and the Regional Water Quality Committee (RWQC).

### 14.1 RWSP Reports

The reporting policies provide direction on the content and frequency of RWSP-related reports. These reports are as follows:

- **RWSP annual report.** This report is expected to be submitted to the King County Council in September each year to cover the previous year's RWSP implementation. The RWSP annual report is expected to continue until the facilities identified in the RWSP are operational. The policies direct the annual report to include a summary of activities for major RWSP components, details on RWSP projects in design or construction, a status of the odor prevention program, a summary of odor complaints received, an overview of water quality monitoring program results, and a summary of RWSP cost estimates through 2030.
- **RWSP comprehensive review.** The policies specify that a comprehensive review report be submitted in September 2007; after this report, future reports are expected to be submitted to the King County Council every three to five years. Future due dates are to be based upon availability of necessary information, completion of key milestones, and the time needed to collect and analyze data. The policies direct the report to provide a review of assumptions related to the rate and location of growth, rate of septic conversions, water conservation efforts, phasing and sizing of facilities, and effectiveness of RWSP policies implementation. In addition, the comprehensive review report is to include all elements of the RWSP annual report, replacing it for that year.
- **Brightwater monthly report.** The reporting policies require the executive to prepare a monthly report for Brightwater that is based on a reporting format approved by the King County Council via Motion 12189 in August 2005. The policies call for this report to include a project summary, upcoming activities, schedules, an expenditures summary, a description of cost or schedule adjustments, and a status of the project's contracts. In addition, this report is to be distributed electronically and is expected to continue until the Brightwater system is operational.

- **Operational Master Plan.** The reporting policies call for updating on a regular basis, in conjunction with RWSP policy amendments, the RWSP Operational Master Plan that was approved by the King County Council via Motion 10809 in December 1999.

This chapter provides an overview on implementation of the RWSP reporting policies in 2004 through 2006. The complete text of all the reporting policies, along with a brief summary of how each policy was implemented in 2004–2006, is provided in Appendix M.

## 14.2 Implementation of Reporting Policies from 2004 through 2006

### 14.2.1 RWSP Annual Report

In accordance with the RWSP reporting policies, the King County Executive has transmitted to the King County Council an RWSP annual report every year since the year 2000. These reports are posted on the RWSP library Web site at

<http://dnr.metrokc.gov/wtd/rwsp/library.htm#ProgressReports>

The elements of the 2006 annual report are included in this *RWSP 2006 Comprehensive Review and Annual Report*.

### 14.2.2 RWSP Comprehensive Review Report

The first RWSP comprehensive review report was transmitted to the King County Council in April 2004. This report described RWSP implementation from 1999 through 2003. This *RWSP 2006 Comprehensive Review and Annual Report* is the second comprehensive review report; it provides a comprehensive review of RWSP implementation from 2004 through 2006 and includes the annual report elements for 2006. The RWSP policies call for subsequent reports every three to five years, depending on availability of necessary information and key milestones.

Based on anticipated milestones and future information, the Wastewater Treatment Division (WTD) recommends that the next RWSP comprehensive review be issued in September 2012 to cover RWSP implementation from 2007 through 2011. Two key milestones are expected to be achieved in 2010—completion of Brightwater construction and completion of the second combined sewer overflow control program review.<sup>1</sup> Important information associated with Brightwater operations will be gathered in 2011; the division would then be able to include this information in the 2007–2011 comprehensive review. In addition, the initial infiltration and inflow projects are expected to be substantially complete in 2011. It is also possible that population and employment growth forecasts based on the Puget Sound Regional Council's analysis of the 2010 census would be available in 2011. If so, WTD staff would have time to

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<sup>1</sup> The first CSO program review was transmitted to the King County Council in 2006, the second review is expected in 2010 and will include information on the results of the updated hydraulic model and the pilot tests of CSO treatment technologies, as well as updated schedules and cost estimates for the CSO control program projects.

analyze the updated forecasts and their effects, if any, on RWSP planning assumptions and facility needs and to include this information in the 2007–2011 review.

In accordance with the reporting policies, the King County Council sets the subsequent due dates, in consultation with the RWQC, following their review of the 2006 comprehensive review.

### 14.2.3 Brightwater Monthly Report

Since March 2005, the Brightwater monthly report has been distributed electronically to the King County Council in accordance with the RWSP policies and Motion 12189.

### 14.2.4 RWSP Operational Master Plan

WTD anticipates completing an update to the RWSP Operational Master Plan in the second quarter of 2008.





# Appendices

**Appendix A.** RWSP Treatment Plant Policies

**Appendix B.** RWSP Conveyance Policies

**Appendix C.** RWSP Infiltration and Inflow Policies

**Appendix D.** RWSP Combined Sewer Overflow Policies

**Appendix E.** RWSP Biosolids Policies

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**Appendix I.** RWSP Wastewater Planning Policies

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**Appendix N.** 2006 Summary of Odor Complaints

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**Appendix P.** “Robinswood Agreement” Letter

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Appendix A

# RWSP Treatment Plant Policies



## RWSP Treatment Plant Policies

A. Explanatory material. The treatment plant policies are intended to guide the county in providing treatment at its existing plants and in expanding treatment capacity through the year 2030. The policies direct that secondary treatment will be provided to all base sanitary flows. The county will investigate possible tertiary treatment with a freshwater outfall to facilitate water reuse. The policies also direct how the county will provide the expanded treatment capacity necessary to handle the projected increases in wastewater flows resulting from population and employment growth. The policies provide for the construction of a new treatment plant (the Brightwater treatment plant) to handle flows in a new north service area, expansion of the south treatment plant to handle additional south and east King County flows and the reservation of capacity at the west treatment plant to handle Seattle flows and CSOs. The potential for expansion at the west and south treatment plants will be retained for unanticipated circumstances such as changes in regulations. The policies address goals for odor control at treatment plants and direct that water reuse is to continue and potentially expand at treatment plants.

Treatment Plant Policies	How implemented in 2004–2006
<p>TPP-1: King County shall provide secondary treatment to all base sanitary flow delivered to its treatment plants. Treatment beyond the secondary level may be provided to meet water quality standards and achieve other goals such as furthering the water reuse program or benefiting species listed under the ESA.</p>	<p>The county's regional treatment plants, West Point and South plants, are activated sludge secondary plants. The Vashon Treatment Plant is an oxidation ditch secondary treatment plant.</p> <p>Some of the secondary effluent at the West Point and South treatment plants undergoes disinfection and advanced treatment to be reused for on-site landscaping and in-plant processes. In addition, some of the reclaimed water produced at South plant is distributed in the summer months off-site for irrigation purposes.</p> <p>In 2006, construction began on the Brightwater Treatment Plant and the Carnation Treatment Plant. Both treatment plants will use membrane bioreactor technology (MBR), which will result in treated wastewater that is seven to ten times cleaner than typical secondary treatment.</p> <p>The Department of Natural Resources and Parks (DNRP) continues to monitor and work with agencies and organizations, such as the Washington State Department of Ecology (Ecology) and the Puget Sound Partnership on issues relating to water quality standards, reclaimed water goals, and activities to benefit species listed under the federal Endangered Species Act.</p>
<p>TPP-2: King County shall provide additional wastewater treatment capacity to serve growing wastewater needs by constructing the Brightwater treatment plant at the Route 9 site north of the city of Woodinville and then expanding the treatment capacity at the south treatment plant. The west treatment plant shall be maintained at its rated capacity of one</p>	<p>Construction on the Brightwater Treatment System began in 2006; the project is on schedule for completion in 2010.</p> <p>A South Plant capacity and re-rating evaluation was completed in 2004. Updated population projections (2003 Puget Sound Regional Council forecast by traffic analysis zone) and a 10 percent water</p>

Treatment Plant Policies	How implemented in 2004–2006
<p>hundred thirty-three mgd. The south treatment plant capacity shall be limited to that needed to serve the eastside and south King County, except for flows from the North Creek Diversion project and the planned six-million-gallon storage tank, or minor rerating to facilitate south or east county growth. The potential for expansion at the west treatment plant and south treatment plant should be retained for unexpected circumstances which shall include, but not be limited to, higher than anticipated population growth, new facilities to implement the CSO reduction program or new regulatory requirements.</p> <p><i>(This policy was amended by Ordinance 15602 in September 2005—replacing “north treatment plant” references to “Brightwater” and adding information about minor re-rating to South Plant.)</i></p>	<p>conservation assumption by 2010 were then applied to update flow projections to South plant. Based on these projections, and available capacity at South plant, taking into account the on-line date for Brightwater, it is projected that South plant will have capacity until 2023, at which point re-rating of unit processes could be implemented to provide additional capacity instead of doing a major expansion at that time. Expansion would then occur in 2029 as originally planned.</p> <p>The county will continue to review future updated population projections and water conservation assumptions. Based on future information, the projected dates for re-rating or expansion of South plant could change.</p>
<p>TPP-3: Any changes in facilities of the west treatment plant shall comply with the terms of the West Point settlement agreement.</p>	<p>The county continues to comply with the West Point Settlement Agreement.</p> <p>A significant provision of the agreement was completed in March 2006, when the King County Council approved Ordinance 15391, authorizing payment of \$5.3 million to the City of Seattle in satisfaction of Section 1(d) of the agreement. This section requires the county to investigate alternative technologies that have the potential to remove digesters from the West Point Treatment Plant site, and if no alternatives could be implemented by December 31, 2005, King County agreed to pay an amount established via the agreement to the City of Seattle for deposit in the city’s Shoreline Park Improvement Fund. <i>(See Chapter 2 for more details.)</i></p>
<p>TPP-4: King County’s goal is to prevent and control nuisance odor occurrences at all treatment plants and associated conveyance facilities and will carry out an odor prevention program that goes beyond traditional odor control. To achieve these goals, the following policies shall be implemented:</p> <p>1. Existing treatment facilities shall be retrofit in a phased manner up to the High/Existing Plant Retrofit odor prevention level as defined in Table 1 of Attachment A to Ordinance 14712, the odor prevention policy recommendations dated March 18, 2003. This level reflects what is currently defined as the best in the country for retrofit treatment facilities of a similar size. Odor prevention systems will be employed as required to meet the goal of preventing and controlling nuisance</p>	<p>TPP-4.1: The Wastewater Treatment Division (WTD) is undertaking the following phased improvements at West Point and South treatment plants:</p> <ul style="list-style-type: none"> <li>• Changes to the division channel ventilation system at West Point were completed in 2005. Modifications to the odor scrubber system were completed in early 2007. WTD will evaluate the effects of these improvements through 2008 to determine if they meet the odor control goal for existing facilities.</li> <li>• At South Treatment Plant, the final design of covers for each first pass of the four aeration basins and for the return activated sludge channel was completed in 2005. Installation of the covers began in 2006 and is expected to be completed by the end of 2007.</li> </ul>

Treatment Plant Policies	How implemented in 2004–2006
<p>odor occurrences;</p> <p>2. Existing conveyance facilities that pose nuisance odor problems shall be retrofitted with odor prevention systems as soon as such odors occur, subject to technical and financial feasibility. All other existing conveyance facilities shall be retrofitted with odor control systems during the next facility upgrade;</p> <p>3. The executive shall phase odor prevention systems implementing the tasks that generate the greatest improvements first, balancing benefit gained with cost, and report to the council on the status of the odor prevention program in the annual RWSP report as outlined in K.C.C. 28.86.165;</p> <p><i>(sub-section 3 was amended by Ordinance 15384, which directed the executive to include the report on the odor prevention program in RWSP annual reports)</i></p> <p>4. New regional treatment facilities shall be constructed with odor control systems that are designed to meet the High/New Plant odor prevention level as defined in Table 1 of Attachment A to Ordinance 14712, the odor prevention policy recommendations dated March 18, 2003. This level reflects what is currently defined as the best in the country for new treatment facilities of a similar size;</p> <p>5. New conveyance facilities serving these new regional treatment facilities shall also be constructed with odor control systems as an integral part of their design;</p> <p>6. Design standards will be developed and maintained for odor control systems to meet the county's odor prevention and control goals;</p> <p>7. A comprehensive odor control and prevention monitoring program for the county's wastewater treatment and conveyance facilities will be developed. This program shall include the use of near facility neighbor surveys and tracking of odor complaints and responses to complaints and shall consider development of an odor prevention benchmarking and audit program with peer utilities; and</p> <p>8. New odor prevention and measurement technologies will be assessed and methods for pilot testing new technologies identified when determined by the executive to be necessary and appropriate for achieving the goals of this policy</p>	<p>TPP-4.2: Table 2.1 in Chapter 2 lists the improvements WTD is undertaking in the county's existing conveyance facilities.</p> <p>TPP-4.3: The schedule for phased improvements follows this direction. RWSP annual reports include a status of the odor prevention program.</p> <p>TPP-4.4: The Brightwater Treatment Plant's odor control system is being designed to meet the "best in the country for new facilities" level, described in Attachment A to Ordinance 14712. Brightwater's odor control system includes biological, chemical, and carbon odor scrubber stages.</p> <p>TPP-4.5: The Brightwater conveyance system's design includes odor control systems.</p> <p>TPP-4.6: WTD is using the design standard that was developed in 2002 for the county's odor control systems.</p> <p>TPP-4.7: The <i>Odor and H<sub>2</sub>S Corrosion Control Plan</i> was completed in late 2006. Surveys of businesses and residents that are near-neighbors of the treatment plants are carried out on an annual basis and provide feedback on odor sources and process improvements that have reduced odor impacts. In addition, WTD has procedures in place to log, investigate, and track all odor complaints. A summary report of yearly odor complaints is provided in RWSP annual reports (see Appendix N).</p> <p>WTD consults with peer utilities on information related to odor control technologies, lessons learned, and information sharing.</p> <p>TPP-4.8: Biological odor scrubbers (bioscrubbers) were pilot tested at the South Treatment Plant in 2005 and resulted in the adoption of the technology for the Brightwater Treatment Plant.</p>

Treatment Plant Policies	How implemented in 2004–2006
<p>TPP-5: King County shall undertake studies to determine whether it is economically and environmentally feasible to discharge reclaimed water to systems such as the Lake Washington and Lake Sammamish watersheds including the Ballard Locks.</p>	<p>The water reuse work plan that was submitted to the King County Council in December 2000 determined such a discharge will not need to be considered for at least 10 years.</p>
<p>TPP-6: The county shall evaluate opportunities in collaboration with adjacent utilities regarding the transfer of flows between the county's treatment facilities and treatment facilities owned and operated by other wastewater utilities in the region. The evaluation shall include, but not be limited to, cost environmental and community impacts, liability, engineering feasibility, flexibility, impacts to contractual and regulatory obligations and consistency with the level of service provided at the county owned and operated facilities.</p> <p><i>(Ordinance 15602 amended this policy to make the policy read clearer, there were no changes to the intent of the policy.)</i></p>	<p>No new opportunities were presented in 2004–2006 regarding transfer of flows between the county's treatment facilities and treatment facilities owned and operated by other wastewater utilities in the region.</p> <p>King County and the City of Edmonds continue to transfer wastewater flows between systems in accordance with their interlocal agreement.</p>
<p>TPP-7: King County may explore the possibility of constructing one or more satellite treatment plants in order to produce reclaimed water. The county may build these plants in cooperation with a local community and provide the community with reclaimed water through a regional water supply agency. In order to ensure integrated water resource planning, in the interim period prior to the development of a regional water supply plan, King County shall consult and coordinate with regional water suppliers to ensure that water reuse decisions are consistent with regional water supply plans. To ensure costs and benefits are shared equally throughout the region, all reclaimed water used in the community shall be distributed through a municipal water supply or regional water supply agency consistent with a regional water supply plan.</p> <p><i>(Ordinance 15602 amended this policy to include the words "a municipal water supply or" in the last sentence.)</i></p>	<p>The King County Council decided to cancel the Sammamish Valley Reclaimed Water Project as part of the 2005 budget ordinance (Ordinance 15083) in favor of developing capabilities of the Brightwater system to produce and distribute reclaimed water, now known as the Brightwater reclaimed water backbone.</p> <p>A regional water supply plan has not been developed. The county continues to consult and coordinate with water utilities on reclaimed water projects and opportunities.</p>
<p>TPP-8: King County shall continue water reuse and explore opportunities for expanded use at existing plants, and shall explore water reuse opportunities at all new treatment facilities.</p>	<p>WTD has been safely using reclaimed water since 1997 at the South and West Point plants.</p> <p>When operational, reclaimed water from the Carnation Treatment Plant will be used to enhance a wetland in the county's Chinook Bend Natural Area.</p> <p>In November 2005, the King County Council approved Phase 1 of the Brightwater reclaimed water pipeline,</p>



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**Appendix A. Treatment Plant Policies and Implementation in 2004-2006**

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Treatment Plant Policies	How implemented in 2004–2006
<i>(Ordinance 15602 deleted policies TPP-9 and TPP-10, which referred to the Brightwater siting process. The siting process was completed in December 2003.)</i>	also known as the Brightwater backbone, as part of WTD's 2006 budget. Potential reclaimed water opportunities from this portion of the Brightwater backbone include uses for parks and businesses in Bothell, Woodinville, Redmond, and other cities in the area, as well as farms, parks, and businesses in the Sammamish Valley.

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Appendix B

# RWSP Conveyance Policies



## RWSP Conveyance Policies

A. Explanatory material. The conveyance policies are intended to guide how major improvements to the wastewater conveyance system, including building and upgrading the pipes and pump stations needed to convey wastewater to the Brightwater treatment plant and building the outfall pipe from the Brightwater treatment plant, will be accomplished. The policies also include guidance for other major and minor conveyance improvements to accommodate increased flows in other parts of the service area and to prevent improper discharges from the sanitary system.

The policies also direct the executive to develop and recommend policies to implement equitable regional ownership of the conveyance system.

Conveyance Policies	How implemented in 2004–2006
<p>CP-1: To protect public health and water quality, King County shall plan, design and construct county wastewater facilities to avoid sanitary sewer overflows.</p> <ol style="list-style-type: none"> <li>1. The twenty-year peak flow storm shall be used as the design standard for the county's separated wastewater system.</li> <li>2. Parameters developed by the wastewater treatment division in consultation with the metropolitan water pollution abatement advisory committee shall be used to guide project scheduling and prioritization for separated wastewater system projects.</li> <li>3. The south treatment plant effluent transfer system shall be designed with a five-year design storm standard. When effluent volumes exceed the five-year design standard and exceed the capacity of the south treatment plant effluent transfer system, secondary treated effluent from the south treatment plant will be discharged to the Green/Duwamish river until the flow subsides such that the flow can be discharged through the south treatment plant effluent transfer system.</li> </ol> <p><i>(Ordinance 15602 amended this policy—clarifying the definition of the design standard and adding CP-1.2 on the use of parameters developed in consultation with Metropolitan Water Pollution Abatement Advisory Committee)</i></p>	<p>CP-1.1: The twenty-year peak flow storm is used as the design standard for the county's separated wastewater system.</p> <p>CP-1.2: In 2004, WTD worked in consultation with MWPAAC to develop prioritization criteria, which were used in the process to update the Conveyance System Improvement program. (See Chapter 3 for more information.)</p> <p>CP-1.3: There were no emergency or maintenance discharges from South Plant to the Green/Duwamish River in 2004–2006.</p>
<p>CP-2: King County shall construct the necessary wastewater conveyance facilities, including, but not limited to pipelines, pumps and regulators, to convey wastewater from component agencies to the treatment plants for treatment and to convey treated effluent to water bodies for discharge. Conveyance facilities shall be constructed during the</p>	<p>Conveyance projects are being planned and implemented to meet the 20-year peak flow storm design standard and projected flow increases based on anticipated growth.</p> <p>The conveyance system improvement (CSI) program was updated in 2007. The CSI program update identifies 33 conveyance projects to meet identified</p>

<b>Conveyance Policies</b>	<b>How implemented in 2004–2006</b>
planning period of this plan to ensure that all treatment plants can ultimately operate at their rated capacities. No parallel eastside interceptor shall be constructed. No parallel Kenmore Interceptor shall be constructed.	capacity needs through 2050; 24 of these projects are planned through the RWSP planning horizon of 2030. All 33 projects are in addition to the RWSP projects that are completed or that are in design or construction.  Chapter 3 provides information on the CSI program update and on conveyance projects in design or construction in 2004-2006.
CP-3: King County shall periodically evaluate population and employment growth assumptions and development pattern assumptions used to size conveyance facilities to allow for flexibility to convey future flows that may differ from previous estimates.	In preparation of the CSI program update, WTD staff used the population and flow information that was included in the <i>2004 RWSP Update</i> and met with staff from the component agencies to go over the estimates and what they are experiencing to validate the estimates and ensure facilities are planned accordingly.  The county will continue to evaluate population, employment, and development growth assumptions based on information gathered from the Puget Sound Regional Council, local jurisdiction's comprehensive plan updates, and discussions with the component agencies.
CP-4: King County shall apply uniform criteria throughout its service area for the financing, development, ownership, operation, maintenance, repair and replacement of all conveyance facilities. The criteria shall include:  1. County ownership and operation of permanent conveyance facilities that serve natural drainage areas of greater than one thousand acres;  2. Conformance to the county's comprehensive water pollution abatement plan and the Regional Wastewater Service Plan as precondition of county ownership; and  3. A financial feasibility threshold governing limitations of the county's financial contribution to: development of a new interceptor or trunk sewer; or acquisition of an interceptor or trunk sewer constructed by a local agency. The threshold, as specified in K.C.C. 28.84.080, shall consider the capital costs that can be supported by the existing customers in the natural drainage area that would be served by the new facility.  <i>(CP-4 in Ordinance 13680 directed the executive to prepare and submit to the council recommended policies for achieving uniform financing, construction, operation, maintenance and replacement of all conveyance facilities within its service area. Ordinance 15602, which was adopted by the King County Council in</i>	The following activities regarding pipeline acquisitions took place in 2004 through 2006 in accordance with this policy: <ul style="list-style-type: none"><li>• Acquisition of the Southeast Sammamish Interceptor and flow control structure from the Sammamish Plateau Water and Sewer District</li><li>• Acquisition of the Juanita Creek Trunk Sewer from Northshore Utility District</li><li>• Acquisition of the Coal Creek Interceptor Extension from Coal Creek Utility District</li></ul>

Conveyance Policies	How implemented in 2004–2006
<p><i>September 2006, amended CP-4 to meet this requirement.)</i></p> <p>CP-5: King County shall closely integrate water reuse planning and I/I study results with planning for wastewater conveyance and treatment facilities. King County shall consider water conservation and demand management assumptions developed by local utilities for wastewater facility planning.</p> <p><i>(Ordinance 15602 amended CP-5 to clarify that the county consider the assumptions developed by local utilities for wastewater facility planning.)</i></p>	<p>For the CSI program update, the county used a water conservation planning assumption of a 10 percent reduction in per day consumption from the 2000 levels by 2010, with no additional reduction thereafter. This is the same assumption used to update the 1998 RWSP flow projections in the <i>2004 RWSP Update</i>. WTD staff will continue to review and monitor the water conservation assumptions of the City of Seattle and other utilities in the county's wastewater service area. For example, in spring 2007, the City of Seattle revised its water conservation assumptions and is now projecting greater conservation through 2010 and additional conservation between 2010 and 2020. WTD is in the process of analyzing Seattle's revised water conservation assumptions to determine the effect, if any, on future flow projections and facility needs.</p> <p>During the process to update the CSI program, no reclaimed water planning efforts were under way or planned that might affect the flow projections used in updating the CSI program. WTD staff will continue to review component agency comprehensive plans to incorporate any evaluation of reclaimed water opportunities in those plans into wastewater facilities planning.</p> <p>The design and construction of the Brightwater reclaimed water pipeline takes advantage of the opportunity to construct this pipeline in conjunction with the construction of the Brightwater conveyance facilities.</p> <p>The infiltration/inflow (I/I) initial projects will provide more information on the effectiveness of I/I control projects. I/I reduction will be pursued in lieu of a CSI project when the cost of an I/I project is less than the cost of the CSI improvement.</p>
<p><i>(Ordinance 15602 deleted CP-6, which called for a study on the impact of conveyance trenches on groundwater recharge, because the study had been completed.)</i></p>	





Appendix C

RWSP Infiltration and Inflow Policies



## RWSP Infiltration and Inflow Policies

A. Explanatory material. The I/I policies are intended to guide the county in working cooperatively with component agencies to reduce the amount of I/I that flows into component agencies' local collection systems, thereby reducing the impact of I/I on the regional system's capacity. This cooperative process will assess levels of I/I in local conveyance systems and construct pilot projects and will evaluate the cost-effectiveness and environmental costs and benefits of local collection system rehabilitation. The executive will develop and recommend long-term measures to reduce existing and future levels of I/I into local collection systems. Incentives for component agencies to meet the adopted target for I/I reduction may include a surcharge.

Infiltration and Inflow Policies	How Implemented in 2004–2006
I/IP-1: King County is committed to controlling I/I within its regional conveyance system and shall rehabilitate portions of its regional conveyance system to reduce I/I whenever the cost of rehabilitation is less than the costs of conveying and treating that flow or when rehabilitation provides significant environmental benefits to water quantity, water quality, stream flows, wetlands or habitat for species listed under the ESA.	<p>Since the adoption of the RWSP, WTD has implemented a regional infiltration/inflow (I/I) control program to reduce the volume of I/I from entering its regional conveyance system. The goal of the I/I control program is to pursue I/I reduction projects when the cost of rehabilitation is less than the costs of conveying and treating that flow. The executive's recommended I/I control program that was approved by the King County Council in May 2006 includes the construction of initial I/I projects to test the cost-effectiveness of I/I reduction on a larger scale. The results of these projects will be incorporated into future wastewater facility planning.</p> <p>All I/I rehabilitation or repair projects are subject to project specific environmental review procedures required under the State Environmental Policy Act and other applicable drainage and erosion control standards. The <i>Alternatives/Options Report</i>, March 2005 provides information on potential environmental benefits or impacts associated with I/I reduction.</p>
I/IP-2: King County shall work cooperatively with component agencies to reduce I/I in local conveyance systems utilizing and evaluating I/I pilot rehabilitation projects, and developing draft local conveyance systems' design guidelines, procedures and policies, including inspection and enforcement standards. Evaluations of the pilot rehabilitation projects and a regional needs assessment of the conveyance system and assessments of I/I levels in each of the local sewer systems will form the basis for identifying and reporting on the options and the associated cost of removing I/I and preventing future increases. The executive shall submit to the council a report on the options, capital costs and environmental costs and benefits including but not limited to those related to water quality, groundwater inception, stream flows and wetlands, and habitat of species listed under	<p>A six-year comprehensive I/I control study, completed in 2005, was carried out in coordination with the component agencies. As a result of this study, the King County Executive forwarded the <i>Executive's Recommended Regional I/I Control Program</i> to the King County Council for approval; the council approved the program in May 2006.</p> <p>The recommended I/I control program reflects the need to reduce I/I by cost-effectively removing enough I/I from the collection system to delay, reduce, or eliminate some otherwise needed CSI projects. The recommendations include identifying cost-effective I/I reduction projects on a project specific basis, rather than on a regional basis or by the need to meet specific I/I reduction targets.</p> <p>The recommended program calls for the selection, implementation, and evaluation of two or three "initial" I/I reduction projects to test the effectiveness of I/I reduction on a larger scale than the pilot projects. In</p>

<b>Infiltration and Inflow Policies</b>	<b>How Implemented in 2004–2006</b>
<p>the ESA. No later than December 31, 2005, utilizing the prior assessments and reports the executive shall recommend target levels for I/I reduction in local collection systems and propose long-term measures to meet the targets. These measures shall include, but not be limited to, establishing new local conveyance systems design standards, implementing an enforcement program, developing an incentive based cost sharing program and establishing a surcharge program. The overall goal for peak I/I reduction in the service area should be thirty percent from the peak twenty-year level identified in the report. The county shall pay one hundred percent of the cost of the assessments and pilot projects.</p> <p><i>(Ordinance 15602 updated this policy to reflect conditions as of January 2005.)</i></p>	<p>summer 2006, WTD worked with the Metropolitan Water Pollution Abatement Advisory Committee's (MWPAAC) Engineering and Planning Subcommittee to develop selection criteria for the initial I/I projects. Based on the criteria, four projects were selected by MWPAAC to move forward into pre-design. Based on the results of this work, WTD will work with MWPAAC to select the 2 to 3 most feasible projects for design and construction.</p> <p>A benefit/cost analysis was completed in November 2005 to determine the feasibility of reducing I/I in the region by 30 percent. The analysis found that costs outweighed benefits by nearly three to one. As a result, one of the program recommendations is that the 30 percent goal articulated in I/IP-2 not be implemented. Instead, cost-effective I/I reduction projects will be identified and implemented on a project-specific basis.</p> <p>After completion of the initial projects, the King County Executive will likely forward policy recommendations to the King County Council regarding long-term I/I reduction and control.</p>
<p>I/IP-3: King County shall consider an I/I surcharge, no later than June 30, 2006, on component agencies that do not meet the adopted target levels for I/I reduction in local collection systems. The I/I surcharge should be specifically designed to ensure the component agencies' compliance with the adopted target levels. King County shall pursue changes to component agency contracts if necessary or implement other strategies in order to levy an I/I surcharge.</p> <p><i>(Ordinance 15602 amended the date in this policy from June 30, 2005 to June 30, 2006.)</i></p>	<p>One of the recommendations included in the <i>Executive's Recommended Regional Infiltration and Inflow Control Program</i> is to not implement a surcharge on local agencies. The county and component agencies found that implementing a surcharge would be costly to administer and would pose difficulties in verifying violations. Investing in actual improvements to the conveyance system was considered a better use of revenues.</p> <p>As noted in I/IP-2, after completion of the initial projects, the executive will likely forward policy recommendations to the King County Council regarding long-term I/I reduction and control.</p>

Appendix D

RWSP Combined Sewer Overflow  
Control Policies



## RWSP Combined Sewer Overflow Control Policies

A. Explanatory material. The CSO control policies are intended to guide the county in controlling CSO discharges. Highest priority for controlling CSO discharges is directed at those that pose the greatest risk to human health, particularly at bathing beaches, and environmental health, particularly those that threaten species listed under ESA. The county will continue to work with federal, state and local jurisdictions on regulations, permits and programs related to CSOs and stormwater. The county will also continue its development of CSO programs and projects based on assessments of water quality and contaminated sediments.

Combined Sewer Overflow Policies	How Implemented in 2004–2006
CSOCP-1: King County shall plan to control CSO discharges and to work with state and federal agencies to develop cost-effective regulations that protect water quality. King County shall meet the requirements of state and federal regulations and agreements.	<p>The county continues to implement the RWSP CSO Control Program to meet the Washington State Department of Ecology (Ecology) standard of no more than an average of one untreated discharge per year at each CSO location. Highlights in 2004–2006 to achieve this goal include:</p> <ul style="list-style-type: none"> <li>• In 2005, completed construction and began startup of Mercer/Elliott West CSO and Henderson/Norfolk CSO control systems (these projects were under way prior to approval and adoption of RWSP)</li> <li>• Completed CSO Control Program annual reports as required per the NPDES (National Pollutant Discharge Elimination System) permit for the West Point Treatment Plant</li> <li>• In 2005, upgraded the pumping capacity at the Carkeek CSO plant from 8.4 mgd to 9.2 mgd</li> <li>• Submitted the <i>CSO Control Program Review</i> to King County Council in 2006</li> <li>• Continued investigations to determine if proposed levels of CSO control will be sufficient to meet sediment standards</li> <li>• Continued participation and involvement in the Lower Duwamish Waterway Group Superfund studies</li> </ul> <p>In 2007, predesign began on four RWSP CSO control projects: South Magnolia, North Beach, Barton Street and Murray Avenue.</p>
CSOCP-2: King County shall give the highest priority for control to CSO discharges that have the highest potential to impact human health, bathing beaches and/or species listed under ESA.	The current CSO control schedule aligns with the priorities outlined in CSOCP-2. The CSO program review that was submitted to the King County Council in spring 2006 reaffirmed the RWSP priorities of protecting public health, the environment, and endangered species, which shaped the development of the CSO control program.
CSOCP-3: Where King County is responsible for stormwater as a result of a CSO control project, the county shall participate with the City of Seattle in the municipal stormwater	This policy was developed with the Lander and Densmore separated drains in mind. In accordance with memoranda of agreements, King County and the City of Seattle jointly manage stormwater discharges

## Appendix D. Combined Sewer Overflow Policies and Implementation in 2004-2006

Combined Sewer Overflow Policies	How Implemented in 2004–2006
national pollutant discharge elimination system permit application process.	<p>in the Lander and Densmore drainage basins that occur as the result of county sewer separation projects. In addition, the county is a co-permittee with the City of Seattle for the Densmore NPDES municipal stormwater permit.</p> <p>The county and city continue to discuss how to address stormwater prevention and enforcement needs.</p>
CSOCP-4: Although King County's wastewater collection system is impacted by the intrusion of clean stormwater, conveyance and treatment facilities shall not be designed for the interception, collection and treatment of clean stormwater.	<p>The county remains committed to not building facilities to collect or treat new separated stormwater.</p>
CSOCP-5: King County shall accept stormwater runoff from industrial sources and shall establish a fee to capture the cost of transporting and treating this stormwater. Specific authorization for such discharge is required.	<p>WTD's Industrial Waste Program coordinates the approvals of and cost recovery for such discharges.</p>
CSOCP-6: King County, in conjunction with the city of Seattle, shall implement stormwater management programs in a cooperative manner that results in a coordinated joint effort and avoids duplicative or conflicting programs.	<p>To prevent duplication and conflicts, the county and Seattle coordinate on their stormwater and wastewater management programs. In areas served by combined sewers, the city manages stormwater before it enters the county sewers; the county manages the stormwater after it enters the county sewers. The county is responsible for the stormwater that results from county sewer separation projects. In areas served by separated sewers, the city manages most of the stormwater. As mentioned in CSOCP-3, the county and city are working together and coordinating on source control inspections in the Lower Duwamish Basin.</p>
<p>CSOCP-7: King County shall implement its long-range sediment management strategy to address its portion of responsibility for contaminated sediment locations associated with county CSOs and other facilities and properties. Where applicable, the county shall implement and cost share sediment remediation activities in partnership with other public and private parties, including the county's current agreement with the Lower Duwamish Waterway Group, the Department of Ecology and the Environmental Protection Agency, under the federal Comprehensive Environmental Response, Compensation and Liability Act.</p> <p><i>(Ordinance 15602 amended CSOCP-7 to reflect that a sediment strategy has been developed and is in place.)</i></p>	<p>The county continues to work to improve water quality in the Lower Duwamish Waterway through actions such as reducing CSOs, restoring habitats, capping and cleaning up sediments, and controlling toxicants from industries and stormwater runoff. WTD is partnering with the City of Seattle, the Port of Seattle, and the Boeing Company under a consent agreement with EPA and Ecology to prepare a remedial investigation and feasibility study for the Lower Duwamish Waterway Superfund Site. The remedial investigation, which defines the extent and inherent risks of contamination, will be ready for public review in autumn 2007. The feasibility study, which will identify cleanup alternatives, is scheduled to be completed in 2009.</p> <p>The county is participating in two early action sites—the Diagonal/Duwamish CSO/Storm Drain and Slip 4 CSO. The cleanup at Diagonal/Duwamish was</p>



Combined Sewer Overflow Policies	How Implemented in 2004–2006
<p>CSOCP-8: King County shall assess CSO control projects, priorities and opportunities using the most current studies available, for each CSO Control Plan Update as required by the Department of Ecology in the NPDES permit renewal process, which is approximately every five to seven years. Before completion of an NPDES required CSO Control Plan Update, the executive shall submit a CSO program review to the council and RWQC. Based on its consideration of the CSO program review, the RWQC may make recommendations for modifying or amending the CSO program to the council.</p> <p><i>(Ordinance 15602 updated this policy to reflect current information.)</i></p>	<p>completed in February 2004. Follow-up work was completed at the site in February 2005, and monitoring of these actions is providing critical information on cleanup alternatives for the Superfund site.</p> <p>In 2006, EPA approved a cleanup plan for Slip 4 CSO sediments. Sediments with the highest contamination will be removed, and the remaining sediments will be capped.</p> <p>Monitoring activities in 2005 showed accumulations of phthalates and some other chemicals in front of the Diagonal/Duwamish outfall. This discovery led to formation of the Sediment Phthalate Work Group, composed of representatives from EPA, Ecology, King County, and the Cities of Seattle and Tacoma. The work group is looking at environmental occurrence, sources, risks and receptors, source control and treatment, and regulatory aspects of phthalate sediment contamination.</p> <p>The next CSO control plan update is due to Ecology in 2008—the updates are done in coordination with the NPDES permit renewal for the West Point Treatment Plant. The CSO program review was submitted to the King County Council in 2006, satisfying the requirement for a review to be issued prior to the 2008 CSO Control Plan Update.</p> <p>New technologies that offer some promise for greater cost-effectiveness will be pilot tested between 2007 and 2009. The hydraulic model used to predict the effectiveness of CSO control and to design CSO control projects is being updated and recalibrated. WTD expects the updated model to be ready in 2008. The Lower Duwamish Waterway Source Control Project is pilot testing enhanced source control methods that if effective, could be added to future efforts.</p>
<p>CSOCP-9: Unless specifically approved by the council, no new projects shall be undertaken by the county until the CSO program review has been presented to the council for its consideration. CSO project approval prior to completion of CSO program review (beyond those authorized in this subsection) may be granted based on, but not limited to, the following: availability of grant funding; opportunities for increased cost-effectiveness through joint projects with other agencies; ensuring compliance with new regulatory requirements; or responding to emergency public health situations. The council shall request advice from the RWQC when considering new CSO projects. King County</p>	<p>This policy has been fully implemented. The CSO program review referred to in this policy was submitted to the King County Council in April 2006. No new projects were initiated prior to the submittal of the CSO program review.</p> <p>The projects that were under way as of December 13, 1999 have been completed. The Alki transfer of base flow was completed in 1998 and conversion of the plant to CSO treatment was finished in 2000. The Mercer Elliott/West and the Henderson/Norfolk systems were completed in 2005.</p>

## **Appendix D. Combined Sewer Overflow Policies and Implementation in 2004-2006**

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<b>Combined Sewer Overflow Policies</b>	<b>How Implemented in 2004–2006</b>
shall continue implementation of CSO control projects underway as of the effective date of this section, which are the Denny way, Henderson/Martin Luther King, Jr. way/Norfolk, Harbor and Alki CSO treatment plants.	

Appendix E  
RWSP Biosolids Policies



## RWSP Biosolids Policies

A. Explanatory material. The biosolids policies are intended to guide the county to continue to produce and market class B biosolids. The county will also continue to evaluate alternative technologies so as to produce the highest quality marketable biosolids. This would include technologies that produce class A biosolids.

Biosolids Policies	How Implemented in 2004–2006
BP-1: King County shall strive to achieve beneficial use of wastewater solids. A beneficial use can be any use that proves to be environmentally safe, economically sound and utilizes the advantageous qualities of the material.	One hundred percent of King County's biosolids were used beneficially in agriculture and forestry or as an ingredient in compost. At the West Point and South treatment plants, digester gas was used for energy generation, and at South plant, some of the gas was sold.
BP-2: Biosolids-derived products should be used as a soil amendment in landscaping projects funded by King County.	Specifications for the biosolids compost, GroCo have been added to King County's standard procurement documents for use in bids and contracts. GroCo is also used in the King County Parks greenhouse/nursery program.
BP-3: King County shall consider new and innovative technologies for wastewater solids processing, energy recovery, and beneficial uses brought forward by public or private interests. King County shall seek to advance the beneficial use of wastewater solids, effluent, and methane gas through research and demonstration projects.	<p>WTD continues to evaluate and test new technologies with the capability to advance the beneficial use of biosolids, reclaimed water, and energy resources.</p> <p>Digester gas (methane) is used for energy generation at the plants or is scrubbed and sold. A two-year fuel cell demonstration project at South Plant using digester gas began in February 2004; demonstration testing was completed in 2006.</p> <p>A feasibility study, which has been funded by a state grant, will be prepared in 2007 to identify potential technologies for utilizing the digester gas to generate alternative forms of energy at Brightwater.</p> <p>Resulting from research (2004 to 2006) initiated by University of Washington, the county's biosolids are being used by canola farmers in eastern Washington.</p> <p>In 2006, WTD worked with the University of Washington to estimate carbon sequestration for each biosolids end use: composting, agriculture, and forestry. The university also evaluated the potential for biosolids applications to qualify for carbon credits that could be traded on the Chicago Climate Exchange.</p>
<p>BP-4: King County shall seek to maximize program reliability and minimize risk by one or more of the following:</p> <ol style="list-style-type: none"> <li>1. maintaining reserve capacity to manage approximately one hundred fifty percent of projected volume of biosolids;</li> <li>2. considering diverse technologies, end products, and beneficial uses; or</li> <li>3. pursuing contractual protections including interlocal agreements, where</li> </ol>	<p>WTD recycles 100 percent of its biosolids for use in forestry, on irrigated and dryland crops, and to make compost. The biosolids program has permitted land, primarily in Douglas County to maintain site capacity for 150 percent of annual production. This additional capacity has allowed King County to recycle 100 percent of its biosolids even when one or more of its projects has temporarily reduced capacity.</p> <p>The county continues to evaluate markets that would provide additional site capacity as well as provide environmental benefits and continues to investigate</p>

## Appendix E. Biosolids Policies and Implementation in 2004-2006

Biosolids Policies	How Implemented in 2004–2006
appropriate.	technologies that have the potential to cost-effectively produce Class A biosolids.
BP-5: King County shall produce and use biosolids in accordance with federal, state and local regulations.	<p>All regulatory requirements for production and beneficial use of biosolids are being met.</p> <p>In 2004, the county's biosolids program passed an independent audit and was certified into a national program of Environmental Management Systems (EMS). King County was the third wastewater agency in the nation to earn this prestigious certification. The EMS is a program developed by the National Biosolids Partnership to document, monitor and optimize the management of wastewater solids and improve biosolids management programs nationwide.</p>
BP-6: King County shall strive to produce the highest quality biosolids economically and practically achievable and shall continue efforts to reduce trace metals in biosolids consistent with 40 C.F.R. Part 503 pollutant concentration levels (exceptional quality) for individual metals. The county shall continue to provide class B biosolids and also to explore technologies that may enable the county to generate class A biosolids cost-effectively or because they have better marketability. Future decisions about technology, transportation and distribution shall be based on marketability of biosolids products.	<p>WTD's biosolids are routinely monitored for metals, conventional constituents (phosphorous, potassium, and pH), microbes, and organic compounds. WTD's biosolids consistently meet or exceed all federal and state criteria.</p> <p>The county's biosolids metal concentrations are well below the most restrictive federal and state standards. Industrial source control and pretreatment have reduced the amount of metals in biosolids by 70–90 percent since the 1980s.</p> <p>WTD's Industrial Waste Program is evaluating potential sources that contribute Mo (molybdenum) to the wastewater system, such as air conditioning cooling towers. EPA is expected to limit Mo in biosolids for land application in upcoming revisions to federal biosolids rules (40 CFR 503).</p> <p>WTD is participating in a two-year study on the fate and degradation of nonylphenol from land applied biosolids. Nonylphenol is a surfactant found in many household cleaning products and therefore is commonly found in wastewater and biosolids.</p> <p>In 2004–2006, the county conducted investigations into the most appropriate technologies and resultant costs of producing Class A biosolids. The investigation concluded that, at this time, Temperature-Phased Anaerobic Digestion would be the most viable alternative for converting each plant to Class A Biosolids production. Further assessment of costs and benefits will continue in 2007.</p>
BP-7: When biosolids derived products are distributed outside the wastewater service area, the county shall require that local sponsors using the products secure any permits required by the local government body.	The local sponsors outside of the county's wastewater service area who use biosolids are responsible for securing local support and any applicable permits relating to the use of biosolids.
BP-8: King County shall work cooperatively with statewide organizations on biosolids issues.	King County participates in local organizations and is a founding member of the Northwest Biosolids Management Association (NBMA), whose purpose is to share technical knowledge about biosolids

Biosolids Policies	How Implemented in 2004–2006
BP-9: King County shall seek to minimize the noise and odor impact associated with processing, transporting and applying of biosolids, consistent with constraints of economic and environmental considerations and giving due regard to neighboring communities.	<p>management between members, provide opportunities to work with university scientists; local, state, and federal regulators; and the general public.</p> <p>Through the NBMA, WTD works cooperatively with regulatory officials, scientists, and other biosolids managers on regulatory issues, education and training, public information, and research and demonstration. WTD is participating in the Washington State Department of Ecology's biosolids rule revision advisory group and in the NBMA's regulations committee review and comment process.</p> <p>In addition, the county and the University of Washington are evaluating the amount of carbon storage created by each of WTD's current biosolids end uses.</p> <p>In 2004–2006, biosolids truck trips at West Point have averaged about four trips per day. At South plant, the trips went from an average of 6.6 trips per day in 2003 to fewer than five trips per day in 2006. The reduction in truck trips at both plants is attributed to the installation of high solids centrifuges. However, odors at application sites have increased due to the use of the centrifuges. WTD is evaluating the options available to reduce these odors. National studies are also under way as other treatment plants are facing similar results from the use of high-solids centrifuges.</p> <p>The West Point Digestion System Improvements project is being planned to increase the stability of the digestion system and decrease the potential for digester upsets. In addition to affecting the quality of the biosolids, these upsets increase odor at the plant. The project will also include modifications to the blending storage tank (Digester 6) to enable its use as an emergency active digester if needed. Predesign will be completed in 2007; final design is expected be complete in 2008.</p>
BP-10: Where cost-effective, King County shall beneficially use methane produced at the treatment plants for energy and other purposes.	<p>King County is beneficially using digester gas, which consists mostly of energy-rich methane gas, at both treatment plants. Both the West Point and South plants recover this gas to generate electricity and heat for treatment plant processes; it is used to power engines, boilers, turbines, and a fuel cell to produce heat and power. Some of the gas produced at South plant is sold to Puget Sound Energy for distribution in its natural gas system.</p>





Appendix F  
RWSP Water Reuse Policies



## RWSP Water Reuse Policies

A. Explanatory material. The water reuse policies are intended to guide the county in continuing to develop its program to produce reclaimed water. The county will coordinate its program with regional water supply plans and work with state agencies and local jurisdictions on opportunities for water reuse. The county will implement pilot and demonstration projects. Additional projects shall be implemented subject to economic and financial feasibility assessments, including assessing environmental benefits and costs.

The water reuse policies, as in the treatment plant policies, intend that the county continue producing reclaimed water at its treatment plants. The treatment plant policies also address the potential construction of one or more satellite plants. These small plants would provide reclaimed water, with the solids being transferred to the regional plants for processing.

Water Reuse Policies	How Implemented in 2004–2006
<p>WRP-1: King County shall actively pursue the use of reclaimed water while protecting the public health and safety and the environment. The county shall facilitate the development of a water reuse program to help meet the goals of the county to preserve water supplies within the region and to ensure that any reclaimed water reintroduced into the environment will protect the water quality of the receiving water body and the aquatic environment.</p> <p><i>(Ordinance 15602 amended this policy—replacing the word “accelerate” with “facilitate” in the second sentence.)</i></p>	<p>The Wastewater Treatment Division (WTD) has been safely using reclaimed water since 1997 at its regional treatment plants in Seattle and Renton; some of the reclaimed water produced at the South plant is used off-site for irrigation during the summer months. WTD complies with all federal, state, and local regulations governing the application of reclaimed water.</p> <p>In November 2005, the King County Council approved appropriation for the Brightwater reclaimed water backbone, which will be able to provide up to 7 million gallons per day (mgd) of reclaimed water beginning in 2011. WTD has been working with local jurisdictions, water and sewer districts, businesses, and organizations to identify potential reclaimed water customers. Potential reclaimed water opportunities from this segment include uses for parks and businesses in Bothell, Woodinville, Redmond, and other cities in the area, as well as farms, parks, and businesses in the Sammamish Valley. In addition, the county has an agreement with Willows Run Golf Course to supply the golf course with reclaimed water from this portion of the backbone.</p> <p>Reclaimed water will be produced at the Carnation Treatment Plant to enhance a wetland in the Chinook Bend Natural Area.</p>
<p>WRP-2: By December 2007, the King County executive shall prepare for review by council a reclaimed water feasibility study as part of a regional water supply plan which will include a comprehensive financial business plan including tasks and schedule for the development of a water reuse program and a process to coordinate with affected tribal and local governments, the state and area citizens. The reclaimed water feasibility study shall be reviewed by the RWQC. At a minimum the feasibility study shall comply with chapter 90.46</p>	<p>Although a regional water supply plan has not been developed, WTD is committed to the deadline of December 2007 for the reclaimed water feasibility study. In November 2006, WTD began the process to hire consultants and develop a scope, schedule, and budget for the feasibility study based upon this policy.</p>

## Appendix F. Water Reuse Policies and Implementation in 2004-2006

Water Reuse Policies	How Implemented in 2004–2006
<p>RCW and include:</p> <ol style="list-style-type: none"> <li>1. Review of new technologies for feasibility and cost effectiveness, that may be applicable for future wastewater planning;</li> <li>2. Review of revenue sources other than the wastewater rate for distribution of reused water;</li> <li>3. Detailed review and an update of a regional market analysis for reused water;</li> <li>4. Review of possible environmental benefits of reused water; and</li> <li>5. Review of regional benefits of reused water.</li> </ol> <p><i>(Ordinance 15602 amended this policy—replacing the directive for a reclaimed water work program, which the executive submitted to the King County Council in December 2000—with the directive for a reclaimed water feasibility study as part of a regional water supply plan.)</i></p>	
<p>WRP-3: Recycling and reusing reclaimed water shall be investigated as a possible future significant new source of water to enhance or maintain fish runs, supply additional water for the region's nonpotable uses, preserve environmental and aesthetic values and defer the need to develop new potable water supply projects.</p> <p><i>(Ordinance 15602 amended this policy by adding the word "future" before the words "significant new source of water...")</i></p>	<p>Through adoption of the 2005 county budget ordinance, the Sammamish Valley Reclaimed Water Production Facility was cancelled in favor of the production of reclaimed water at Brightwater.</p> <p>Starting in 2011, the reclaimed water backbone will be able to convey Class A reclaimed water produced at the Brightwater Treatment Plant to the Sammamish Valley and to potential customers along the conveyance tunnel. Studies indicate that if self suppliers (those agricultural businesses currently taking water directly from the Sammamish River) were to use reclaimed water instead there would be a significant cooling effect of the river which contains a run of Chinook salmon.</p>
<p>WRP-4: King County's water reuse program and projects shall be coordinated with the regional water supply plans and regional basin plans, in accordance with state and federal standards. The coordination shall be done with the affected water supply purveyors. Water reuse must be coordinated with water supply/resource purveyors to ensure that resources are developed in a manner complementary with each other to allow the most effective management of resources in the county.</p> <p><i>(Ordinance 15602 amended this policy to ensure coordination of reclaimed water projects with affected water supply purveyors.)</i></p>	<p>WTD has been meeting with water supply purveyors to discuss reclaimed water opportunities. Although a regional water supply plan has not been developed, the county remains committed to coordinating with water supply purveyors on reclaimed water projects and related issues.</p>
WRP-5: King County shall implement	As noted in WRP-3, the King County Council

Water Reuse Policies	How Implemented in 2004–2006
<p>nonpotable projects on a case-by-case basis. To evaluate nonpotable projects, King County shall develop criteria which will include, but are not limited to: capital, operation and maintenance costs; cost recovery; potential and proposed uses; rate and capacity charge impacts; environmental benefits; fisheries habitat maintenance and enhancement potential; community and social benefits and impacts; public education opportunities; risk and liability; demonstration of new technologies; and enhancing economic development. A detailed financial analysis of the overall costs and benefits of a water reuse project shall include cost estimates for the capital and operations associated with a project, the anticipated or existing contracts for purchases of reused water, including agricultural and other potential uses, anticipated costs for potable water when the project becomes operational; and estimates regarding recovery of capital costs from new reused water customers versus costs to be assumed by existing ratepayers and new customers paying the capacity charge. Water reuse projects that require major capital funding shall be reviewed by RWQC and approved by the council.</p> <p><i>(Ordinance 15602 amended this policy to further define the criteria to be used to evaluate nonpotable reuse project, the elements to be included in project financial analysis, and to require water reuse projects that require major capital funding be reviewed by RWQC and approved by the King County Council.)</i></p>	<p>cancelled the Sammamish Valley reclaimed water satellite production facility in favor of producing reclaimed water at Brightwater. In 2005, WTD staff briefed the King County Council, RWQC, MWPAAC, and other stakeholders about the plan to distribute reclaimed water to the Sammamish Valley from Brightwater. As a result, the Brightwater reclaimed water backbone was evaluated and approved by the King County Council in November 2005. To date, no other major reclaimed water projects have been proposed. Evaluation of any new major reclaimed water projects will be done in accordance with this policy.</p>
<p>WRP-6: King County shall work with local water purveyors, including when the local purveyors update their water comprehensive plans, to evaluate the opportunities for water reuse within their local service area.</p>	<p>WTD participates in discussions with individual water purveyors, jurisdictions, MWPAAC, and other entities concerning reclaimed water opportunities.</p> <p>The county's Brightwater mitigation agreements with the City of Bothell, City of Kenmore, and the Cross Valley Water District include language about working together to pursue opportunities for using reclaimed water.</p> <p>King County Code 13.24.010 calls for water comprehensive plans to include an evaluation of reclaimed water opportunities as required by RCW 90.46.120 and calls for sewer comprehensive plans to discuss opportunities for reclaimed water as required under RCW 90.48.112. King County's Utilities and Technical Review Committee (UTRC) serves as the technical review body for water and sewer utilities' comprehensive plans.</p>

<b>Water Reuse Policies</b>	<b>How Implemented in 2004–2006</b>
<p>WRP-7: King County shall develop an active water reuse public education and involvement program to correspond with the development of the water reuse program and be coordinated with other water conservation education programs.</p>	<p>King County has developed an active water reuse public education and involvement program. The effort is coordinated with water conservation and other WTD educational programs.</p> <p>In 2004–2006, written materials on reclaimed water and water conservation were developed for a variety of audiences, from large water users to the general public. Information on reclaimed water is included in tours and open houses of the county’s regional treatment plants. Informational displays on reclaimed water are available for public meetings and events.</p> <p>WTD’s reclaimed water and water conservation Web sites are updated on a regular basis.</p>
<p>WRP-8: King County shall utilize a forum or multiple forums to provide opportunities for coordination and communication with the Washington state Departments of Health and Ecology, which have the principal state regulatory roles in the planning, design and construction of reuse facilities. The county shall involve other parties on these forums, including but not limited to, the Corps of Engineers, Washington state Department of Fish and Wildlife, National Marine Fisheries Service, United States Fish and Wildlife Service, regional water suppliers, tribal governments, local water and wastewater districts, cities, local health departments, watershed forums and environmental and community groups.</p>	<p>This process is an ongoing element of the county’s reclaimed water planning. Agencies cited in WRP-8 are regular participants, along with the county, in multiple processes and committees related to water supply and environmental and public health issues. In 2004–2006, efforts included participation in the Normative Flows Studies project, Puget Sound Partnership efforts, Central Puget Sound Water Suppliers Forum, the 2005 King County Climate Change Conference, the regional water supply planning process, and efforts and discussions related to the Brightwater permitting process.</p>
<p>WRP-9: King County shall work, on a case-by-case basis, with the Washington state Departments of Health and Ecology on water reuse projects including, but not limited to, those that are not specifically cited in the 1997 Department of Health and Ecology Water Reclamation and Reuse Standards.</p>	<p>King County works closely with the Washington State Departments of Health and Ecology on the county’s water reuse projects, including reclaimed water production associated with the future Brightwater and Carnation treatment plants. Ecology approved the facilities plan for the Brightwater Treatment Plant in June 2005 and for the Carnation Treatment Plant in October 2005. The <i>Brightwater Reclaimed Water Engineering Report</i> was approved by the Washington State Department of Health (DOH) on October 31, 2006 and by Ecology on November 8, 2006. WTD continues to work with DOH and Ecology to ensure the design and construction of the backbone complies with state standards</p>
<p>WRP-10: King County shall hold and maintain the exclusive right to any reclaimed water generated by the wastewater treatment plants of King County.</p> <p><i>(Ordinance 15602 amended this policy to correct grammatical error.)</i></p>	<p>This policy is in accordance with RCW 90.46.120, which states “The owner of a wastewater treatment facility that is reclaiming water with a permit issued under this chapter has the exclusive right to any reclaimed water generated by the wastewater treatment facility.”</p>
<p>WRP-11: King County’s water reuse program projects shall not impair any existing water</p>	<p>This policy is in accordance with RCW 90.46.130, which states “...facilities that reclaim water under this</p>

Water Reuse Policies	How Implemented in 2004–2006
rights unless compensation or mitigation for such impairment is agreed to by the holder of the affected water rights.	chapter shall not impair any existing water right downstream from any freshwater discharge points of such facilities unless compensation or mitigation for such impairment is agreed to by the holder of the affected water right.”
WRP-12: King County shall retain the flexibility to produce and distribute reclaimed water at all treatment plants including retaining options to add additional levels of treatment.	The county will consider additional reclaimed water opportunities associated with its two regional plants (South plant in Renton, and West Point plant in Seattle). The design and treatment technology at Brightwater and Carnation will provide flexibility for future reclaimed water opportunities.
WRP-13: King County shall continue to evaluate potential funding of pilot-scale and water reuse projects, in whole or in part, from the wastewater utility rate base.  <i>(Ordinance 15602 amended this policy by replacing the word “fund” with “evaluate potential funding” and deleted the word “demonstration”, which preceded “water reuse projects”.)</i>	The water reuse technology pilot projects at the West Point plant were funded from the wastewater rate. The Brightwater reclaimed water backbone will be initially financed from the wastewater rate. The county is exploring other financing options for future reclaimed water opportunities, such as user fees, grants, and loans. The reclaimed water feasibility study called for in WRP-2 will include information on revenue sources other than the wastewater rate for distribution of reused water.
WRP-14: King County shall complete an economic and financial feasibility assessment, including environmental benefits, of its water reuse program. The assessment shall include the analysis of marginal costs including stranded costs and benefits to estimate equitable cost splits between participating governmental agencies and utilities. The assessment shall also include a review of existing and planned water and wastewater facilities in an approved plan to ensure that water reuse facilities are justified when any resulting redundant capacity as well as other factors are taken into account.	The feasibility study called for in WRP-2 aligns closely with this policy.
WRP-15: King County should pursue development of a water reuse program to discharge reclaimed water to reduce freshwater consumption used in the operation of the Ballard Locks as a priority water reuse project.	During the development of the water reuse program that was submitted in December 2000, it was determined to defer consideration of this policy for at least ten years. There haven’t been any changes to this assessment since that time.





Appendix G

# RWSP Wastewater Services Policies



## RWSP Wastewater Service Policies

A. Explanatory material. The wastewater services policies guide the county in both providing wastewater services to its customers and maintaining the wastewater system in a cost-effective, environmentally responsible manner. These policies shall also guide King County's development and operation of community treatment systems.

King County provides wholesale wastewater treatment and disposal service to component agencies. The county's wastewater service area boundary generally coincides with the boundaries of these component agencies, including certain areas in Snohomish county and Pierce county. The county is to provide wastewater services to areas within the respective urban growth boundaries and in rural areas only to protect public health and safety, in conformance with state provisions and local growth management act policies and regulations.

Wastewater Services Policies	How Implemented in 2004–2006
<p>WWSP-1: King County shall provide wastewater services to fulfill the contractual commitments to its component agency customers in a manner that promotes environmental stewardship, recognizes the value of wastewater in the regional water resource system and reflects a wise use of public funds.</p>	<p>King County has long-term agreements to provide sewage disposal and treatment services with 33 local governments and one Indian Tribe.</p> <p>Environmental stewardship is an important component of the county's wastewater treatment service; WTD's mission is to protect public health and enhance the environment by treating and reclaiming water, recycling solids and generating energy. WTD's vision of creating resources from wastewater is carried out in recognition of the overall value of wastewater.</p> <p>WTD provides high quality wastewater treatment in as cost-effective manner as possible. The division regularly evaluates projects in the planning process and design phase to identify potential cost-savings. WTD bonds are highly rated and receive low interest rates.</p>
<p>WWSP-2: King County shall continue to foster tribal relations as appropriate to structure processes for joint water quality stewardship.</p>	<p>WTD regularly works with tribes on its plans and projects. Activities with the tribes during the 2004 to 2006 timeframe include:</p> <ul style="list-style-type: none"> <li>• Entering into a sewage disposal agreement with the Muckleshoot Indian Tribe; the tribe took ownership over a portion of Auburn's sewer service area</li> <li>• Working with the Puyallup Tribe to address shellfish contamination of the Quartermaster Harbor area of Vashon-Maury Island</li> <li>• Working with the Muckleshoot Indian and Suquamish Tribes in the decision process for cleaning up Duwamish River sediments</li> <li>• Carrying out research studies that are part of the Brightwater mitigation agreement with the Suquamish Tribe regarding marine habitat in Puget Sound; the results of these studies will be also be shared with the Tulalip Tribes</li> </ul>

Wastewater Services Policies	How Implemented in 2004–2006
	<ul style="list-style-type: none"> <li>• Entering into agreements with the Suquamish Tribe and the Muckleshoot Indian Tribe regarding mitigation for the Brightwater project</li> <li>• Working closely with the Snoqualmie Tribe on the Carnation Treatment Plant and entering into an agreement with the tribe to accelerate the wetland discharge option for the Carnation plant</li> <li>• Reviewing results of Sammamish River monitoring with the Muckleshoot Indian Tribe</li> <li>• Coordinating with the Muckleshoot Indian Tribe to identify and address concerns regarding the design of the Ballard Siphon Repair project.</li> </ul>
<p>WWSP-3: King County shall not accept additional wastewater directly from private facilities within the boundaries of a component agency without the prior written consent of such component agency.</p>	<p>WTD has received no such requests from private facilities since the adoption of the RWSP.</p>
<p>WWSP-4: King County's wastewater service area generally has been developed along those boundaries adopted in the original metropolitan Seattle sewerage and drainage survey, substantive portions of which were adopted as the county's comprehensive water pollution abatement plan and amended. King County's wastewater service area consists of the service areas of the component agencies with which a sewage disposal agreement has been established (agreement for sewage disposal, section 2) and the county's service area boundary is the perimeter of these areas. The service area boundary for sewer service provided to Snohomish county and Pierce county shall not exceed each county's urban growth boundary. The service area boundary within King County shall be consistent with countywide planning policy CO-14 and the King County Comprehensive Plan which permit sewer expansion in rural areas and resource lands where needed to address specific health and safety problems. To protect public health and safety, the county may assume in accordance with state procedures, the ownership of existing sewer treatment and conveyance facilities that have been constructed by a sewer district organized under state law.</p>	<p>The county's wastewater service area boundary remains consistent with this policy.</p>
<p>WWSP-5: Extensions of existing conveyance facilities or construction of new conveyance facilities must be consistent with King County's</p>	<p>WTD evaluates its projects during the planning process to ensure consistency with the county's land use plans and policies. WTD maintains and reviews up-to-date</p>

<b>Wastewater Services Policies</b>	<b>How Implemented in 2004–2006</b>
land use plans and policies, and certified by potentially affected land use jurisdictions as consistent with their adopted land use plans and policies.	local capital improvement plans for jurisdictions and sewer districts in the county's wastewater service area and works closely with local jurisdictions through all phases of a project that is planned within their jurisdiction.
WWSP-6: King County shall operate and maintain its facilities to protect public health and the environment, comply with regulations and improve services in a fiscally responsible manner.	<p>WTD's mission is to protect public health and enhance the environment by treating and reclaiming water, recycling solids and generating energy. Extensive resources have been committed to maintaining the integrity of the wastewater system and preventing sanitary sewer overflows (SSOs). The Industrial Waste and Local Hazardous Waste Management programs work to control pollutants at their sources and prevent those pollutants from reaching the county's treatment plants. In 2006, the West Point and South plants received the National Association of Clean Water Agencies (NACWA) Platinum Peak Performance Award for operating five consecutive years with no permit exceptions.</p> <p>The King County Council's review of WTD's programs, priorities, and costs during the annual rate setting process and council's budget process provides additional assurance that WTD is carrying out its programs in a fiscally responsible manner.</p>
WWSP-7: King County shall plan, design and construct wastewater facilities in accordance with standards established by regulatory agencies and manuals of practice for engineering.	<p>WTD designs and constructs its wastewater treatment facilities to ensure the county fully complies with or exceeds regulatory and permit requirements. WTD applies good science and engineering to its planning, design, and construction of facilities and it follows industry-recognized standards. As a result, the county's wastewater system exceeds the reliability standards of most major metropolitan areas and has been able to absorb record storm events in recent years with little effect on public health and safety.</p> <p>To ensure the county is keeping up-to-date with regulations and standards information, WTD participates in national organizations and associations that address issues such as pumping standards, treatment and odor control standards and technologies, and predictive modeling tools. In addition, WTD follows the guidelines in the <i>Criteria for Sewage Works Design</i> manual. The Washington State Department of Ecology prepares this manual, also known as the "Orange Book". It serves as a guide for the design of wastewater collection, treatment, and reclamation systems and addresses requirements that will lead to approvable plans. State code (WAC 173-240-040) requires that sewer plans and specifications are reasonably consistent with the Orange Book.</p>
WWSP-8: King County shall construct, operate and maintain facilities to prevent raw sewage overflows and to contain overflows in the	<p>Implementation of the RWSP ensures that adequate wastewater capacity will be available when needed.</p> <p>The various sections and work units of WTD coordinate</p>

<b>Wastewater Services Policies</b>	<b>How Implemented in 2004–2006</b>
combined collection system. In the event of a raw sewage overflow, the county shall initiate a rapid and coordinated response including notification of public health agencies, the media, the public and the affected jurisdiction. Preserving public health and water quality shall be the highest priority, to be implemented by immediately initiating repairs or constructing temporary diversion systems that return flow back to the wastewater system.	to assess facilities' needs and prioritize projects to prevent overflows. WTD's forecasting and demand-modeling capabilities, in-field flow monitoring, and ongoing facilities' inspection provide essential information to identify and address capacity, operational, and maintenance needs.  WTD has established emergency response procedures in the event of sewage overflows.
WWSP-9: To ensure the region's multibillion-dollar investment in wastewater facilities, an asset management program shall be established that provides for appropriate ongoing maintenance and repair of equipment and facilities. The wastewater maintenance budget, staffing levels and priorities shall be developed to reflect the long-term useful life of wastewater facilities as identified by the asset management program.  <i>(Ordinance 15602 amended this policy to specify the establishment of an asset management program; prior to being amended, the policy stated that ongoing maintenance and repair of facilities shall be a high priority of King County.)</i>	A formal and detailed asset management program is being developed to optimize the useful life of county wastewater facilities. In 2004, WTD went through a benchmarking process comparing the agency with 22 Australian and New Zealand utilities that are recognized world leaders in the institution of asset management practices. This process helped to identify what is working well in WTD's asset management program and what areas need improvement.  A comprehensive asset management strategic plan is under way and anticipated to be complete by the end of 2007; this plan will be updated annually. The plan will include information on best management practices for all assets and refine the long-range capital replacement program to best predict which assets will need to be replaced, when they will need to be replaced, and a corresponding budget.
WWSP-10: The asset management program shall establish a wastewater facilities assets management plan, updated annually, establishing replacement of worn, inefficient and/or depreciated capital assets to ensure continued reliability of the wastewater infrastructure.  <i>(Ordinance 15602 amended this policy and replaced the words "King County" at the beginning of the policy with "The asset management program".)</i>	Regularly scheduled condition assessments are performed on the conveyance system and facility structures. Findings and rehabilitation recommendations are reported in a Facilities Inspection Annual Report.  Forecasted asset replacement plans for process equipment, facility structures and conveyance system is a major product of the asset management program.
WWSP-11: King County shall design, construct, operate and maintain its facilities to meet or exceed regulatory requirements for air, water and solids emissions as well as to ensure worker, public and system safety.	WTD's treatment plants continue to meet, and in most cases exceed permit requirements. In 2006, the West Point and South plants received the National Association of Clean Water Agencies (NACWA) Platinum Peak Performance Award for operating five consecutive years with no permit exceptions.  The Industrial Waste Program permits discharges into the sewer that are not hazardous to workers and cause no environmental harm.  In the case of emergencies, WTD has procedures in place to ensure worker, public, and system safety.

<b>Wastewater Services Policies</b>	<b>How Implemented in 2004–2006</b>
<p>WWSP-12: King County shall accept sewage, septage and biosolids from outside its service area provided that it is consistent with the King County Comprehensive Plan or the comprehensive plan of the source jurisdiction, capacity is available and no operating difficulties are created. The county shall establish a rate to recover costs from accepting sewage, septage and biosolids from outside its service area.</p>	<p>Services are monitored for consistency with applicable plans and to ensure they cause no adverse impact to the wastewater system. A separate rate, based on solids content, has been established to cover the costs of processing deliveries of septage and biosolids at the South Treatment Plant.</p>
<p>WWSP-13: King County shall identify the potential for “liability protection” for component agencies for unexpected costs associated with water quality requirements.</p>	<p>This policy was developed in 1999, soon after the Chinook salmon was listed as a threatened species under the Endangered Species Act. There was discussion that if the county were to do a Habitat Conservation Plan (HCP) for the entire wastewater service area, there might be a way for the county’s component agencies to achieve “liability protection” under WTD’s HCP. WTD discontinued the work on the HCP in April 2005 after the first phase was completed (see Chapter 9).</p>
<p>WWSP-14: King County shall continue its long-standing commitment to research and development funding relating to water quality and technologies for the wastewater system.</p>	<p>In the period from 2004 through 2006, the county conducted pilot-scale studies on the membrane bioreactor (MBR) technology being installed in the new Carnation and Brightwater treatment plants. The studies provided valuable information regarding process control, peaking capabilities, process optimization, and nutrient removal. In addition, the MBR studies provided an opportunity for operations and maintenance staff to become familiar with the technology.</p> <p>A 1-megawatt fuel cell demonstration project was initiated at the South Treatment Plant in 2004 and completed in 2006.</p> <p>The county has also begun assessing the presence and fate of endocrine disrupting compounds in wastewater, surface waters and soils as well as the analytical procedures necessary to detect minute quantities of these compounds; this work will continue in 2007.</p>
<p>WWSP-15: King County will consider development and operation of community treatment systems under the following circumstances:</p> <ol style="list-style-type: none"> <li>1. The systems are necessary to alleviate existing documented public health hazards or water quality impairment;</li> <li>2. Connections to public sewers tributary to conventional wastewater treatment facilities are not technically or economically feasible;</li> <li>3. Installation of on-site septic systems is not technically feasible;</li> <li>4. Properties to be served by said systems are within the jurisdiction and service area of a</li> </ol>	<p>Community treatment service continues to be provided in accordance with this policy. WTD owns and operates the Beulah Park/Cove Treatment Facility on Vashon Island. This facility began operating in November 2001, and received its first State Waste Discharge permit from The Washington State Department of Ecology (Ecology) on October 31, 2005.</p>

<b>Wastewater Services Policies</b>	<b>How Implemented in 2004–2006</b>
local government authority authorized to provide sewer service; 5. The local sewer service provider agrees to own and operate the collection system tributary to the community treatment system; 6. Development of the community systems and provision of sewer service are consistent with all applicable utility and land use plans; and Public sewer extensions shall be in compliance with King County Comprehensive Plan Policy F-313 as in effect on March 11, 1999.	



Appendix H

RWSP Water Quality Protection Policies



## RWSP Water Quality Protection Policies

A. Explanatory materials. The water quality protection policies are intended to guide King County in identifying and resolving regional water quality issues, protecting public and environmental health and protecting the public's investment in wastewater facilities and water resource management. Research and analysis are required and will be used to evaluate water quality in county streams and other bodies of water within the service district.

Water Quality Protection Policies	How Implemented in 2004–2006
WQPP-1: King County shall participate in identifying and resolving water quality issues pertaining to public health and ecosystem protection in the region to ensure that the public's investment in wastewater facilities and water resource management programs is protected.	<p>King County monitors the waters and sediments near treatment plant and CSO outfalls to ensure compliance with water quality regulations to quickly identify and resolve water quality issues.</p> <p>King County's Trouble Call Program investigates water quality complaints, including wastewater overflows and leaks, in the county's wastewater service area. The program responded to about 110 incidents each year for the years 2004–2006. In 2004 and 2005, nine of the incidents were WTD-related. In 2006, 24 incidents were Wastewater Treatment Division (WTD)-related, primarily because of the Barton force main break and the December windstorm.</p> <p>The Department of Natural Resources and Parks (DNRP) is following the scientific and technical developments for emerging chemicals of concerns, such as endocrine disrupting chemicals (EDCs).</p>
WQPP-2: King County shall evaluate the impacts and benefits of actions that affect the quality of the region's waters and identify measures to meet and maintain water quality standards.	<p>WTD builds, operates, and maintains wastewater facilities to ensure the county meets and exceeds water quality regulations and standards, such as NPDES discharge limitations. In 2006, the West Point and South plants received the National Association of Clean Water Agencies (NACWA) Platinum Peak Performance Award for operating five consecutive years with no permit exceptions.</p> <p>The county's new treatment plants, Brightwater and Carnation, will use membrane bioreactor technology, which produces a higher quality effluent than effluent produced by typical secondary treatment processes. The use of this technology will help to ensure these plants meet or exceed stringent water quality standards for effluent discharge or reclaimed water production.</p>
WQPP-3: King County shall forecast future aquatic resource conditions that may affect wastewater treatment decisions and work cooperatively to identify cost-effective alternatives to mitigate water quality problems and enhance regional water quality.	<p>King County routinely monitors and models the condition of county water resources and uses information from these efforts and from other programs in the region to identify trends.</p> <p>In 2006, DNRP in partnership with Pacific Northwest National Laboratory completed an Integrated Water Resource Modeling System, which will be used to evaluate diverse water, land use, population, and climate change scenarios and to inform decisions on</p>

<b>Water Quality Protection Policies</b>	<b>How Implemented in 2004–2006</b>
<p>WQPP-4: King County shall participate with its regional partners to identify methods, plans and programs to enhance water quality and water resources in the region.</p>	<p>complex issues such as drinking water withdrawal from urban lakes, instream flows for fish, wastewater capital project planning, and discharge of reclaimed water on agricultural fields.</p> <p>In 2005, King County, in cooperation with other sponsors, held a climate change conference. Experts presented possible future effects of climate change on the region, including impacts on availability of water resources and on flood management. WTD will continue to monitor the growing information on climate change and sea-level rise and will accommodate this information in its plans as needed.</p> <p>The county works with other entities in the region on water quality monitoring and protection programs, including studies done in support of salmon conservation in the two major watersheds in the county.</p> <p>The county works with the Washington State Department of Ecology (Ecology) and local jurisdictions on developing and implementing Total Maximum Daily Loads for impaired surface waters and to develop a more coordinated ambient monitoring program. It also participates in the Puget Sound Partnership—a public/private group convened by the governor to develop an aggressive 15-year plan to solve Puget Sound’s most vexing problems—and works with University of Washington researchers to understand and plan for climate change. In addition, the county continues to participate in the Lower Duwamish Waterway Group on sediment clean up efforts.</p> <p>Since 2005, multiple agencies and organizations, including King County are participating in a regional water supply planning process for the purpose of identifying, compiling information on, and discussing many of the key issues that relate to or may affect water resources of the region.</p>
<p>WQPP-5: The King County executive shall implement a comprehensive water quality monitoring program of streams and water bodies that are or could be impacted by influent, effluent, sanitary system overflows or CSOs. The range of data to be gathered should be based on water pollutants and elements that scientific literature identifies as variables of concern, what is needed to substantiate the benefits of abating combined sewer overflows and what is required by state and federal agencies. The executive shall submit summary reports and comprehensive reviews of this information to the King County council as outlined in K.C.C. 28.86.165.</p> <p><i>(Ordinance 15384 amended this policy to include information and results of the water</i></p>	<p>A summary report on the county’s comprehensive water quality monitoring program is provided in the RWSP annual reports. The 2006 Water Quality Monitoring Report is provided in Appendix O of this report.</p>

<b>Water Quality Protection Policies</b>	<b>How Implemented in 2004–2006</b>
<i>quality monitoring program in RWSP annual reports instead of as a separate report.)</i>	
WQPP-6: King County shall implement and maintain water quality, monitoring, evaluating and reporting programs to support the national pollutant discharge elimination system for wastewater and other permit applications, and ensure permit compliance.	King County has ongoing monitoring programs that assess discharge quality for permit compliance. Ambient water and sediment quality monitoring provides background information and assists in identifying any adverse impacts from wastewater facilities. A summary of these programs is provided in Chapter 9 and in Appendix O.
WQPP-7: King County shall actively participate in the development of water quality laws, standards and program development to ensure cost-effective maintenance or enhancement of environmental and public health.	The county uses many opportunities to participate in the development of effective and reasonable regulations, both on its own and through professional organizations such as the National Association of Clean Water Agencies, Water Environment Federation, and Pacific Northwest Clean Water Association. The county participates in advisory groups, contributes technical information, and reviews and comments on proposals. County staff has also been participating in nationwide discussions on emerging chemicals of concerns, such as endocrine disrupting chemicals (EDCs).
WQPP-8: King County shall assess the risk to human health and the environment from wastewater treatment and conveyance activities, and use this information in evaluating water pollution abatement control options.	<p>The Lower Duwamish Waterway Work Group (City of Seattle, Port of Seattle, the Boeing Company, and King County) completed human and ecological risk assessments as part of Phase 2 remedial investigation studies for the Lower Duwamish Waterway Superfund cleanup project.</p> <p>King County completed a screening-level aquatic life risk assessment in 2005 for the Green River watershed as part of the Green-Duwamish Water Quality Assessment. WTD is using the results of the Green-Duwamish Water Quality Assessment in capital planning efforts, including planning for CSO control projects. The results are also contributing to salmon conservation planning and Ecology's Total Maximum Daily Load program.</p> <p>In addition, aquatic life, wildlife, and human health risk assessments in the greater Lake Washington watershed were completed in 2006.</p>



Appendix I

# RWSP Wastewater Planning Policies





## RWSP Wastewater Planning Policies

A. Explanatory material. The wastewater planning policies are intended to guide the county in its long-term comprehensive planning for design and construction of facilities that meet the wastewater needs of customers within the service area.

Recognizing that the RWSP is a complex and dynamic comprehensive development guide that will regularly need to be updated, the county will conduct annual reviews of plan implementation and its consistency with policies, and of scientific, economic and technical information as well as periodic comprehensive reviews of the assumptions on which the RWSP is based.

These policies also express the intent of the council to request that the RWQC continue review of the conditions and assumptions that guide the implementation of the RWSP.

Wastewater Planning Policies	How Implemented in 2004–2006
WWPP-1: King County shall plan comprehensively to provide for the design and construction of facilities that meet the wastewater system needs of the service area and shall coordinate with other local jurisdictions to ensure that construction-related disruption to neighborhoods is minimized.	<p>WTD considers several factors to ensure comprehensive wastewater planning. Flow monitoring and facilities inspections provide key information related to capacity, maintenance, and asset replacement needs. WTD reviews population and employment forecasts, water conservation assumptions, and rainfall data and incorporates updated information into its planning of facilities. In addition, WTD reviews the comprehensive plans of its component agencies and meets with representatives of those agencies to confirm planning assumptions as well as to coordinate construction related activities.</p> <p>WTD regularly works with permitting agencies, local jurisdictions and affected neighbors during the planning, design and construction of projects to minimize construction related disruptions. Agreements related to hours of construction, parking for construction workers, noise control, and traffic control measures often result from these efforts.</p>
WWPP-2: In planning future wastewater systems, King County shall make a long-term assessment of wastewater system needs.	To protect public health and water quality, it is essential to plan wastewater facilities before they are needed. The RWSP outlined wastewater needs through 2030 and beyond. Current planning is through 2050—when the county’s wastewater service area is expected to reach saturation. To ensure that existing and planned facilities will meet future needs, the county monitors population and employment forecasts, comprehensive plans of the county’s component agencies, the potential for new regulations, new technologies, and information relating to climate change.
WWPP-3: In planning for facilities, King County shall work collaboratively with other jurisdictions and look for opportunities to achieve cost-savings.	<p>Recent examples of how this policy is implemented include:</p> <ul style="list-style-type: none"> <li>• <b>Executive’s Recommended I/I Program.</b> The recommendations in this King County Council approved program represent the</li> </ul>

Wastewater Planning Policies	How Implemented in 2004–2006
	<p>consensus reached by the county and component agencies throughout the six-year program development process. Implementation of this program is under way and will help determine if enough I/I can be cost-effectively removed from the collection system to delay, reduce, or eliminate some otherwise needed conveyance improvement project.</p> <ul style="list-style-type: none"> <li>• <b>Partnership with Ducks Unlimited.</b> King County is partnering with Ducks Unlimited, a nonprofit organization dedicated to wetland conservation, to design the Carnation Treatment Plant wetland discharge project. This partnership will help reduce costs and expedite implementation of the project.</li> <li>• <b>Brightwater Backbone.</b> Building the reclaimed water pipes during construction of the Brightwater conveyance tunnels and providing reclaimed water to the Sammamish Valley from the backbone are more cost-effective than building and operating a stand-alone satellite facility in the Sammamish Valley. Building the backbone now is less expensive and less disruptive to the local jurisdictions than building it in the future.</li> <li>• <b>Conveyance System Improvement (CSI) Program Update.</b> During the process to update the CSI program, King County and the Metropolitan Water Pollution Abatement Advisory Committee (MWPAAC) worked collaboratively to identify and analyze alternative cost containment strategies, such as delaying or phasing project construction. To assist in identifying the most pressing conveyance system needs, prioritization criteria were jointly developed and applied to planned conveyance projects.</li> <li>• <b>Ballard Siphon Replacement Project.</b> Coordination within WTD also provides opportunities for cost-savings. The Ballard Siphon Replacement Project—initiated in 2006 and scheduled for completion in 2010—will protect water quality in the Lake Washington Ship Canal by replacing the 70-year-old wooden sewer pipe that extends across the floor of Salmon Bay near the Hiram M. Chittenden Locks. In addition, the project is being designed to bring the CSO at the Ballard Regulator Station under control and, thus, eliminate the need for the CSO storage project at this location scheduled in the RWSP</li> </ul>

Wastewater Planning Policies	How Implemented in 2004–2006
WWPP-4: Facility sizing shall take into account the need to accommodate build-out population.	<p>for completion in 2029. The project also holds the potential to reduce CSOs at the 11th Avenue Regulator Station and thus reduce the size of the CSO storage project planned for completion at this location in 2030.</p> <p>As mentioned in WWPP-2, current planning considers needs through 2050, which is when the county's wastewater service area is anticipated to be fully built out and all portions of the service area will be connected into the wastewater treatment system. The updated conveyance system improvement program identifies the separated conveyance system needs that are necessary to accommodate projected regional growth and volumes of I/I through the year 2050 (see Chapter 3).</p> <p>The RWSP and subsequent population and flow updates identified needed future expansions to South Treatment Plant and Brightwater Treatment Plant.</p>
<p>WWPP-5: RWSP review processes. King County shall monitor the implementation of the RWSP and conduct reviews of the RWSP as outlined in K.C.C. 28.86.165.</p> <p><i>(Ordinance 15384 amended this policy, establishing a new section of the King County Code [KCC 28.86.165] that outlines the RWSP reporting policies.)</i></p>	<p>The reporting policies that were adopted by the King County Council in March 2006 are being followed. The 2005 RWSP Annual Report was submitted to the King County Council in September 2006; the RWQC reviewed the report in October 2006. The <i>RWSP 2006 Comprehensive Review and Annual Report</i> is presented in according with the RWSP reporting policies.</p> <p>The reporting and wastewater planning policies also call for the county to review assumptions on the rate and location of growth, on the rate of septic conversions, and on water conservation efforts.</p> <p>There were no updates made to the population and employment forecast data presented in the <i>RWSP 2004 Update</i> because there were no new PSRC forecasts by traffic analysis zones in 2004–2006. Projections reported in the 2004 update confirmed the need for the major treatment and conveyance improvements that are under way and planned through 2030. The process to update the conveyance system improvement (CSI) yielded information from the component agencies that prompted changes in some of the estimated dates that 20-year peak flow volumes will exceed the capacity of regional conveyance facilities (see Chapter 3). However, the overall projections for the 20-year peak flow in 2050 did not change.</p> <p>The key planning assumptions used to determine flow projections and facility sizing remain as follows:</p> <ul style="list-style-type: none"> <li>• <b>Extent of Eventual Service Area.</b> The assumed extent of the planning area is the sewerable areas within Urban Growth Areas of King, Snohomish, and Pierce counties</li> </ul>

Wastewater Planning Policies	How Implemented in 2004–2006
	<p>where King County WTD has sewage disposal contracts.</p> <ul style="list-style-type: none"> <li> <b>Future Population.</b> PSRC 2003 data by traffic analysis zones (TAZ), which is forecasted out to 2030, is allocated to sewer basins to determine future flow projections. The maximum wastewater system service area population is a straight line extrapolation of the growth rate between 2020 and 2030 out to 2050.         </li> <li> <b>Water Conservation.</b> WTD continues to assume a 10 percent reduction in per day water consumption between 2000 and 2010, with no additional reduction after 2010.         </li> <li> <b>Septic Conversion.</b> The current planning assumption is that 90 percent of the unsewered area (in year 2000) with potential for sewers will be sewered by 2030 and that 100 percent of this area will be sewered by 2050.         </li> <li> <b>Infiltration/Inflow (I/I) Degradation.</b> WTD assumes that I/I degradation starting in 2000 would be 7 percent per decade, with a limit of 28 percent over a 40-year period; for new construction, the degradation assumption of 7 percent per decade will start after the decade of construction, to a maximum of 28 percent. Future monitoring and modeling may provide refinements to this estimate.         </li> <li> <b>Design Standard.</b> In accordance with RWSP Conveyance Policy (CP)-1, the 20-year peak flow storm in 2050 is used as the design standard for the separated regional conveyance system.         </li> <li> <b>Planning Horizon.</b> The year 2050 is used to represent the projected date that the regional wastewater service area will be fully built out and all sewerable portions of the service area will be connected into the wastewater system. WTD extrapolates the PSRC population forecasts linearly from 2030 to 2050 for each of the wastewater basins. RWSP WWPP-4 calls for facility sizing to take into account the need to accommodate build-out population.         </li> </ul> <p>WTD will continue to review and analyze future information that could affect RWSP planning assumptions and make adjustments, if needed, to flow projections and facility needs and sizing.</p>

Appendix J

# RWSP Environmental Mitigation Policies



## RWSP Environmental Mitigation Policies

A. Explanatory material. The environmental mitigation policies are intended to guide King County in working with communities to develop mitigation measures for environmental impacts from the construction and operation of wastewater facilities. These policies also ensure that the siting and mitigation processes for wastewater facilities are consistent with the Growth Management Act and the state Environmental Policy Act.

Environmental Mitigation Policies	How Implemented in 2004–2006
<p>EMP-1: King County shall work with affected communities to develop mitigation measures for environmental impacts created by the construction, operation, maintenance, expansion or replacement of regional wastewater facilities. These mitigation measures shall:</p> <ol style="list-style-type: none"> <li>1. Address the adverse environmental impacts caused by the project;</li> <li>2. Address the adverse environmental impacts identified in the county's environmental documents; and</li> <li>3. Be reasonable in terms of cost and magnitude as measured against severity and duration of impact.</li> </ol>	<p>During the planning, environmental review, design, and construction of projects, WTD works with permitting and regulatory agencies, local jurisdictions, and affected businesses and residents to determine ways to develop mitigation measures for environmental impacts created by the construction, operation, maintenance, expansion or replacement of regional wastewater facilities.</p> <p>Examples of mitigation related activities that occurred during 2004 through 2006 include:</p> <ul style="list-style-type: none"> <li>• <b>Brightwater project:</b> In December 2005, the county completed a Brightwater systemwide mitigation package that is the result of many meetings with the public and negotiations with jurisdictions, Tribal governments, and permitting agencies. Some of the mitigation addresses the short-term impacts of construction; other measures are intended to cover longer-term impacts, such as the changes visible facilities like the treatment plant will have on the community landscape.</li> <li>• <b>Hidden Lake Pump Station/Boeing Creek Trunk Sewer Project:</b> An agreement with the City of Shoreline includes mitigation measures related to transportation management; odor control; landscaping, temporary park access during construction, and stormwater and water quality improvements at Shoreview/Boeing Creek Park; a restoration and park access plan for Richmond Beach Saltwater Park; and a pavement restoration plan and pedestrian pathway along the route of the sewer pipe</li> <li>• <b>Juanita Bay Pump Station Replacement Project:</b> Mitigation measures during construction of this project include building sound walls on the portions of the site that are near apartment buildings and condominiums, implementing temporary erosion and sediment control measures, and traffic control measures.</li> </ul>
EMP-2: Mitigation measures identified through	This policy is implemented for every project that

<b>Environmental Mitigation Policies</b>	<b>How Implemented in 2004–2006</b>
the state Environmental Policy Act process shall be incorporated into design plans and construction contracts to ensure full compliance.	<p>undergoes the SEPA review process. WTD environmental planners who prepare checklists review construction plans and specifications to make sure mitigation measures are included in these documents.</p> <p>Typical mitigation measures included in State Environmental Policy Act (SEPA) checklists for WTD projects include:</p> <ul style="list-style-type: none"> <li>• Temporary erosion and sedimentation control measures during project construction</li> <li>• Measures to minimize noise, such as mufflers or sound barriers</li> <li>• Landscaping and architectural features to help facility blend into surrounding area</li> <li>• Actions to minimize light and glare</li> <li>• Construction traffic routing and parking plans.</li> </ul>
EMP-3: The siting process and mitigation for new facilities shall be consistent with the Growth Management Act and the state Environmental Policy Act, as well as the lawful requirements and conditions established by the jurisdictions governing the permitting process.	<p>Wastewater treatment facilities are considered essential public facilities under the Growth Management Act. WTD plans new facilities or upgrades to existing facilities to ensure capacity is available when needed.</p> <p>Environmental, community, cost, right-of-way, and regulatory considerations are included in the process to site new wastewater facilities. WTD staff works with permitting agencies and local jurisdictions to ensure projects and facilities comply with applicable requirements and conditions.</p>
EMP-4: King County shall mitigate the long-term and short-term impacts for wastewater facilities in the communities in which they are located. The county's goal will be to construct regional wastewater facilities that enhance the quality of life in the region and in the local community, and are not detrimental to the quality of life in their vicinity.	<p>King County is committed to being a good neighbor with its wastewater facilities.</p> <p>In addition to the kinds of activities mentioned in EMP-1, landscaping and design features help to ensure that the county's wastewater facilities are good neighbors. Examples include:</p> <ul style="list-style-type: none"> <li>• The northern 43 acres of the Brightwater Treatment Plant site are being redeveloped as a restored and enhanced salmon habitat and reforestation area. This area will include open space and trails that are accessible to the public and provide visual screening of the treatment plant site.</li> <li>• The design features of the Hidden Lake Pump Station incorporated community concerns that the facility fits into its residential setting. Adjustments include increasing the roof pitch; vegetative screening and landscaping; and building materials, such as tile roof and earth tones for the exterior.</li> <li>• The proposed design for the Juanita Bay Pump Station replacement reduces the building mass to preserve views from neighboring properties and includes</li> </ul>



Environmental Mitigation Policies	How Implemented in 2004–2006
<p>EMP-5: King County shall enter into a negotiated mitigation agreement with any community that is adversely impacted by the expansion or addition of major regional wastewater conveyance and treatment facilities. Such agreements shall be executed in conjunction with the project permit review. Mitigation shall be designed and implemented in coordination with the local community, and shall be at least ten percent of the costs associated with the new facilities. For the south treatment plant and for the new north treatment plant, a target for mitigation shall be at least ten percent of individual project costs, or a cumulative total of ten million dollars for each plant, whichever is greater, provided that mitigation funded through wastewater revenues is consistent with: chapter 35.58 RCW; Section 230.10.10 of the King County Charter; agreements for sewage disposal entered into between King County and component agencies; and other applicable county ordinance and state law restrictions.</p>	<p>landscaping for aesthetics and screening. In addition, the facility will include sustainable “green-building” elements.</p> <p>This policy was written with the construction of a new third regional treatment system (now known as the Brightwater Treatment System) and the planned future expansion of the South Plant in mind. The Brightwater systemwide mitigation package that was completed in December 2005 is the result of many meetings with the public and negotiations with jurisdictions, Tribal governments, and permitting agencies. Information on the Brightwater systemwide mitigation package and agreements with local jurisdictions are available at <a href="http://dnr.metrokc.gov/WTD/brightwater/mitigation/index.htm">http://dnr.metrokc.gov/WTD/brightwater/mitigation/index.htm</a></p>



Appendix K

# RWSP Public Involvement Policies



## RWSP Public Involvement Policies

A. Explanatory material. The public involvement policies are intended to guide the county in maintaining public information and education programs and to engage the public and component agencies in planning, designing and operating decisions that affect them.

Public Involvement Policies	How Implemented in 2004–2006
PIP-1: King County shall maintain public information/education programs and engage the public and component agencies of local sewer service in the planning, designing and operating decisions affecting them.	<p>WTD engages public officials and residents of affected jurisdictions in the planning and decision-making process for its projects and programs. WTD holds monthly meetings to share information on programs and projects that are at various stages of planning and implementation with the Metropolitan Water Pollution Abatement Advisory Committee (MWPAAC).</p> <p>Implementation of this policy in 2004 through 2006 include:</p> <ul style="list-style-type: none"> <li>• The agricultural design for the future Carnation Treatment Plant was selected based on input from the public and Carnation City Council.</li> <li>• In response to community concerns, the design of the new Hidden Lake Pump Station was changed to ensure that it architecturally fits in its residential neighborhood.</li> <li>• In response to suggestions made at community meetings, the design of the new Juanita Bay Pump Station will protect sight lines from neighboring residences to the extent possible. In addition, native plant landscaping, building perimeter, and sidewalks will complement the neighborhood and nearby park.</li> <li>• Meetings were held around the Brightwater Treatment Plant and portal areas to update community members on design and mitigation issues and solicit their ideas and feedback. Comments were incorporated into the Brightwater systemwide mitigation package.</li> <li>• WTD worked with MWPAAC's Engineering and Planning Subcommittee to develop selection criteria and select projects for the initial I/I projects.</li> <li>• WTD staff met with staff from the component agencies to discuss regional conveyance system needs in their areas in preparation of the conveyance system improvement program update.</li> </ul>
PIP-2: King County shall develop public information and education programs to support county wastewater programs and shall lay the	In addition to the information in PIP-1 and PIP-3, WTD's public information and outreach activities

Public Involvement Policies	How Implemented in 2004–2006
groundwork for public understanding of and involvement in specific programs.	<p>include:</p> <ul style="list-style-type: none"> <li>• Speaker's bureau</li> <li>• Community open houses</li> <li>• Wastewater treatment plants and facilities tours</li> <li>• Informational booths at community fairs, festivals, and other events</li> </ul> <p>WTD's Web site includes information on the county's wastewater system and process, programs planned for the future, projects in design and construction, and information on sewer rates and the capacity charge.</p> <p>WTD's Industrial Waste program has programs for businesses on pollution prevention, waste reduction, and water reuse.</p> <p>WTD's media relations keeps local news media informed about WTD projects and programs that affect the neighborhoods they serve as well as general information on the county's wastewater system.</p> <p>See PIP-5 for more information on WTD's informational and educational programs.</p>
PIP-3: King County shall involve public officials and citizens of affected jurisdictions early and actively in the planning and decision-making process for capital projects.	<p>WTD's public involvement program carries out activities to ensure public officials and affected residents and businesses have the opportunity to be informed and involved in the planning and decision-making process regarding capital projects. Activities include meetings, open houses, project Web sites, project bulletins and newsletters, mailings, and tours of facilities.</p>
PIP-4: King County shall inform affected residents and businesses in advance of capital construction projects.	<p>WTD's public involvement program includes informing affected residents and businesses of potential WTD related construction projects and activities. The program includes pre-construction meetings, fliers, signs, direct on-the-ground contact, and 24-hour project hotlines. Public involvement staff form part of WTD's construction project teams and is available to respond to questions and concerns. Procedures are in place to document and track questions, concerns, or complaints, and ensure prompt response. Lessons-learned evaluations are conducted to identify what has worked and applied to other projects.</p>
PIP-5: King County shall disseminate information and provide education to the general public, private sector and governmental agencies regarding the status, needs and potential future of the region's water resources.	<p>WTD helps to carry out the following informational and educational activities:</p> <ul style="list-style-type: none"> <li>• <b>Treatment Plant tours.</b> This program introduced over three thousand students and hundreds of other interested parties annually to the importance of water conservation and the process of wastewater treatment.</li> <li>• <b>Treatment Plant Open Houses.</b> The two regional treatment plants host open houses each year that feature water conservation,</li> </ul>

Public Involvement Policies	How Implemented in 2004–2006
	<p>water quality, and wastewater treatment information.</p> <ul style="list-style-type: none"> <li>• <b>Duwamish River Educational Events.</b> Volunteer activities and public education events in 2006 featured a variety of information on water quality and water conservation.</li> </ul> <p>Educational materials include:</p> <ul style="list-style-type: none"> <li>• <b>Lets Talk Trash brochures and posters.</b> The Department of Natural Resources and Parks printed and distributed this resource on not using the toilet as a trash can.</li> <li>• <b>Web based information.</b> The water conservation tips web site, <a href="http://dnr.metrokc.gov/wtd/waterconservation/tips.htm">http://dnr.metrokc.gov/wtd/waterconservation/tips.htm</a>, draws an average of 400 visits a month. A Web site on water supply was inaugurated in 2005; <a href="http://dnr.metrokc.gov/topics/water-supply/index.htm">http://dnr.metrokc.gov/topics/water-supply/index.htm</a>.</li> <li>• <b>Award winning groundwater education video.</b> This online groundwater animation is available via the Web at: <a href="http://dnr.metrokc.gov/wlr/wq/groundwater-animation.htm">http://dnr.metrokc.gov/wlr/wq/groundwater-animation.htm</a></li> </ul>
<p>PIP-6: King County shall actively solicit and incorporate public opinions throughout the implementation of its comprehensive plan.</p>	<p>The activities described in PIP-1 through PIP-5 illustrate how WTD keeps people informed and involved in the projects and programs associated with implementing the RWSP.</p> <p>WTD solicits public feedback and opinion in its public meetings, open houses, informational booths, and through the annual water quality surveys and annual surveys of near neighbors of the regional treatment plants. Opportunities for public comment are also provided via WTD project Web sites, emails, letters, or phone calls.</p>
<p>PIP-7: Beginning January 1, 2001, King County shall implement a public awareness and education program regarding the environmental impacts and costs to wastewater rate payers of I/I in the local and regional conveyance systems.</p>	<p>The <i>2004 RWSP Update</i> discussed the efforts in 2000 through 2003 to educate and involve local agency staff and elected officials about I/I.</p> <p>A public opinion telephone survey regarding I/I was conducted in 2004. The survey included 400 homeowners in the general service area plus 100 from three of the I/I pilot project areas. They were asked about their role as a property owner in implementing solutions to reduce I/I, whether they preferred having voluntary and/or mandatory property owner actions, their willingness to pay to reduce I/I, and what would be acceptable community options to reduce I/I.</p> <p>In 2007, the county and the local agencies participating in the initial I/I projects as part of the <i>Executive's Recommended I/I Program</i> will carry out</p>

<b>Public Involvement Policies</b>	<b>How Implemented in 2004–2006</b>
	<p>an intensive public involvement effort associated with the field testing, pre-design, and design and construction work for the initial I/I reduction projects.</p> <p>WTD's I/I Web site continues to provide information on I/I is updated on a regular basis. In addition, WTD serves as a clearinghouse regarding information on technologies related to I/I reduction; this information is made available to MWPAAC members.</p>
<p>PIP-8: King County shall support regional water supply agencies and water purveyors in their public education campaign on the need and ways to conserve water. King County should promote pilot projects that support homeowner water conservation in coordination with water suppliers and purveyors, emphasizing strategies and technologies that reduce wastewater.</p>	<p>In 2005, King County and the Cascade Water Alliance signed a Memorandum of Understanding to address water supply needs; initiation of a regional water supply planning process also began that year. The county participates in activities to increase water conservation with the Partnership for Water Conservation. The county's water conservation Web site provides educational information that is used by water supply agencies and purveyors and the public.</p> <p>In accordance with this policy, the King County Council approved a five-year water conservation program through 2005 that emphasized water conserving retrofit projects. While no additional funding was allocated in the 2006 budget, the program was extended by one year to complete several projects that began in 2005, but were completed in 2006 (see Chapter 12).</p>



Appendix L

RWSP Financial Policies



## RWSP Financial Policies

A. Under the provisions of the King County Charter and RCW 35.58.200, these financial policies are hereby adopted and declared to be the principal financial policies of the comprehensive water pollution abatement plan for King County, adopted by the Municipality of Metropolitan Seattle (Metro) in Resolution No. 23, as amended, and the RWSP, a supplement to the plan.

### B. Explanatory material.

1. Financial forecast and budget. Policies FP-1 through FP-7\* are intended to guide the county in the areas of prudent financial forecasting and budget planning and are included to ensure the financial security and bonding capacity for the wastewater system. This set of policies also addresses the county's legal and contractual commitments regarding the use of sewer revenues to pay for sewer expenses.

2. Debt financing and borrowing. Policies FP-8\* through FP-11\* are intended to guide the county in financing the wastewater system capital program. These policies direct that capital costs be spread over time to keep rates more stable for ratepayers by the county issuing bonds. A smaller share of annual capital costs will be funded directly from sewer rates and sewer revenues and capacity charges.

3. Collecting revenue. Policies FP-12\* through FP-14\* are intended to guide King County in establishing annual sewer rates and approving wastewater system capital improvement and operating budgets. Monthly sewer rates, which are the primary source of revenue for the county's regional wastewater system, are to be uniformly assessed on all customers. Customers with new connections to the wastewater system will pay an additional capacity charge. The amount of that charge is set by the council, within the constraints of state law.

4. Community treatment systems. Policy FP-15\* is intended to guide the county in the financial management of community treatment systems.

\*King County Code Reviser's note: Ordinance 15602 added new policies FP-3, FP-4 and FP-5, but this reference was not changed.

Financial Policies	How Implemented in 2004–2006
FP-1: The county shall maintain for the wastewater system a multiyear financial forecast and cash-flow projection of six years or more, estimating service growth, operating expenses, capital needs, reserves and debt service. The financial forecast shall be submitted by the executive with the annual sewer rate ordinance.	A six-year financial plan is submitted each year with the WTD sewer rate proposal and, again, with the annual budget proposal.
FP-2: If the operations component of the proposed annual wastewater system budget increases by more than the reasonable cost of the addition of new facilities, increased flows, new programs authorized by the council, and inflation, or if revenues decline below the financial forecast estimate, a feasible alternative spending plan shall be presented, at the next quarterly budget report, to the council by the executive identifying steps to reduce	There were no occurrences of the situation described in FP-2 in 2004–2006, nor are any anticipated for the near-term. If such a situation were to occur, this policy would be implemented.

<b>Financial Policies</b>	<b>How Implemented in 2004–2006</b>
cost increases. <i>(Ordinance 15602 amended this policy by splitting the policy into two policies, FP-2 and FP-3.)</i>	
FP-3: The executive shall maintain an ongoing program of reviewing business practices and potential cost-effective technologies and strategies for savings and efficiencies; the results shall be reported in the annual budget submittal and in an annual report to the RWQC. <i>(This policy was previously included as part of FP-2; Ordinance 15602 made this into its own policy.)</i>	The WTD Productivity Initiative is an ongoing systematic and comprehensive program for identifying ways to increase efficiency. This ten-year incentive program applies certain private-sector business practices, including an incentive-based cash payment to employees in the wastewater program, to cut operating costs, increase productivity and continue a high level of service and environmental protection for WTD's customers. A productivity report is submitted annually to the King County Council. Through 2006, the Productivity Initiative Pilot Program has resulted in a \$42.8 million savings to ratepayers.  Summary information from this report for 2006 is included in Chapter 13 of this report. Summary information from future reports will be included in future RWSP annual reports.
FP-4: New technologies or changes in practice that differ significantly from existing technologies or practices shall be reported to the council and RWQC with projected costs prior to implementation and shall also be summarized in the RWSP annual report. <i>(Ordinance 15602 added this policy to the RWSP financial policies.)</i>	No new technologies or changes in practice that differ significantly from existing technologies or practices are under consideration for implementation.
FP-5: Significant new capital and operational initiatives proposed by the Executive that are not within the scope of the current RWSP nor included in the RWSP, or are required by new state or federal regulations will be reviewed by the RWQC and approved by the council to ensure due diligence review of potential impacts to major capital projects' schedules, including Brightwater, the bond rating or the sewer rate and capacity charge. <i>(Ordinance 15602 added this policy to the RWSP financial policies.)</i>	All capital and operational costs are reviewed as part of the annual budget adoption process. No initiatives of this type were included in either the capital or operating budget requests in 2004–2006.
FP-6: The county shall maintain for the wastewater system a prudent minimum cash balance for reserves, including but not limited to, cash flow and potential future liabilities. The cash balance shall be approved by the council in the annual sewer rate ordinance.	Cash balance reserves are reviewed as part of the annual sewer rate and budget adoption process. In addition, cash reserve balances are reviewed annually with the bond rating agencies.
FP-7: Unless otherwise directed by the council by motion, the King County department of natural resources and parks or its successor agency shall charge a fee that recovers all	All work performed by WTD for other public or private organizations has required the recovery of all direct and indirect costs.

Financial Policies	How Implemented in 2004–2006
<p>direct and indirect costs for any services related to the wastewater system provided to other public or private organizations.</p>	<p>The one and one-half percent of annual operating budget limit on “Culver” funds is strictly adhered to.</p> <p>This policy was amended by Ordinance 15602 based on concerns raised by MWPAAC and Suburban Cities Association members on the Regional Water Quality Committee. They requested that the county investigate alternative funding sources for water quality improvement activities.</p> <p>In April 2007, The King County Executive submitted to the King County Council a report on alternative methods to provide a similar level of funding assistance for water quality improvement activities. More details on this report are provided in Chapter 13 of this report.</p>
<p>FP-8: Water quality improvement activities, programs and projects, in addition to those that are functions of sewage treatment, may be eligible for funding assistance from sewer rate revenues after consideration of criteria and limitations suggested by the metropolitan water pollution abatement advisory committee, and, if deemed eligible, shall be limited to one and one half percent of the annual wastewater system operating budget. An annual report on activities, programs and projects funded will be made to the RWQC. Alternative methods of providing a similar level of funding assistance for water quality improvement activities shall be transmitted to the RWQC and the council within seven months of policy adoption.</p> <p><i>(Ordinance 15602 amended this policy; it replaced the last sentence, which previously stated: “This policy shall remain in effect until such time as a financial plan for the surface water regional needs assessment is adopted and implemented.” with “Alternative methods of providing a similar level of funding assistance for water quality improvement activities shall be transmitted to the RWQC and the council within seven months of policy adoption.”)</i></p>	
<p>FP-9: The calculation of general government overhead to be charged to the wastewater system shall be based on a methodology that provides for the equitable distribution of overhead costs throughout county government. Estimated overhead charges shall be calculated in a fair and consistent manner, utilizing a methodology that best matches the estimated cost of the services provided to the actual overhead charge. The overall allocation formula and any subsequent modifications will be reported to the RWQC.</p>	<p>Overhead costs of King County general government are allocated by the Executive budget office to all parts of the county on a consistent basis.</p>
<p>FP-10: The assets of the wastewater system are pledged to be used for the exclusive benefit of the wastewater system including operating expenses, debt service payments, asset assignment and the capital program associated therewith. The system shall be fully reimbursed for the value associated with any use or transfer of such assets for other county government purposes. The executive shall provide reports to the RWQC pertaining to any</p>	<p>There have been no transfers of assets in 2004–2006.</p>

<b>Financial Policies</b>	<b>How Implemented in 2004–2006</b>
significant transfers of assets for other county government purposes in advance of and subsequent to any such transfers.	
FP-11: The county shall structure bond covenants to ensure a prudent budget standard.	Bond covenants are strictly followed, monitored, and revised to maintain prudent and conservative standards. Outstanding bonds are constantly monitored for refunding opportunities to lower interest rates/debt service. In 2004 and 2006 \$62 million and \$171 million in bonds were refunded respectively.
FP-12: King County should structure the term of its borrowings to match the expected useful life of the assets to be funded.	In 2007, WTD increased the term of bonds issued to 40 years. In addition to moderating the impact to current sewer rates, this provides a better match between the life of the facilities and the debt financing their construction.
FP-13: The wastewater system's capital program shall be financed predominantly by annual staged issues of long-term general obligation or sewer revenue bonds, provided that: All available sources of grants are utilized to offset targeted program costs; Funds available after operations and reserves are provided for shall be used for the capital program; excess funds accumulated in reserves may also be used for capital; Consideration is given to competing demands for use of the county's overall general obligation debt capacity; and Consideration is given to the overall level of debt financing that can be sustained over the long term given the size of the future capital programs, potential impacts on credit ratings, and other relevant factors such as intergenerational rate equity and the types of projects appropriately financed with long-term debt.	WTD capital expenditures are predominantly funded by the issuance of Sewer Revenue Bonds. County General Obligation Bonds are not expected to be a significant portion of new debt issuance. Through 2004, funds from meeting debt-service coverage requirements were transferred to the capital program. Beginning in 2005, funds from meeting debt-service coverage requirements are transferred to the capital program and the rate stabilization fund.
FP-14: To achieve a better maturity matching of assets and liabilities, thereby reducing interest rate risk, short-term borrowing shall be used to fund a portion of the capital program, provided that: Outstanding short-term debt comprises no more than fifteen percent of total outstanding revenue bonds and general obligation bonds; and Appropriate liquidity is available to protect the day-to-day operations of the system.	Short-term (junior lien) debt is targeted for approximately 15 percent of the total debt issued. Year-end liquidity reserves are targeted at 15 percent of the year's operating expense total.
FP-15: King County shall charge its customers sewer rates and capacity charges sufficient to	Beginning in 2002, WTD was reorganized to include an asset management section to reinforce the emphasis and visibility on maintaining the current assets of the

Financial Policies	How Implemented in 2004–2006
<p>cover the costs of constructing and operating its wastewater system. Revenues shall be sufficient to maintain capital assets in sound working condition, providing for maintenance and rehabilitation of facilities so that total system costs are minimized while continuing to provide reliable, high quality service and maintaining high water quality standards.</p>	utility.
<p>1. Existing and new sewer customers shall each contribute to the cost of the wastewater system as follows:</p>	
<p>a. Existing customers shall pay through the monthly sewer rate for the portion of the existing and expanded conveyance and treatment system that serves existing customers.</p>	<p>King County maintains a uniform monthly sewer rate in accordance with this policy.</p>
<p>b. New customers shall pay costs associated with the portion of the existing wastewater conveyance and treatment system that serves new customers and costs associated with expanding the system to serve new customers. New customers shall pay these costs through a combination of the monthly sewer rate and the capacity charge. Such rates and charges shall be designated to have growth pay for growth.</p>	<p>The sewer rate is set on an annual basis such that, given projections of other revenues and costs, the revenue requirements for providing wastewater services are met.</p>
<p>2. Sewer rate. King County shall maintain a uniform monthly sewer rate expressed as charges per residential customer equivalent for all customers.</p>	<p>The recent refinancing of certain bond series has lifted bond covenants that constrained the creation of a true rate stabilization reserve. Under the old parity bond covenants, revenues earned in one year could be recognized only in that year, forcing all excess operating revenues to be used to fund capital projects. This reduced the utility's borrowing needs; however, the resulting reduction in debt service had only a modest impact on the subsequent year's rate. With a rate stabilization reserve, excess revenues generated in the first year of a multi-year rate can be treated as operating revenues for the subsequent year. These revenues therefore can be applied directly to debt coverage requirements in the subsequent year, allowing for a reduction of the multi-year rate. For example, the adopted 2007 rate includes the use of such a reserve with a year-end 2007 reserve balance projected to be \$20 million. The full amount of this reserve is projected to be used in 2008 to keep the sewer rate level. The use and planned use of the rate stabilization funds are included in the rate transmittal. Information on the rate stabilization account is included in the annual sewer rate briefing to RWQC.</p>
<p>a. Sewer rates shall be designed to generate revenue sufficient to cover, at a minimum, all costs of system operation and maintenance and all capital costs incurred to serve existing customers.</p>	<p>The debt service coverage minimum is based on meeting two ratios, 1.25 on parity debt and a target of 1.15 on all debt.</p>
<p>b. King County should attempt to adopt a multiyear sewer rate to provide stable costs to sewer customers. If a multiyear rate is established and when permitted upon the retirement by the county of certain outstanding sewer revenue bonds, a rate stabilization reserve account shall be created to ensure that adequate funds are available to sustain the rate through completion of the rate cycle. An annual report on the use of funds from this rate stabilization account shall be provided annually to the RWQC.</p>	
<p>c. The executive, in consultation with the RWQC, shall propose for council adoption policies to ensure that adequate debt service coverage and emergency reserves are</p>	<p>The capacity charge is based on the methodology listed in this policy.</p>

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**Financial Policies****How Implemented in 2004–2006**

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established and periodically reviewed.

3. Capacity charge. The amount of the capacity charge shall be a uniform charge, shall be approved annually and shall not exceed the cost of capital facilities necessary to serve new customers. The methodology that shall be applied to set the capacity charge is set forth in FP-12.3.a\*.

a. The capacity charge shall be based on allocating the total cost of the wastewater system (net of grants and other non rate revenues) to existing and new customers as prescribed in this subsection. The total system cost includes the costs to operate, maintain, and expand the wastewater system over the life of the RWSP. Total estimated revenues from the uniform monthly rate from all customers and capacity charge payments from new customers, together with estimated non rate revenues, shall equal the estimated total system costs. The capacity charge calculation is represented as follows:

$$\text{Capacity Charge} = \frac{[\text{Total system costs} - \text{rate revenue from existing customers}] - \text{Rate revenue from new customers}}{\text{Number of new customers}}$$

where:

(1) total system costs (net of grants and other non rate revenues) minus rate revenue from existing customers equals costs allocated to new customers.

(2) costs allocated to new customers minus rate revenue from new customers equals the total revenue to be recovered through the capacity charge.

(3) total capacity charge revenue requirements divided by the total number of new customers equals the amount of the capacity charge to be paid by each new customer.

b. The capacity charge may be paid by new customers in a single payment or as a monthly charge at the rate established by the council. The county shall establish a monthly capacity charge by dividing that amount by one hundred eighty (twelve monthly payments per year for fifteen years). The executive shall transmit for council adoption an ordinance to adjust the discount rate for lump sum payment. The executive shall also transmit for council

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Financial Policies	How Implemented in 2004–2006
<p>adoption an ordinance to adjust the monthly capacity charge to reflect the county's average cost of money if the capacity charge is paid over time.</p>	
<p>c. King County shall pursue changes in state law to enable the county to require payment of the capacity charge in a single payment.</p>	
<p>d. The capacity charge shall be set such that each new customer shall pay an equal share of the costs of facilities allocated to new customers, regardless of what year the customer connects to the system. The capacity charge shall be based upon the costs, customer growth and related financial assumptions used for the Regional Wastewater Services Plan adopted by Ordinance 13680 as such assumptions may be updated. Customer growth and projected costs, including inflation, shall be updated every three years beginning in 2003.</p>	
<p>e. The county should periodically review the capacity charge to ensure that the actual costs of system expansion to serve new customers are reflected in the charge. All reasonable steps should be taken to coordinate the imposition, collection of and accounting for rates and charges with component agencies to reduce redundant program overhead costs.</p>	
<p>f. Existing customers shall pay the monthly capacity charge established at the time they connected to the system as currently enacted by K.C.C. 28.84.055. New customers shall pay the capacity charge established at the time they connect to the system.</p>	
<p>g. To ensure that the capacity charge will not exceed the costs of facilities needed to serve new customers, costs assigned and allocated to new customers shall be at a minimum ninety five percent of the projected capital costs of new and existing treatment, conveyance and biosolids capacity needed to serve new customers.</p>	
<p>h. Costs assigned and allocated to existing customers shall include the capital cost of existing and future treatment, conveyance and biosolids capacity used by existing customers, and the capital costs of assessing and reducing infiltration and inflow related to the use of the existing conveyance and treatment capacity.</p>	
<p>i. Capital costs of combined sewer</p>	

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**Financial Policies**

**How Implemented in 2004–2006**

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overflow control shall be paid by existing and new customers based on their average proportionate share of total customers over the life of the RWSP.

j. Operations and maintenance costs shall be paid by existing and new customers in the uniform monthly rate based on their annual proportionate share of total customers.

k. Any costs not allocated in FP-12.3 f, g, h, i and j\* shall be paid by existing and new customers in the sewer rate.

l. Upon implementation of these explicit policies, the Seattle combined sewer overflow benefit charge shall be discontinued.

4. Based on an analysis of residential water consumption, as of December 13, 1999, King County uses a factor of seven hundred fifty cubic feet per month to convert water consumption of volume-based customers to residential customer equivalents for billing purposes. King County shall periodically review the appropriateness of this factor to ensure that all accounts pay their fair share of the cost of the wastewater system.

\*King County Code Reviser's note: Ordinance 15602 added new policies FP-3, FP-4 and FP-5, but this reference was not changed.

FP-16: The executive shall prepare and submit to the council a report in support of the proposed monthly sewer rates for the next year, including the following information:

Key assumptions: key financial assumptions such as inflation, bond interest rates, investment income, size and timing of bond issues, and the considerations underlying the projection of future growth in residential customer equivalents;

Significant financial projections: all key projections, including the annual projection of operating and capital costs, debt service coverage, cash balances, revenue requirements, revenue projections and a discussion of significant factors that impact the degree of uncertainty associated with the projections;

Historical data: a discussion of the accuracy of the projections of costs and revenues from previous recent budgets, and

Policy options: calculations or analyses, or both, of the effect of certain policy options on the overall revenue requirement.

These options should include alternative capital

All key assumptions, significant financial projections, historical results, and policy options are provided as part of the annual sewer rate submittal letter and attachments.

<b>Financial Policies</b>	<b>How Implemented in 2004–2006</b>
program accomplishment percentages (including a ninety percent, a ninety-five percent and a one hundred percent accomplishment rate), and the rate shall be selected that most accurately matches historical performance in accomplishing the capital program and that shall not negatively impair the bond rating.	
FP-18: The cost of community treatment systems developed and operated in accordance with WWSP-15 would not be subsidized by the remaining ratepayers of the county's wastewater treatment system.	This policy has been adhered to since the adoption of the RWSP.



Appendix M

# RWSP Reporting Policies



## RWSP Reporting Policies

A. The executive shall review the implementation of the RWSP on a regular basis and submit the following reports to council and the RWQC:

*Note: These policies were adopted by Ordinance 15384 in March 2006.*

Reporting Policies	How Implemented in 2004–2006
<p>A. Regional wastewater services plan annual report. The executive shall submit a written report to the council and RWQC in September each year until the facilities identified in the RWSP are operational. This report, covering the previous year's implementation, will provide the following:</p> <ol style="list-style-type: none"> <li>1. A summary of activities for each major component of the RWSP, including treatment, conveyance, infiltration and inflow, combined sewer overflows, water reuse, biosolids and highlights of research and development projects underway and proposed for the coming year;</li> <li>2. Details on each active RWSP project in the capital budget, including a project summary, project highlights, project issues, upcoming activities, schedules, an expenditures summary including staff labor and miscellaneous services, a description of adjustments to costs and schedule and a status of the projects contracts;</li> <li>3. A status of the odor prevention program, including a listing and summary of odor complaints received and progress on implementing odor prevention policies and projects;</li> <li>4. A summary of the previous year's results for the comprehensive water quality monitoring program;</li> <li>5. A review of the plan elements, including water pollution abatement, water quality, water reclamation, Endangered Species Act compliance, biosolids management and variability of quality over time, wastewater public health problems, compliance with other agency regulations and agreements, to ensure it reflects current conditions; and</li> <li>6. An update of anticipated RWSP program costs through the year 2030</li> </ol>	<p>The RWSP annual reports are submitted to the King County Council in September to cover the previous year's implementation and include information on the items listed in 1 through 6 of this policy. The King County Executive has transmitted an annual report to the King County Council every year since the year 2000.</p> <p>The elements of the RWSP 2006 annual report are included in the <i>RWSP 2006 Comprehensive Review and Annual Report</i>.</p>
<p>B.1. Comprehensive regional wastewater services plan review. The executive shall submit a written report to council and RWQC</p>	<p>The <i>RWSP 2006 Comprehensive Review and Annual Report</i> is the second RWSP comprehensive review and covers implementation of the RWSP from 2004 through</p>

<b>Reporting Policies</b>	<b>How Implemented in 2004–2006</b>
<p>that provides a comprehensive review of the RWSP. The report will review the following:</p> <ul style="list-style-type: none"><li>a. assumptions on the rate and location of growth, the rate of septic conversions and the effectiveness of water conservation efforts;</li><li>b. phasing and size of facilities; and</li><li>c. effectiveness of RWSP policies implementation, for infiltration and inflow reduction, water reuse, biosolids, CSO abatement, water quality protection, environmental mitigation and public involvement;</li></ul> <p>2. The next comprehensive regional wastewater services plan review is due in September 2007. Subsequent reports will be prepared every three to five years as established by the council and RWQC following their review of the current report. The specific due date will be based upon the availability of necessary information, the completion of key milestones, and the time needed to collect and analyze data. The executive may recommend policy changes based on the findings of the report and other information from changing regulations, new technologies or emerging or relevant factors;</p> <p>3. The comprehensive regional wastewater services plan review will include all elements of the RWSP annual report, replacing it for that year.</p> <p>C. Brightwater monthly report. The executive shall prepare a monthly report to council for the Brightwater project based on a reporting format approved by motion by the King County council. The reporting format shall include a project summary, project highlights, project issues, upcoming activities, schedules, an expenditures summary including staff labor and miscellaneous services, a description of adjustments to costs and schedule and a status of the project's contracts. This report will be distributed electronically and will continue until Brightwater becomes operational.</p>	<p>2006. The first RWSP comprehensive review (<i>2004 RWSP Update</i>) covered RWSP implementation from 1999 through 2003.</p> <p>The Brightwater monthly report is made available to the King County Council electronically in the format that was approved by Motion 12189 in August 2005.</p>
<p>D. Operational master plan. The RWSP Operational Master Plan that was adopted by council in December 1999 shall be updated on a regular basis in conjunction with policy revisions to the RWSP.</p>	<p>The Wastewater Treatment Division (WTD) anticipates completing an update to the OMP in the second quarter of 2008.</p>



Appendix N

# 2006 Summary of Odor Complaints



## Appendix N

# 2006 Summary of Odor Complaints

Location	Date	Complaint	Resolution
<b>West Point Treatment Plant (TP)</b>			
West Point TP	6/26/06	Complainant sensed a combination of fish, rotten eggs and manure-like odors and felt convinced the West Point Plant is the source of the odors.	Plant operations on the day of the complaint were normal. There was a low tide at noon a. No further action taken.
West Point TP	7/03/06	Complainant sensed very strong odors from what he thinks is coming from the West Point Treatment Plant.	At the time he sensed the odors (0800), there was a plant shutdown so no flow was coming into the plant until 0845. Start up was normal with no problems. All of the plant's odor control units were operating normally. Southerly winds tend to rule out West Point as the source of odor. A copy of the odor report was mailed to the complainant per his requested.
West Point TP	7/25/06	Complainant said he sensed very strong odors and thought they were from the West Point Treatment Plant.	No odor sensed around residence at the time of investigation. Staff spoke with the caretaker of the house concerning odors that were coming from the south, which is away from the plant. There are a number of city of Seattle vent lines in the area so a failed septic system, a pumping system that has sludged up or a p-trap that has dried out are all potential sources of odor. A copy of the odor report was mailed to the complainant per his request.
West Point TP	8/01/06	Complainant said he sensed odors from the West Point Treatment Plant.	All of the odor control units were operating and prechlorination was on at 3000 pounds per day. Digester foam and cleaning of it was the most likely cause. Added defoaming agent in order to reduce the amount of foam.
West Point TP	8/09/06	Complainant sensed odors from the West Point Treatment Plant.	While no odors were detected around the beach and the berm area, the wind direction was north to south so the plant could have been the source of the odor. Resolution: Operations staff continuing to hose and clean the roof of the digesters. Defoaming agent being applied to reduce the amount of foam.
West Point TP	8/14/06	Complainant sensed odors from the West Point Treatment Plant.	At the time of the complaint, the wind direction was NNE at 14 mph and the tide was +10 feet. Operations staff continued to hose and clean the roof of the digesters. Continued normal plant operations and ensured that all doors and hatches that are potential odor sources are closed.

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Location	Date	Complaint	Resolution
<b>West Service Area Offsite</b>			
Magnolia, Queen Anne area, Crown Hill and Ballard	1/24/06	Widespread odor complaints, from Magnolia, Queen Anne area, Crown Hill and Ballard.	Only two complaints were called into West Point Main Control, and both complainants did not want to fill out a report. The only problem found was that the Phoenix odor control unit at the Lake City Regulator was flooded with water, thus making it inoperable. However, no complaints were registered from that vicinity. Since there aren't any KC conveyance lines in the areas where the complaints were called in from, it's highly unlikely that King County facilities were the cause of the complaints. The Phoenix unit problem was corrected and placed back in service. Designated as a non-county complaint.
City of Lake Forest Park	2/08/06	Odors sensed for over an hour near the vicinity of highway 522 & 73 <sup>rd</sup> to the county line.	The nearest KC facility is the McAleer odor control unit on Perkins Way. Investigation showed no odors sensed from the unit. Also, flows from the Lake Ballinger pump station were being pumped to the city of Edmonds at this time. Since no odor was detected at the odor control unit and the odor was detected within a wide area, it was designated as a non-county complaint.
Wallingford area	2/08/06	Complainant sensed manure odor.	Nearest KC manholes are N23-12 and N23-13. The area between the two manholes was investigated and no odors found. The manholes were not pressurized. Designated as a non-county complaint.
Taylor Avenue and Lee Street	2/08/06	Complainant sensed sewage odor at his residence.	Investigated the area around his residence; there are no KC manholes or facilities within the immediate vicinity. The nearest KC facility is the Dexter Regulator. Dexter was checked and found to have no problems. Designated as a non-county complaint.
Baker Ave, Fremont area	2/09/06	Complainant sensed a "pulp mill" odor near his residence, similar to the odor problem that occurred on 1/24/06.	The area in question was investigated, and no odors sensed. The Lake City Regulator odor control unit was working fine. Designated as a non-county complaint.
Golden Gardens Dr NW	3/20/06	Complainant sensed moderate sewage odors during the late evening hours and thought they were emanating from the West Point Plant, though the nearest KC facility was the North Beach Pump Station.	Investigation revealed no odors at complainant's address, as well as driving around the Ballard area en route to Golden Gardens Park. Manhole closest to complainant's address belonged to city of Seattle and no odors sensed at nearby city of Seattle lift station. Spoke to local citizen, who denied sensing any sewer odors. The complaint was designated as a non-county complaint.
Lake City Regulator	4/11/06	Complainant stated that they thought odors were coming from the Lake City Regulator Station.	Found no problems with the odor control unit at the Lake City Regulator. OdaLog readings were low and sensed no odors during the walk around the station and on the trail north

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Location	Date	Complaint	Resolution
			and south of the station. No further action taken.
NE 175 <sup>th</sup> St., Kenmore	4/18/06	Odors emanating from manholes in backyard of complainant's residence.	Low odor was detected at the time of investigation. Resolution: the manholes were sealed with plastic and corked.
3722 27 <sup>TH</sup> Place W.	4/20/06	Complainant contacted King County Councilmember Larry Phillips about sewage odors from the West Point Treatment Plant. She sensed the odors on 3/26, but the complaint letter was received at West Point on 4/18.	From the operator log, the odor systems appeared to be running normally. The only unusual occurrence was that 2 cogens were running and may have been a factor. Resolution: WTD Director sent a response l on 4/20. Signs were also placed around the plant trails with Main Control's phone number for future odor complaint call-ins
Dexter Avenue	4/20/06	Complainant sensed odors from a sewer grate next door to the Dexter Regulator.	Investigation did not detect any odors and the odor control system at Dexter was operating properly. The drain (grate) in question may not be King County's but belongs to the complex adjacent (Olympic Hot Tub's back south door). Designated as a non-county complaint.
Riviera Pl. NE	4/27/06	Complainant sensed strong "methane-like" odor from a drain in her home.	The odor was gone at the time of investigation. Water was added to the basement drain to alleviate the odor problem. City of Seattle notified of possible blockage. Complainant stated that there appeared to be human waste in the catch basin across from her home. Designated as a non-county complaint.
Lake City Regulator	5/03/06	Complainant sensed sewage odors inside building coming through vents from the outside.	Investigation revealed some odor emanating from the Lake City Regulator odor control exhaust stack, with outlet readings at 680 ppb H <sub>2</sub> S. A check at Kenmore revealed that the power to the Bioxide chemical injection system had kicked out, which resulted in the high inlet H <sub>2</sub> S readings at Lake City. The power was restored and chemical addition restarted. The complainant was notified of the findings.
28 <sup>th</sup> Ave NE	5/05/06	Complainant stated that sewage odors appeared to be coming from inside her house.	Nearest KC facility is the 30 <sup>th</sup> Street Regulator. The odor control unit there was operational and perimeter monitoring detected no odors. No further action taken. Could not contact person directly as no house number was given, and left message on answering machine about odor investigation. Designated as a non-county complaint.
Lake City Regulator	5/12/06	Complainant sensed odors all week during the afternoon hours.	Faint odors were noticed at the Lake City Regulator but none at the complainants address. The odor control units were operational and Bioxide was being fed at Kenmore at the time of the complaint. The water regeneration cycle was increased and the odor control units were placed in series.
Dexter	5/21/06	Complainant sensed odors the day	Investigation revealed that the exhaust fan by

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Location	Date	Complaint	Resolution
Regulator		before near the Dexter Regulator station.	the gate room door was running. This fan is normally turned off. The fan was shut off and a message left on the complainant's phone regarding the outcome of the investigation.
Bothell Way NE, manhole W11-72	5/21/06	Complainant sensed intermittent sewer odors for the past week and a half.	The odor was found to be emanating from a manhole (W11-72). The manhole cover was sealed but was found to have cracks in the riser. Facilities Construction was contacted about replacing the riser. The complainant was notified of the investigative results.
Lake Forest Park, 44 <sup>th</sup> Avenue	6/12/06	Complainant has sensed odors near the McAleer Trunk for the past few years.	Slight sewage odors were sensed from four manholes (W502-7 to W502-10). All four were eventually sealed. No further action taken.
Thorndyke West	6/28/06	Frequent complainant sensed moderate odors from a manhole outside her building	The Mobile odor unit at the Wheeler Street Discharge Structure was kicked out (fan was off for 2 days). The unit was reset and the complainant was notified of the findings.
Sludge Truck on Elliot West	6/29/06	West Point plant manager informed Main Control about very strong odors emanating from a sludge truck he was following on Elliot West.	Biosolids staff is investigating what can be done to control the odors better.
NE 175 <sup>th</sup> St., Kenmore	7/19/06	Complainant sensed moderate "manure/rotten egg" odors from a sewer manhole in her driveway.	No odors were present at the time of investigation.
NE 175 <sup>th</sup> St., Kenmore	7/20/06	Complainant sensed moderate "manure/rotten egg" odors from a sewer manhole inside her home.	Notified the flow monitoring group to seal up the manhole after entry. Installed plastic under the manhole and caulked around the ring and plugs.
Thorndyke W.	7/21/06	Complainant sensed sewer odors inside her business. Intense sewage odors sensed at the Wheeler Street Force Main Discharge Structure.	The odor control unit at the structure was found tripped. The fan breaker was reset and a work order written to have the fan checked out.
25 <sup>th</sup> Ave NE	8/02/06	Complainant sensed odors starting in May from sinks in the bathroom.	There was a mold/ammonia type odor present in the bathroom upon investigation. Checked for hydrogen sulfide and methane readings, none were recorded. No further action taken at this time. Based on the investigative results, the complaint was designated as non-county.
Riviera Pl. NE	8/04/06	Seattle Public Utilities informed King County that resident had sensed strong sewer odors nearby.	Investigation showed that the odor control unit fan at the Matthews Beach pump station was not running. It failed due to electrical work and testing at the station. The fan was restarted.
Manhole north of Ravenna Avenue & NE 53 <sup>rd</sup> St.	8/08/06	Complainant sensed strong odors from manhole that was part of the Laurelhurst Trunk.	The manhole was sealed at the request of the complainant.
McAleer	8/09/06	Complainant sensed faint sewer	The McAleer odor control unit was off-line

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Location	Date	Complaint	Resolution
Odor Control Unit		odors inside her home.	briefly for maintenance work when she called. After the work was completed, the unit was placed back in service.
North Portal	8/16/06	Complainant sensed strong sewer odors inside his home.	When the odor was first noticed, Matthews pump station was off for a storage program. Suspect that the odor complaint resulted from an elevated wet well level (due to the storage program) which affected the odor control system at Matthews. The pump station was back in operation.
Beach Drive NE, lakeline	8/18/06	Complainants sensed odors inside their home.	The odor control units at Matthews and Logboom were in operation, as well as the chemical injection system at Kenmore. Resolution: The high wet well level at Matthews restricted airflow from the lakeline, backing it up and causing the complaint.
Stone Ave N	8/21/06	Complainant has sensed "gaseous" odors inside her home for the past few months. Suspect that the trucks carrying "hot tar" from the roofing company located the next block is the cause if the odors. She is concerned about the harmful effects of breathing the fumes.	Designated as a non-county complaint.
NE 10 <sup>th</sup> Avenue & 30 <sup>th</sup> Ave NE. manhole NWW 13-07	8/23/06	Received odor complaint via Seattle Public Utilities.	During the investigation, a faint sulfide odor was detected from manhole NWW13-07. Recommended that the manhole be plugged if future complaints are received.
NE 145 <sup>th</sup> St., Woodinville	8/28/06	Complainant sensed odors in the driveway from her apartment complex the past few weeks.	Investigation showed strong sulfide odors coming out from a manhole that had a broken riser. Contacted Facilities Maintenance to have the manhole riser repaired.
Beach Drive NE		Complainant sensed odors inside their home.	There was no odor present at the time of the investigation The carbon in the scrubber on the Fletcher's property was scheduled to be changed.
40 <sup>th</sup> Ave NE	9/04/06	Complainant sensed moderate odors inside her residence.	A slight ammonia odor was sensed around her home. The nearest KC facility is the Belvoir Pump Station. The wet well was pumped down, although the odor did not appear to be associated with the KC facility. Designated as a non-county complaint.
West Seattle Force Main Discharge Structure	9/25/06	Complainant sensed odors inside her building.	Complainant sensed odors inside her building 3 weeks before she phoned in the complaint. Strong odors were coming out the odor control unit stack. The fan was shut off until the carbon in the unit was changed out. The complainant was notified of the findings.
Beach Drive NE, Lake Forest Park	10/03/06	Odors emanating from manhole outside of complainant's garage.	Part of the problem could be Kenmore's pump #2 cycling on and off. At the time of investigation, odor was also sensed at the nearby KC facility at Logboom and also from

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Location	Date	Complaint	Resolution
			manhole from the Ronald Wastewater District at 155562 Beach Drive NE. Problem is being discussed at the KC Odor / Corrosion Taskforce Meetings.
Thorndyke Avenue	10/12/06	Complainant sensed moderate odors inside her building.	Upon investigation, it was found that the Wheeler Street mobile odor control unit was kicked out and not operating. An electrician was called in for the repairs and placed the unit back in service.
NW Canal St./ Fremont Siphon Forebay, Sandcatcher	10/13/06	Complainant(s) have often sensed odors emanating from a large structure across the street from their residence at 1st Avenue NW and Canal St.	No odors were sensed at the time of investigation Complainant wanted information about the King County's policy on odors and asked if anything could be done regarding sealing up the sewer system to control odors. Will discuss at next Odor / Corrosion Task Force Meeting.
Perkins Way / McAleer Odor Control Unit	12/13/06	Complainant sensed strong rotten egg odor from the McAleer odor control unit.	Moderate hydrogen sulfide was measured from the outlet and positive pressure detected from the manhole access to the odor control fan room. The flexible duct connection for the unit was checked for leaks but none found. Plugs were placed in the manhole cover. The carbon in the unit will be replaced as soon as the plant Vactor truck gets returned from Fleet.
<b>South Treatment Plant (TP)</b>			
South Treatment Plant	7/11/06	Complaint received via phone call from an inspector with the Puget Sound Clean Air Agency. A message was received on their odor hot-line about strong odors while driving past the plant on I-405.	Since the odor complaint was received by King County 4 days after the original odors were sensed, no investigation was made. All odor control units were operating at the time of the complaint. No unusual operating activities occurred the day of the complaint, but there were some tanks in the secondary area that needed to be cleaned which may have contributed to a greater potential of odors. The inspector was informed about the upcoming project to cover parts of the aeration tanks.
South Treatment Plant	7/19/06	Complainant sensed strong "solvent/chemical -type" odors from the plant when driving and exiting off I-405.	At the time of the complaint the holding tank mixer and aerator were in service, both potential sources of odor. Since the odor complaint was received 12 hours after the complainant last sensed the odors, no investigation was performed. All odor control units were operating at the time of the complaint, and no unusual plant activities were mentioned in the operator's log. Complainant is staying at hotel across the street from the plant and informed him that should he sense the odors again to call our Main Control number immediately.
South Treatment	8/04/06	Complainant sensed strong odors along Grady Way during	An investigation was performed around the plant when he called; did not detect any odors



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Location	Date	Complaint	Resolution
Plant		evening/nighttime hours but informed plant the next morning.	outside the fenceline. All odor control units were operational. Suspect that the aeration tanks were the most probable cause of the odor complaint. No further action taken at this time. The complainant was informed about the project to cover parts of the aeration tanks.
South Treatment Plant	8/07/06	Complainant sensed strong odors along Grady Way and Oakesdale Avenue.	Upon investigation, the operators sensed a slight odor from the secondary treatment process (aeration tanks). No further action taken at this time. The complainant did not want to be contacted with the investigative results
South Treatment Plant	9/08/06	Complaint received on the Clean Air Agency Odor Hotline and relayed to the South Plant via agency inspector the day after.	Complainant sensed strong odors while driving along I-405. The source of the odor was most likely from the secondary treatment process, specifically from the aeration tanks. Other than a few minor process changes, the ability to control odors from this source is limited. An official memo was sent to the agency inspector and she was notified of the upcoming project to cover parts of the aeration tanks.
South Treatment Plant	9/26/06	Complainant sensed "rotten egg" odors in his car while driving north on Interurban Avenue, and later in his office.	An investigation revealed strong secondary odors outside the fenceline at the south side of the plant. One aeration tank was currently out of service and being hosed. At the time of the complaint, both Primary odor scrubber blowers were temporarily out of service for repairs. Prechlorination of the plant influent was increased and one of the primary odor blowers was placed back into service. The complainant did not want to be contacted.
South Treatment Plant	10/04/06	Complainant has sensed strong odors in his car while commuting. Areas he has sensed plant odors are I-405, Oakesdale Avenue to Longacres Way and the West Valley Highway. He didn't sense the odors at the time of the complaint, but called the plant to inform them about the odors. He stated that he has worked in the area for 22 years and the footprint of the odors has gotten much larger.	The only unusual plant activities that day were aeration tank #3 out of service (some odor sensed topside) and the pulling primary treatment area gates. No investigation was made since the odors were not sensed at the time of the complaint. Suspect that the aeration tanks were the cause of the odors. The complainant did not want to be contacted.
South Treatment Plant	10/24/06	Complainant as well as others sensed very strong odors outside their building complex, which is located just east of the plant on Oakesdale Avenue.	The source of the odor was a secondary sedimentation tank that had been collecting sludge and over time floated to the top. A shear pin to help drive the sludge collector broke and repairs could not be made immediately because there were no spare

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Location	Date	Complaint	Resolution
			parts. The decision was made to drain the tank rather. While draining, granular hypochlorite and constant hosing was performed to minimize the odor impacts. The tank was totally drained on 10/26 and the odors ceased. The complainant did not want to be contacted.
<b>South/East Service Area Offsite</b>			
North Creek Force Main Discharge Structure	1/03/06	Odors sensed by landscaping business personnel adjacent to structure.	No odors sensed around the structure at the time of investigation. H2S readings from the NCFM exhaust stack was 0, 1, 1 ppb. Some of the contractors working at the station did not sense any odors at all, while some sensed a few whiffs of sewage. Reviewing the North Creek pump station trends, the flow through the station ramped up from 7.5 to 16.0 MGD at the time of the complaint, so it may be possible that there was a H2S surge through the carbon scrubber at the time the flow increased. Asked the complainant to call Renton Main Control rather than a specific staff person's phone since the main control phones are staffed at all times.
Heathfield Pump Station	6/07/06	Complainant sensed sewage odors in front of house.	The odors were emanating from a local manhole as well as the storm drain system of the pump station. All of the manholes within the vicinity were pressurized. The odor control unit was operating, with no sulfide coming out from the exhaust. However, the pressure drop across the carbon bed was high so a decision was made to change the carbon in the unit. Dataloggers were also placed in the wet well to measure pressure, as a negative pressure when opening the wet well door has not been as strong as in the past.
North Mercer Pump Station	4/03/06	Complainant has sensed odors from pump station for the last 4 years. She has never called but is concerned about odor problems this coming summer. She thinks that the odors are from two pipes directly from the station and consists of a "toilet smell".	She does not smell the odors now; it was information she wanted to pass along. No investigation made at the time of complaint.
South Mercer Pump Station	4/18/06	Complainant had sensed odors from pump station off and on for the past 3 weeks.	Construction work ongoing at pump station. Investigation revealed some H2S detected from the odor control unit exhaust, though no odors were sensed. The wet well door had been opened during a phase of work by the contractors. Operator will check station status the next morning. Portable carbon unit to arrive at station in 2 weeks. As a precaution, extra carbon (155 pounds) was added to the scrubber on 4/26.

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Location	Date	Complaint	Resolution
North Mercer Pump Station	4/24/06	Complainant sensed sewer odors from pump station the day before she filed complaint.	Since the complaint did not get reported until the day after, no same-day investigation was performed. No odors detected at station at the time of investigation. The Pepcon unit was operational, pH and ORP readings normal, but erratic and high H <sub>2</sub> S measured from the exhaust (21 – 86 ppb).
South Mercer Pump Station	4/25/06	Complainant sensed sewage odors from the pump station.	Investigation found that the odor was from holes drilled in the wet well walls from construction activity at the station. The holes were sealed and the complainant informed.
Holmes Point Flushing Structure	6/07/06	Complainant sensed sewage odors near his house for the past few days.	Sewer odors were sensed upon investigation. The “dogs” were tightened on the hatch over the pipe and a work order written to have a new gasket installed to provide a better seal.
Vashon Treatment Plant	6/07/06	Complainant sensed very strong sewage “bowel movement” odors from her second floor apartment.	At the time of the complaint, the holding tank mixer and aerator were in service, both potential sources of odor. The operator went to complainant’s site and spoke with apartment manager, passed out KC odor pamphlets and informed him that KC is very concerned about odor issues and to call the plant if further odor complaints are sensed.
Holmes Point Flushing Structure	7/03/06	Sewer odors were sensed.	No odors sensed upon investigation but found two of the hatch rings loose. Retightened the two loose rings and ensured that the other rings were as tight as strength would allow.
York Force Main Discharge Structure	7/25/06	Complainant sensed strong “rotten-egg” odors outside his business.	The York Pump Station was taken out of service 4 days before the complaint was called in. The 30-inch force main was currently being drained of sewage at the time of the complaint. The sewage sat in the wet well during that time, thus increasing the sulfide levels and pressurized spikes that could have burned through the odor control carbon bed. The pump station is currently off line. When the station resumes and after the first flush, the carbon in the scrubber will be changed out and hypochlorite added to the sewage to reduce sulfides.
Sweyolocken Force Main Discharge Structure	7/26/06	City of Bellevue received calls concerning odors from the exit off I-405 and onto I-90.	The Phoenix odor control unit was operating at the time of the complaint, but high sulfide readings were measured from the exhaust. The unit was water recharging one of its canister banks at the time of investigation, thus limiting its full odor control capacity. The water regeneration cycle will be modified so recharging does not happen during the day but instead during a time when traffic and receptors are minimal. If odor complaints persist, then the canisters may need to be changed.
45 <sup>th</sup> Ave SW,	7/26/06	Received call from inspector of the	Investigation at the Barton pump station

**Appendix N. 2006 Summary of Odor Complaints**

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<b>Location</b>	<b>Date</b>	<b>Complaint</b>	<b>Resolution</b>
West Seattle		Puget Sound Clean Air Agency; complainant e-mailed her concerning sewer odors sensed near their residence (3 blocks from the Fauntleroy Ferry Dock) 5 days ago.	revealed no odors and very little sulfide measured from the scrubber exhaust. The ferry ticket takers did not notice any highly unusual odors the past week but stated that they thought the odors were from the low tides. There were 4 sewer manholes located within 50 feet of their residence but were not the county's. The complaint was designated as non King County.
Beach Dr. SW, manhole B-4	8/18/06	Complainant has complained about "seaweed" odors near her residence which is near Murray Pump Station.	Investigation found high sulfide reading emanating from the manholes along Beach Drive (B-5 and B-4). The manholes were sealed.
60 <sup>th</sup> Avenue and Spokane Street	9/13/06	Initial complaint phoned to WestPoint and was referred to the South Plant.	No odors sensed at the 63 <sup>rd</sup> Avenue Pump Station at the time of investigation, and no complaints from the residents of the house living next to the pump station. The odor control unit was in operation and no manholes in the area were emitting odors. Other residents nearby were contacted and they did not sense any odors. Designated as a non-county complaint.
SW Admiral Way	10/02/06	Complaint received on the Clean Air Agency Odor Hotline and relayed to the South Plant via agency inspector a few days after. Complainant sensed "chlorine" odors near her residence	The nearest KC facility is the Alki Stormwater Plant. The station has not been in operation since early 2006. The last hypochlorite delivery was in early August 2006 and Operation staff confirmed that no testing of the chlorination system had been performed lately. A check of the roof vents from the hypochlorite storage tank failed to come up with any odors. It was concluded that King County was not the source of the complaint and that the agency inspector was notified of the findings.
Corner of Rainier Avenue and Grady Way	11/25/06	Complainant sensed manure and rotten eggs odor at the corner of Rainier Avenue and Grady Way.	An immediate investigation around the plant was performed and no odors were detected outside the fence line. It was concluded that King County was not the source of the complaint, therefore designated as non-county. Tried to reach complainant by phone, but there was no answer.

Appendix O

The Health of Our Waters,  
Water Quality Monitoring Results  
for 2006



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This appendix presents a summary of the quality of King County's marine water and freshwater bodies in 2006. The summary is followed by more detailed information on water quality monitoring locations, procedures, and results. The information satisfies the RWSP reporting policies that call for inclusion of yearly water quality monitoring results as a part of the RWSP annual report.

## Summary of 2006 Water Quality

Monitoring activities in 2006 found that in general, the quality of marine and fresh waters in King County is good.

With the exception of one site in Elliott Bay, all offshore marine monitoring locations in Puget Sound—both ambient and outfall sites—met fecal coliform bacteria standards in 2006. The percentage of nearshore marine sites (beaches) that met the standards has nearly doubled since 1998.<sup>1</sup> The two nearshore sites of highest concern are near freshwater sources—the mouth of the Lake Washington Ship Canal and a storm drain at Alki Point South. The overall quality of marine water, as indicated by the water quality index, is good. The percentage of monitoring locations ranked as moderate or high concern has declined to zero in the past three years, from a peak of 22 percent in 2000.

The quality of major lakes in King County, as indicated by fecal coliform bacteria levels, is also good. For non-beach areas, 100 percent of Lake Sammamish stations, 92 percent of Lake Washington stations, and 80 percent of Lake Union stations met the exceptionally high fecal coliform standard used for lake water. These percentages represent a slight decrease for Lake Washington from 2005 percentages because of higher bacteria levels at one station.

Bacterial counts in 2006 at all swimming beaches monitored in Lake Washington, Lake Sammamish, and Green Lake were within acceptable ranges and did not warrant swimming beach closures. Bacteria levels were low in Green Lake for the second year in a row. Lakes Washington and Sammamish remained fairly consistent, with slight variability from year to year. In terms of overall water quality, as measured by the Trophic State Index, Lakes Sammamish, Washington, and Union were ranked as moderate in 2006.

Given the large population and the growing urbanization in King County, overall stream water quality, as measured by the Water Quality Index for rivers and streams, is fairly good. In the 2005–2006 water year, water quality at 35 of the 56 sites (63 percent) were rated either low or moderate concern, while 21 sites (38 percent) were rated high concern. A comparison of 2006 data with historical data for 17 streams in King County suggest that increased urbanization has resulted in faster surface runoff and peak streamflow rise and fall than have previously occurred in these streams. These conditions can lead to flooding, channel erosion, and disturbance to organisms.

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<sup>1</sup> About 75 percent of the marine beach sites met the geometric mean standard and about 50 percent met the peak standard for fecal coliform bacteria.

## Monitoring Programs

To protect public health and its significant investment in water quality improvements, King County regularly monitors wastewater treatment plant effluent, marine waters, beaches, major lakes, and streams (Table O-1). The biological, chemical, and physical parameters used to assess a water body's health under Washington State Water Quality Standards are fecal coliform bacteria, dissolved oxygen, temperature, pH, ammonia, turbidity, and a variety of chemical compounds. King County also uses other indicators in addition to these parameters.

### Treatment Plant Effluent

King County's three regional wastewater treatment plants continue to be in compliance with the terms and conditions of their NPDES permits, and so are in compliance with the Washington State Water Pollution Control Law, the Federal Water Pollution Control Act, and the Federal Clean Water Act.

The county regularly samples wastewater effluent from the plants and analyzes these samples at process laboratories at the plants and at its environmental laboratory in Seattle.

### Ongoing Marine Monitoring

King County's marine monitoring program routinely evaluates nutrient, fecal coliform bacteria, dissolved oxygen, and stratification levels at offshore locations in the main basin of Puget Sound. Samples are collected near treatment plant and combined sewer overflow (CSO) outfalls to assess potential effects to water quality from wastewater discharges. Additional samples are collected at ambient locations to better understand regional water quality and to provide data needed to identify trends that might show impacts from long-term cumulative pollution.

Ongoing marine monitoring also includes fecal coliform bacteria monitoring of water at Puget Sound beaches near outfalls and at ambient locations and sediment quality monitoring near outfalls and at ambient locations.

### Ongoing Freshwater Monitoring

The major lakes monitoring program collects samples from 25 open-water sites in Lake Union and the Ship Canal, Lake Washington, and Lake Sammamish. Sampled parameters include

#### Some water quality indicators...

**Fecal coliform bacteria.** The presence of fecal indicator bacteria indicates that the water has been contaminated with the fecal material of humans, birds, or other warm-blooded animals. One type of fecal indicator bacteria, fecal coliforms, may enter the aquatic environment from domestic animals, wildlife, stormwater runoff, wastewater discharges, and failing septic systems. Although these bacteria are usually not harmful, they often occur with other disease-causing bacteria and their presence indicates the potential for pathogens to be present and to pose a risk to human health.

**Dissolved oxygen.** Aquatic plants and animals require a certain amount of dissolved oxygen (DO) for respiration and basic metabolic processes. Waters that contain high amounts of DO are generally considered healthy ecosystems. DO concentrations are most important during the summer season when oxygen-depleting processes are at their peak.

**Temperature.** Temperature influences many of the chemical components of the water, including DO concentration. Temperature also exerts a direct influence on the biological activity and growth and, therefore, the survival of aquatic organisms. Temperature levels in waters that bear salmonids are also very important.

temperature, dissolved oxygen, pH, conductivity, clarity (Secchi Transparency), phosphorus, nitrogen, and fecal coliform bacteria.

The swimming beach monitoring program assesses 21 beaches on Lake Sammamish, Lake Washington, and Green Lake every summer. This effort, ongoing since 1996, tests for fecal coliform bacteria as an indicator of risk to human health.

The stream monitoring program targets rivers and streams that cross sewer trunk lines and those that are considered a potential source of pollutant loading to a major water body. This long-term program has sampled at 56 sites on four rivers and twenty-eight streams for many years.

## Other Monitoring

In addition to ongoing water and sediment quality monitoring, the county conducts special intensive investigations. Currently, studies are under way to understand water quality issues and needs, to project future growth impacts, and to identify any needed improvements to salmon habitat in the two primary watersheds in King County. Other studies are under way to support decision-making, siting, and construction of wastewater capital projects.

## Web-Based Monitoring Data

In 2006, King County's regional data management program continued to upgrade the methods used to store and disseminate monitoring data. This program is intended to allow the public to directly download substantial amounts of data from the Web, instead of requesting data from county staff.

The Swimming Beach monitoring page was upgraded to provide tables, graphs, and maps of monitoring results as they become available each week and to provide the most current information on beach closures. The Swimming Beach page is found at <http://dnr.metrokc.gov/wlr/waterres/swimbeach/default.aspx>.

The Large Lakes, Streams, and Marine Monitoring pages were upgraded to provide additional tables and graphs of monitoring results as they become available each month. These pages continue to allow for direct data download from the Web. Page locations are as follows:

- Large Lakes Monitoring page: <http://dnr.metrokc.gov/wlr/waterres/lakes/index.htm>
- Streams Monitoring page: <http://dnr.metrokc.gov/wlr/waterres/streamsdata/>
- Marine Monitoring page: <http://dnr.metrokc.gov/wlr/waterres/marine/Index.htm>.

The Streamflow monitoring page was upgraded to improve data presentation and data download ability. This page is found at <http://dnr.metrokc.gov/wlr/waterres/hydrology/>.

Table O-1. Summary of King County Water Quality Monitoring Programs

Program	Media and Locations	Parameters	Methods	Sampling Frequency	Program Purpose	Duration
<b>Ambient Monitoring</b>						
Marine monitoring	Water and sediments in areas of Puget Sound away from outfalls and CSOs; shellfish and algae from Puget Sound beaches	Water samples: temperature, salinity, clarity, DO, nutrients, chlorophyll, and bacteria Shellfish: lipids and metals	Water samples collected at multiple depths, ranging from 1 to 200 m Sediments and shellfish	Water samples: monthly Shellfish: annually; sediments: bi-annually	To assess potential effects to water quality from nonpoint pollution sources and to compare quality against point source data	Ongoing
Major lakes monitoring	Cedar-Sammamish Watershed (WRIA 08) only: Lakes Washington, Sammamish, and Union	Temperature, DO, pH, conductivity, clarity, phosphorus, nitrogen, and fecal coliform; microcystin is measured at select stations	Samples collected every 5 m from 1 m below the surface to bottom at one station in center of lake and from the surface around various locations around the shoreline	Biweekly during the growing season; monthly during the rest of the year	To monitor the integrity of the wastewater conveyance system and the condition of lakes	Ongoing
Small lakes monitoring	Volunteers monitor 51 small lakes in King County	Precipitation, lake level, temperature, Secchi depth, phosphorus, nitrogen, chlorophyll-a, phytoplankton	Single-point and vertical profiles	Rainfall & lake level: daily Temperature & Secchi depth: weekly Other parameters: every 2 weeks April to October	To characterize and identify trends in water quality	Ongoing

BMP = best management practices; BOD = biochemical oxygen demand; DNR = Washington State Department of Natural Resources; DO = dissolved oxygen; Ecology = Washington State Department of Ecology; HPA = Hydraulic Permit Approval; SAP = sampling and analysis plan; TMDL = total maximum daily load; TOC = total organic carbon; TSS = total suspended solids.

Table O-1. Summary of King County Water Quality Monitoring Programs

Program	Media and Locations	Parameters	Methods	Sampling Frequency	Program Purpose	Duration
Rivers and streams monitoring	Rivers and streams of both watersheds; emphasis on those that cross wastewater conveyance lines or that could be a source of pollution	Baseflow and storm samples: turbidity, TSS, pH, temperature, conductivity, DO, nutrients, ammonia, bacteria Storm samples: trace metals Sediment quality at selected stations	Various	Monthly sampling under baseflow conditions; three to six times per year at mouth of streams under storm conditions	To monitor the integrity of the wastewater conveyance system and the condition of streams and rivers	Ongoing
Swimming beach monitoring	Cedar-Sammamish Watershed: Lake Washington, Lake Sammamish, and Green Lake	Bacteria	Water samples at swimming beaches	Summer	To evaluate human health risks and necessity for beach closures	Ongoing
Benthic macroinvertebrate monitoring	Wade-able stream sub-basins	Size and distribution of aquatic macroinvertebrate populations	Samples collected with a Surber stream bottom sampler	Annually	To establish a baseline for identifying long-term trends	Ongoing
<b>Wastewater Treatment Plant Outfall Monitoring</b>						
Marine wastewater plant outfall water column and beach monitoring	Puget Sound water column at treatment plant outfalls; water and shellfish at beaches near outfalls	Water samples: temperature, salinity, clarity, DO, nutrients, chlorophyll, and bacteria Shellfish: lipids and metals	Water samples at outfalls collected at multiple depths, ranging from 1 to 200 m Shellfish	Water samples: monthly Shellfish: annually	To assess potential effects to water quality from wastewater discharges	Ongoing
Marine NPDES sediment monitoring	Sediments in Puget Sound near treatment plant outfalls and the Denny Way CSO	Grain size, solids, sulfides, ammonia-nitrogen, oil & grease, TOC, metals, organic compounds, and (at South and West Point plants) benthic infauna	Sediment samples in a grid pattern as defined in the SAP approved by Ecology	Sediment samples at outfalls once per permit cycle (about every 5 years)	NPDES permit requirement	Ongoing

BMP = best management practices; BOD = biochemical oxygen demand; DNR = Washington State Department of Natural Resources; DO = dissolved oxygen; Ecology = Washington State Department of Ecology; HPA = Hydraulic Permit Approval; SAP = sampling and analysis plan; TMDL = total maximum daily load; TOC = total organic carbon; TSS = total suspended solids.

Table O-1. Summary of King County Water Quality Monitoring Programs

Program	Media and Locations	Parameters	Methods	Sampling Frequency	Program Purpose	Duration
<b>Special Studies</b>						
Sammamish-Washington Analysis and Modeling Project (SWAMP)	Water and sediments in major lakes and their inflowing streams	Broad spectrum of water quantity and quality, sediment quality, biological, and physical parameters	Various	1999–2003	To develop a computer model of the watershed	Completed in 2006
Ecological and Human Health Risk Assessment	Water bodies in Cedar-Sammamish watershed	Existing water, sediment, and tissue data	Various, using a tiered approach	Using existing data from other sampling efforts	To assess sampling program adequacy based on potential for chemicals to pose risks to aquatic life, wildlife, or human health	Completed in 2006
Green-Duwamish Water Quality Assessment (G-DWQA)	Water in Green and Duwamish Rivers and their inflowing rivers and streams	Broad spectrum of water quantity and quality, biological, and physical parameters	Various	Intensive	To develop models, evaluate BMPs, prepare risk assessments	Completed in 2006
Storm Impact Water Quality Monitoring	Water in Green and Duwamish Rivers and their inflowing rivers and streams under storm flow conditions	Broad spectrum of water quantity and quality, sediment quality, biological, and physical parameters	Various	Intensive	To evaluate conditions and to support modeling and WRIA planning	Completed in 2003; report issued in 2004
Loadings Calculations	Water in Green and Duwamish Rivers and their inflowing rivers and streams	Broad spectrum of water quantity and quality, sediment quality, biological, and physical parameters	Estimates based on water quality data and on literature reviews for land use classifications		To estimate chemical loading to surface waters	Completed in 2006

BMP = best management practices; BOD = biochemical oxygen demand; DNR = Washington State Department of Natural Resources; DO = dissolved oxygen; Ecology = Washington State Department of Ecology; HPA = Hydraulic Permit Approval; SAP = sampling and analysis plan; TMDL = total maximum daily load; TOC = total organic carbon; TSS = total suspended solids.

Table O–1. Summary of King County Water Quality Monitoring Programs

Program	Media and Locations	Parameters	Methods	Sampling Frequency	Program Purpose	Duration
Temperature and DO Studies	Water in Green and Duwamish Rivers and their inflowing rivers and streams	Daily fluctuations in temperature and DO, especially in the summer	Continuously recording data loggers	Intensive	To evaluate conditions and to support modeling and WRIA planning	Completed in 2003; temperature report issued in 2004; DO report completed in 2006
Microbial Source-Tracking Study	Green River and its tributaries	Land uses and bacterial sources associated with bacterial populations		Intensive	To assist in setting and measuring TMDLs	Completed in 2004; report completed in 2006
Brightwater Outfall Studies	Water, sediment, and eelgrass for the Brightwater outfall site  Upland soils at outfall Portal 19	Water quality: temperature, salinity, DO, nutrients, and fluorescence  Sediments: benthic community and chemistry	Water column samples and continuous buoy readings  Surface sediments  Eelgrass survey	Annual	Regulatory—to meet HPA and DNR outfall lease requirements	Through 2014
Brightwater Construction NPDES Stormwater Monitoring	Stormwater and surface water	Stormwater quality	Various	Intensive	To meet NPDES Construction Stormwater permit	Through 2010
Denny Way/Lake Union pre-remediation sediment monitoring	Sediment near the Denny Way and Lake Union CSOs	Benthic communities, sediment chemistry	Sediment samples per approved SAP	Variable	Regulatory—under a NOAA Fisheries Section 7 ESA consultation	Through 2021
Diagonal/Duwamish post-remediation sediment monitoring	Sediments near the Seattle Diagonal storm drain (includes city and county CSO) and the county's Duwamish CSO	Sediment chemistry, turbidity, cap surveys	Sediment samples per approved SAP	Annual	Regulatory—under an EPA/Ecology Consent Order	Through 2013

BMP = best management practices; BOD = biochemical oxygen demand; DNR = Washington State Department of Natural Resources; DO = dissolved oxygen; Ecology = Washington State Department of Ecology; HPA = Hydraulic Permit Approval; SAP = sampling and analysis plan; TMDL = total maximum daily load; TOC = total organic carbon; TSS = total suspended solids.

## Marine Waters

This section describes the results of marine monitoring activities in 2006. The discussion includes fecal coliform bacteria levels and overall water quality rankings (water quality index). It also includes a discussion of additional sediment sampling and analysis conducted at the West Point Treatment Plant outfall in support of NPDES permit requirements.

### Monitoring Locations

Figures O–1 and O–2 show ambient and outfall monitoring locations in Puget Sound. Ambient sites are chosen to reflect general environmental conditions. Outfall monitoring sites are located at King County wastewater treatment plant and CSO outfalls. Both offshore and nearshore (beach) areas are monitored.

### Fecal Coliform Bacteria

#### Offshore Ambient and Outfall Locations

Levels of fecal coliform bacteria at offshore Puget Sound locations are measured to gauge the risk posed to human health from recreational uses of these waters. For marine surface waters, the current fecal coliform standards are a geometric mean standard of 14 colony forming units (cfu)/100 mL and a peak standard of no more than 10 percent of the samples used to calculate the geometric mean to exceed 43 cfu/100 mL. All 15 ambient and outfall sites met the fecal coliform standards in 2006, with the exception of one ambient site along the Seattle waterfront. Bacteria levels tend to be higher in Elliott Bay than at other sites because of freshwater input from the Duwamish River and stormwater outfalls. The two sites in Elliott Bay that are offshore of the waterfront met the standards, while the site just offshore of the seawall, which receives greater freshwater input, failed both the geometric mean and peak standards.

#### Nearshore (Beach) Ambient and Outfall Locations

Fecal coliform bacteria levels in Puget Sound beach locations are measured to assess the health effects from direct contact with marine waters during activities such as swimming, wading, SCUBA diving, and surfing.

In 2006, 15 Puget Sound beach sites were monitored monthly for fecal coliform bacteria. The results show that 8 of the 15 sites met both the geometric mean and peak standards, 5 sites met the geometric mean standard but not the peak standard, and 2 sites met neither standard (Figure O–3). The greatest determination of compliance with bacteria standards tends to be proximity to a freshwater source. The two sites that failed both standards in 2006 are near freshwater sources: a storm drain in the south Alki area and the mouth of the Lake Washington Ship Canal. These sites also failed these standards in the previous few years. All beaches in the vicinity of an outfall met fecal coliform standards in 2006. The percentage of Puget Sound beach sites meeting fecal coliform standards in 2006 has almost doubled since 1998. Fluctuations in water quality over time are most likely caused by annual variability in amount and intensity of rainfall. For example, 1996 through 1999 were substantially wetter than average years and may have caused the higher fecal coliform levels in 1998 and 1999.



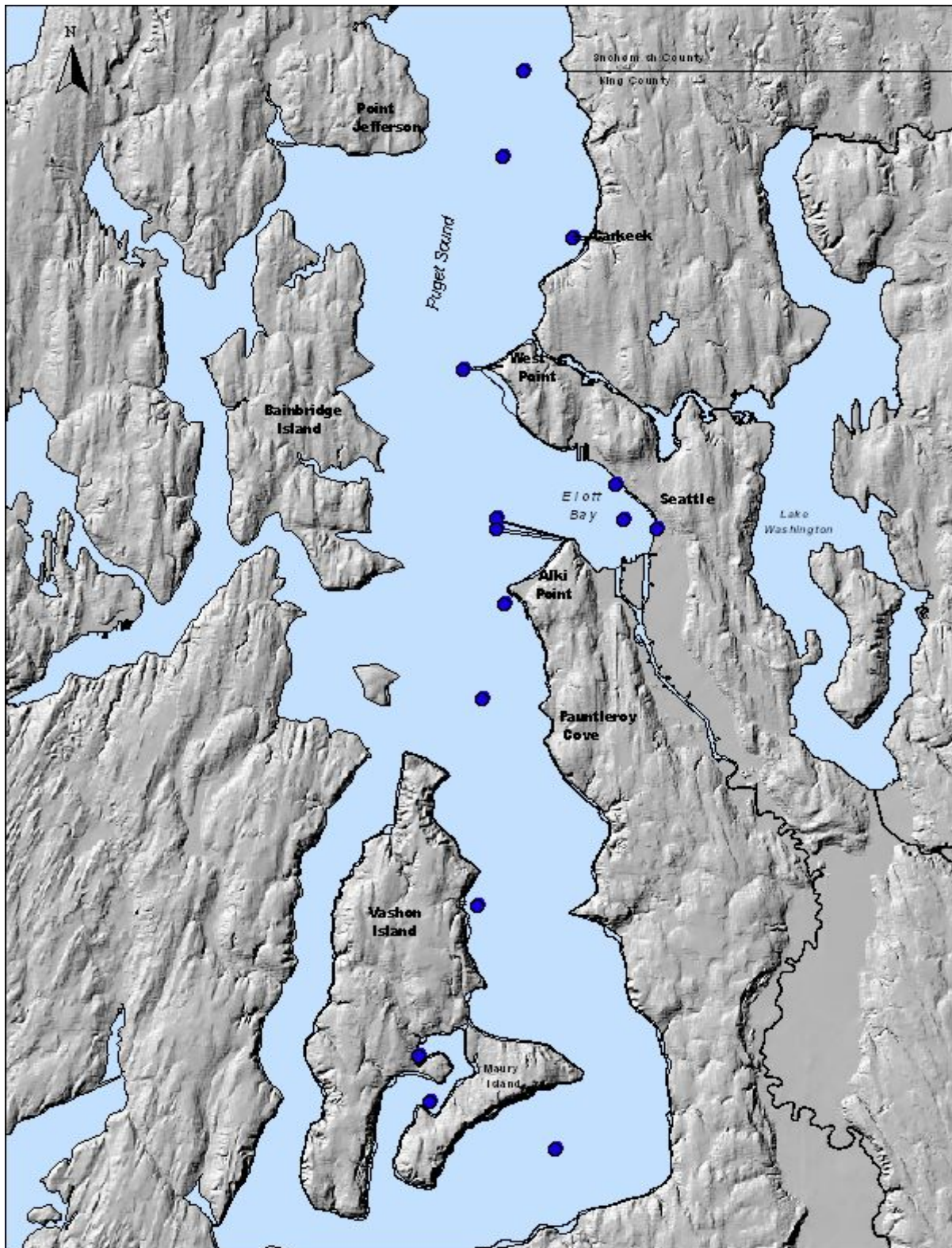


Figure O-1. Offshore Ambient and Outfall Monitoring Locations in Puget Sound



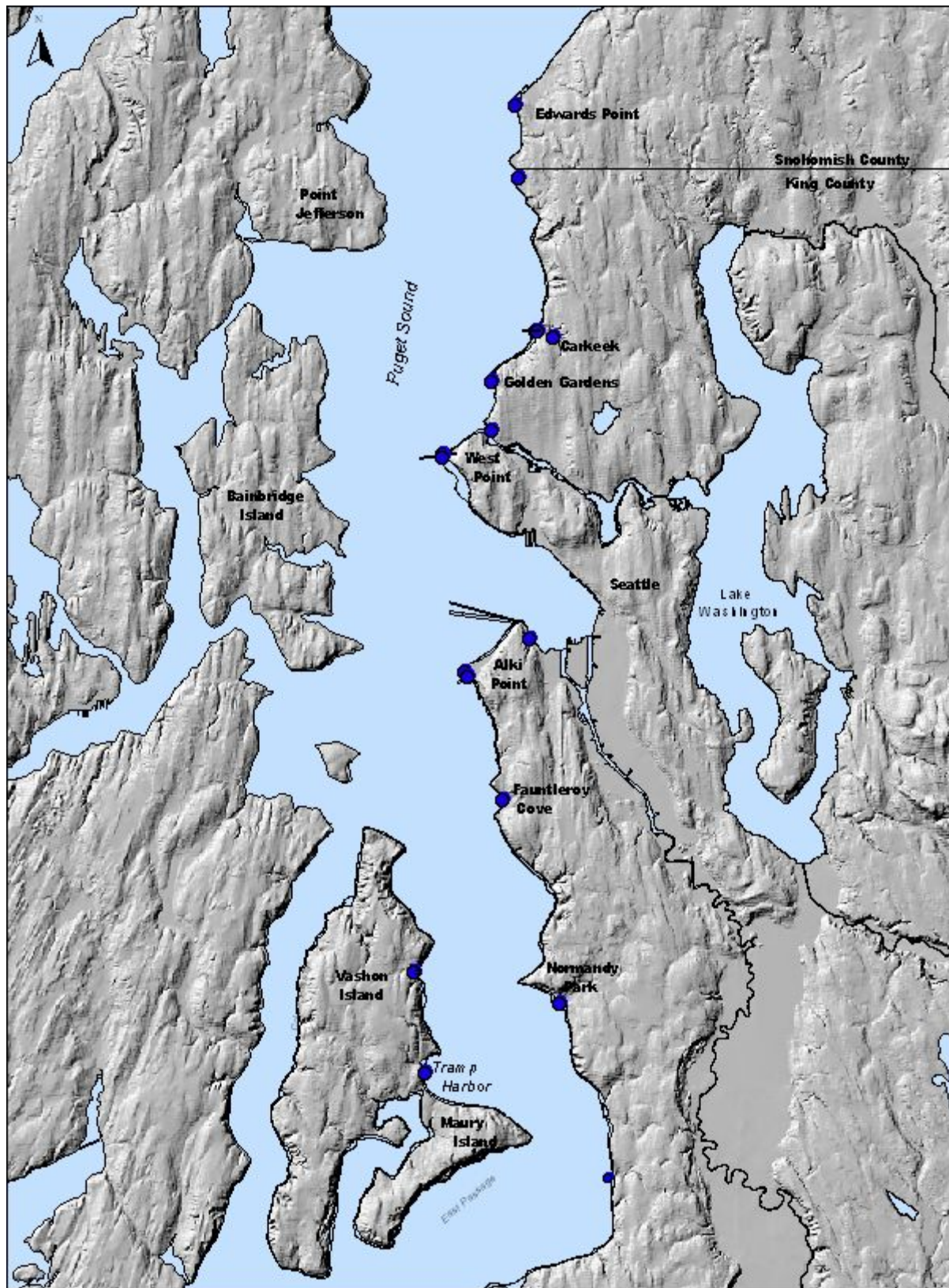


Figure O-2. Nearshore (Beach) Ambient and Outfall Monitoring Locations in Puget Sound



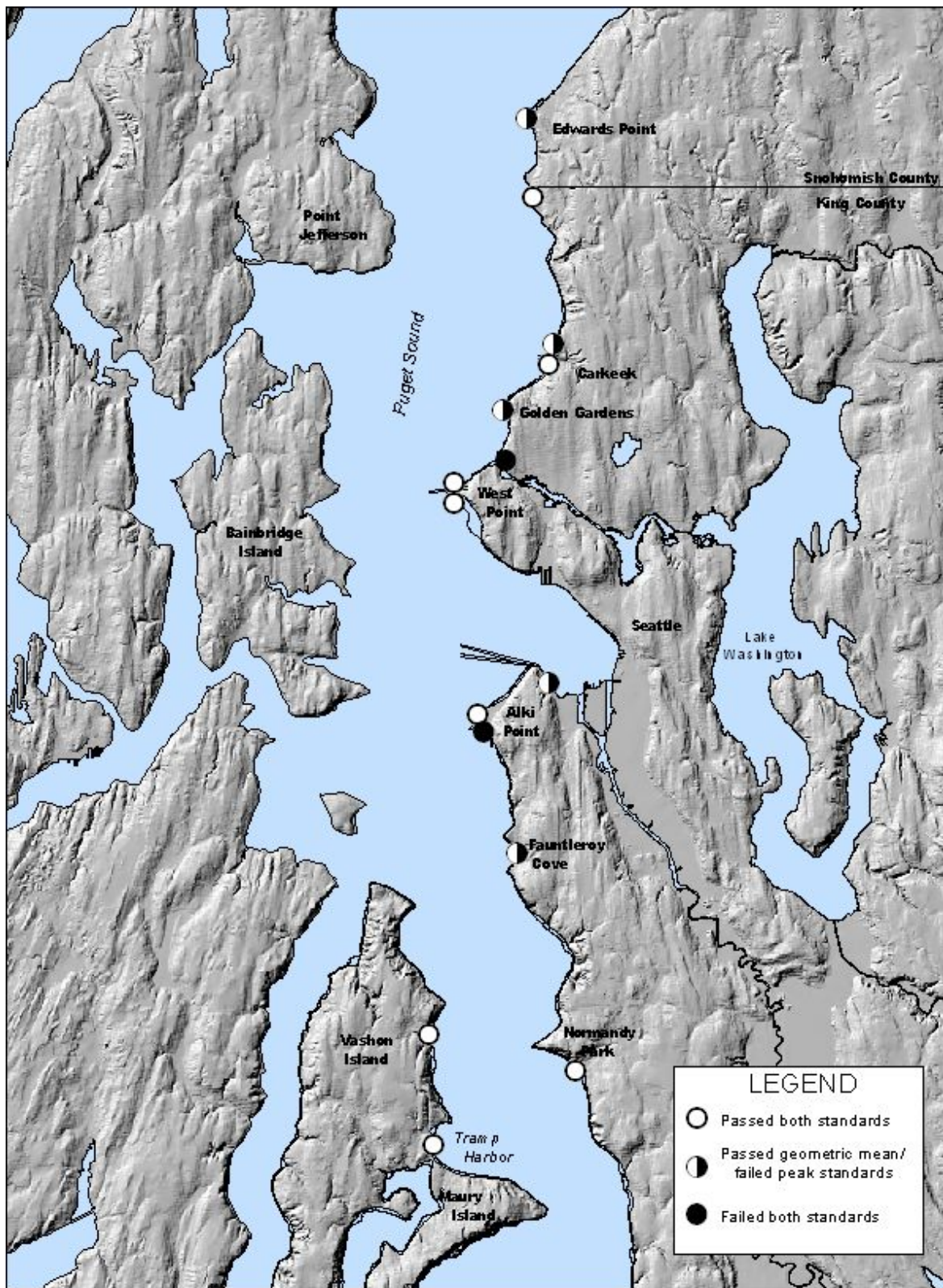
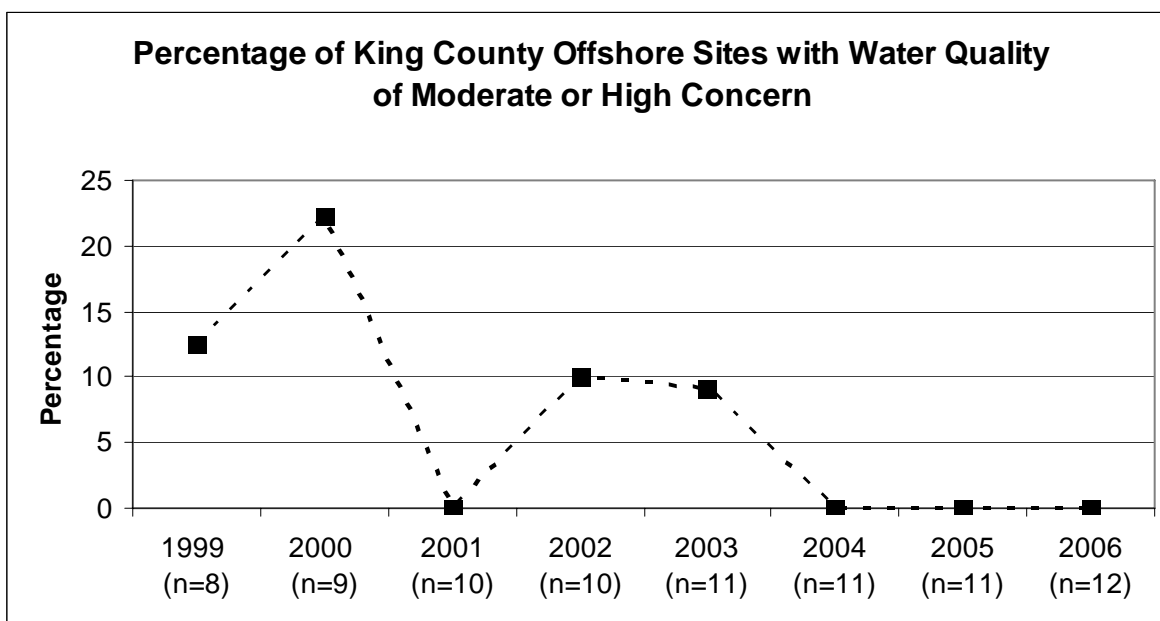


Figure O-3. Pass-Fail Status of Puget Sound Beach Monitoring Sites for Fecal Coliform Bacteria Standards, 2006

## Overall Quality—Marine Offshore Water Quality Index

King County uses a modified version of the water quality index developed by the Washington State Department of Ecology to assess overall quality of offshore marine water. The determination is based on four indicators: dissolved oxygen (DO), dissolved inorganic nitrogen (DIN), ammonia, and stratification strength and persistence. Each location is categorized as low, moderate, or high concern.

The 2006 findings indicate that the water quality at all of the ambient and outfall offshore stations is at a level of low concern. Although five stations located throughout the Central Basin experienced strong-intermittent stratification, low DO levels were not observed. No stations experienced persistent stratification in 2006.<sup>2</sup> Figure O-4 shows the percentage of the 12 offshore stations categorized as moderate or high concern between 1999 through 2006. The percentage of stations of moderate or high concern reached a maximum in 2000 (22 percent) and has declined to zero percent for the past three years.



**Figure O-4. Percentage of King County Offshore Stations with Moderate or High Concern Rankings Based on Water Quality Index, 1999–2006**

## Sediment Quality near West Point Outfall

In 2006, King County collected sediment samples in the vicinity of the West Point Treatment Plant marine outfall to meet NPDES permit requirements. Nineteen surface sediment samples were collected in September 2006 for analysis of chemical parameters including sediment

<sup>2</sup> Areas where persistent stratification occurs may be susceptible to nutrient loading and low DO problems.

conventionals, metals, and trace organics. A subset of these samples were submitted for toxicity testing and benthic community analysis. All analyses have been completed and the data are currently being evaluated and prepared for reporting.

## Major Lakes

This section describes the results of fecal coliform bacteria sampling in ambient and swimming beach locations in the major lakes in King County. It also describes overall water quality in these lakes based on calculation of their Trophic State Index.

### Monitoring Locations

Figure O-5 shows the 25 ambient sampling locations in Lakes Washington, Sammamish, and Union and in the Ship Canal. Figure O-6 shows the 21 swimming beach sampling locations in Lake Washington, Lake Sammamish, and Green Lake.



Figure O-5. Ambient Monitoring Locations in Lakes Washington, Sammamish, and Union (including the Ship Canal)



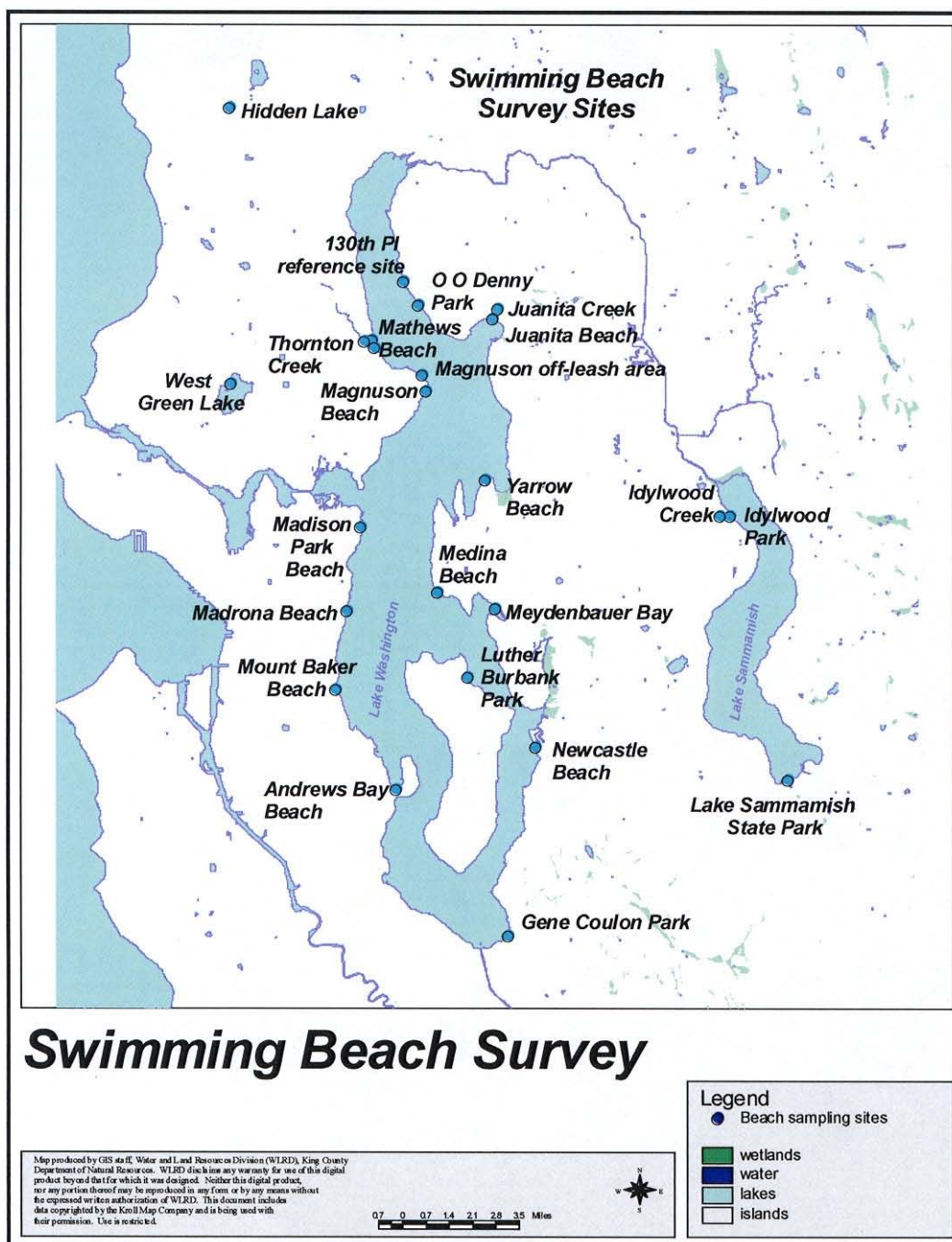


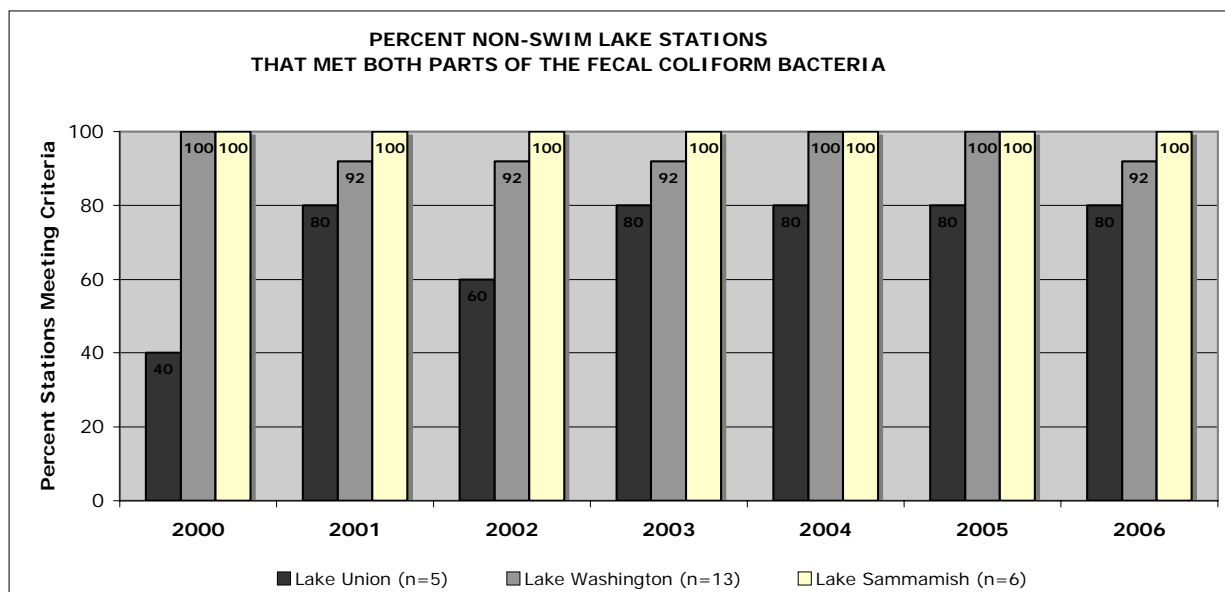
Figure O-6. Swimming Beach Monitoring Locations in Lake Washington, Lake Sammamish, and Green Lake

## Fecal Coliform Bacteria—Ambient Mid-Lake (Open-Water) and Nearshore

The lake standard for fecal coliform bacteria addresses human health risk resulting from direct contact with the water during activities such as swimming and wading. The standard is a geometric mean value of less than 50 colonies/100 mL with no more than 10 percent of all samples obtained for calculating the geometric mean value exceeding 100 colonies/100 mL (WAC 173-201A). Sites used for this indicator are located in both mid-lake (open water) and nearshore locations. The indicator is based on data from routine monitoring at these sites and does not include sampling done in conjunction with emergency overflow events.

Even though this measure uses a standard that is exceptionally difficult to attain, 100 percent of the Lake Sammamish stations, 92 percent of the Lake Washington stations, and 80 percent of the Lake Union stations achieved this standard in 2006 (Figure O–7). Lake Washington showed a decrease of 8 percent from 2005 because of higher bacteria at one station (4903).

In 2006, roughly half of the samples that had higher fecal coliform levels were the result of unusual storm conditions with the highest bacteria concentrations collected in November directly after record-breaking rainfalls hit the region. Lower percentages in Lake Union are due to the influence of CSO and stormwater outfalls into the lake.



**Figure O–7. Percentage of Ambient Stations in Lakes Washington, Sammamish, and Union that Met the Fecal Coliform Bacteria Standard, 2000–2006**

## Fecal Coliform Bacteria—Swimming Beaches

King County’s standard for acceptable fecal coliform bacteria levels in swimming beaches is less than 200 colonies/100 mL in any sample. Public Health–Seattle & King County and the Washington State Department of Health currently use this standard, which is called the Ten State Standard.

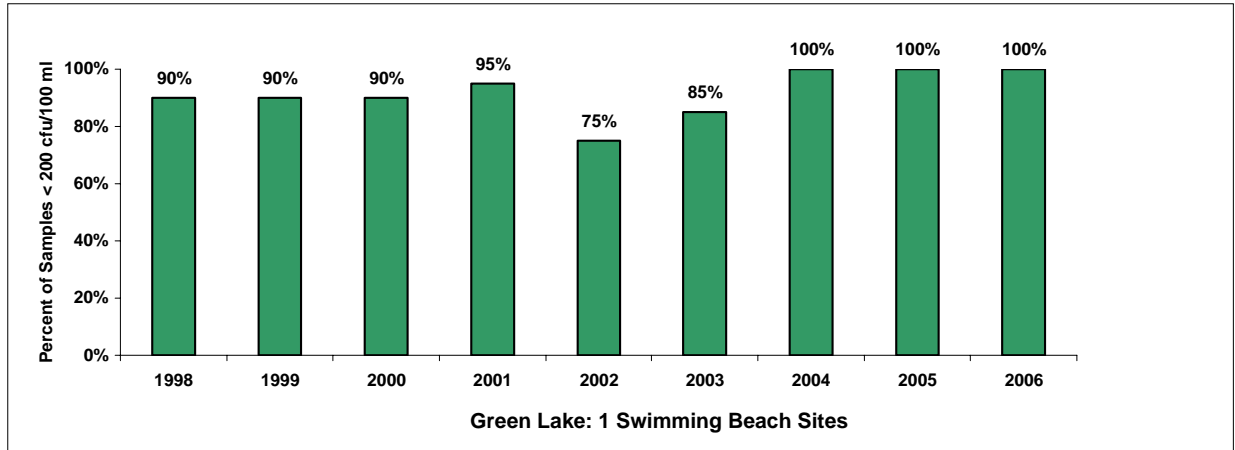
Bacterial counts for all beaches monitored in all three lakes were within acceptable ranges and did not warrant swimming beach closures. All samples collected at Green Lake met the fecal coliform standard for the third year in a row (Figure O–8). Between 1998 and 2006, levels at swimming beaches in Lakes Sammamish and Washington remained fairly consistent, with slight variability from year to year (Figures O–9 and O–10). In Lake Sammamish, 89 percent of the samples collected in 2006 met the standard, down slightly from 2005 (90 percent). In Lake Washington, 88 percent of the samples met the standard, the same percentage as in 2005.

## **Overall Quality in Major Lakes—Trophic State Index**

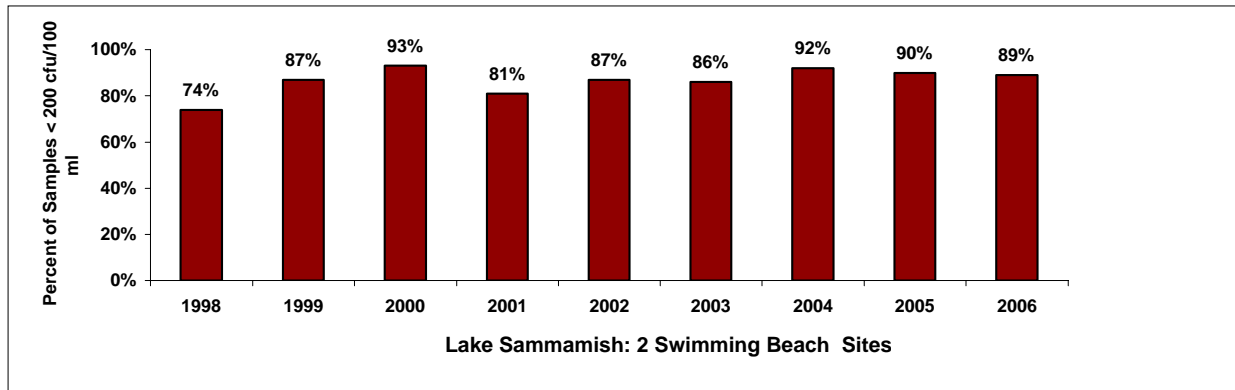
Overall water quality in Lakes Washington, Sammamish, and Union is determined by measuring the summer total phosphorus concentrations and converting them to the Trophic State Index (TSI-TP). The Trophic State Index relates phosphorus to the amount of algae that the lake can support. The potential for nuisance algal blooms is considered low if the TSI-TP is less than 40, moderate if less than 50, and high if greater than 50. High algae productivity often relates to poor water quality. Although such high productivity may not reduce beneficial uses in all cases, depending on the natural condition of the lake, a trend toward increased TSI-TP could indicate changes in the watershed.

Water quality in these lakes varies annually, depending on watershed inputs, weather, and biological interactions. The 1994–2006 results for these three lakes show the values fluctuating across the low-to-moderate threshold, indicating that the water quality varies from good to moderate (Figure O–11). In the past eight years, Lake Union typically has fallen in the moderate range, Lake Washington in the low range, and Lake Sammamish in both ranges.

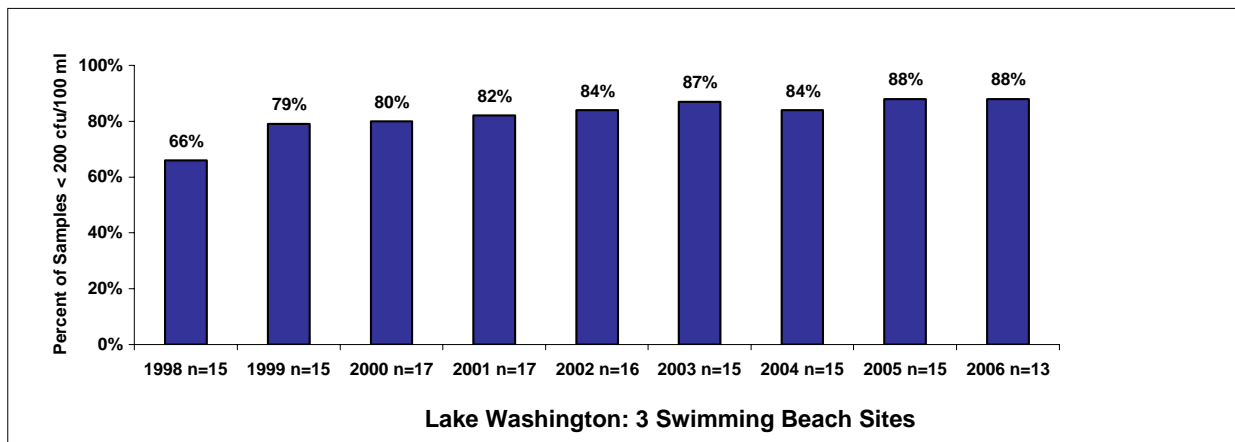




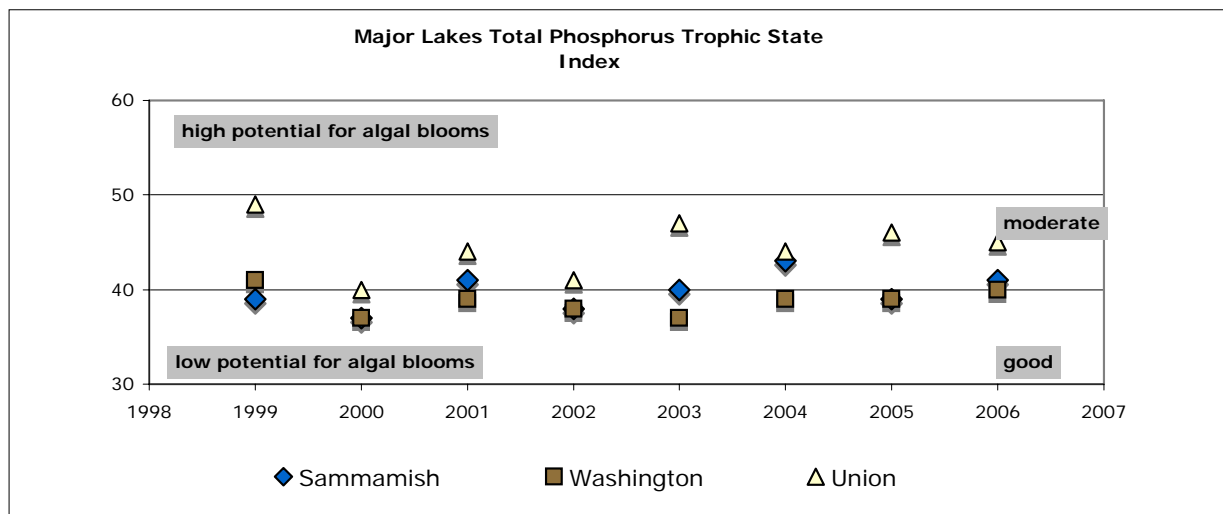
**Figure O–8. Percentage of Samples that Met the Fecal Coliform Bacteria Standard at Green Lake Swimming Beaches, 1998–2006**



**Figure O–9. Percentage of Samples that Met the Fecal Coliform Bacteria Standard at Lake Sammamish Swimming Beaches, 1998–2006**



**Figure O–10. Percentage of Samples that Met the Fecal Coliform Bacteria Standard at Lake Washington Swimming Beaches, 1998–2006**



**Figure O–11. Overall Water Quality in Lakes Washington, Sammamish, and Union Based on Trophic State Index, 1999–2006**

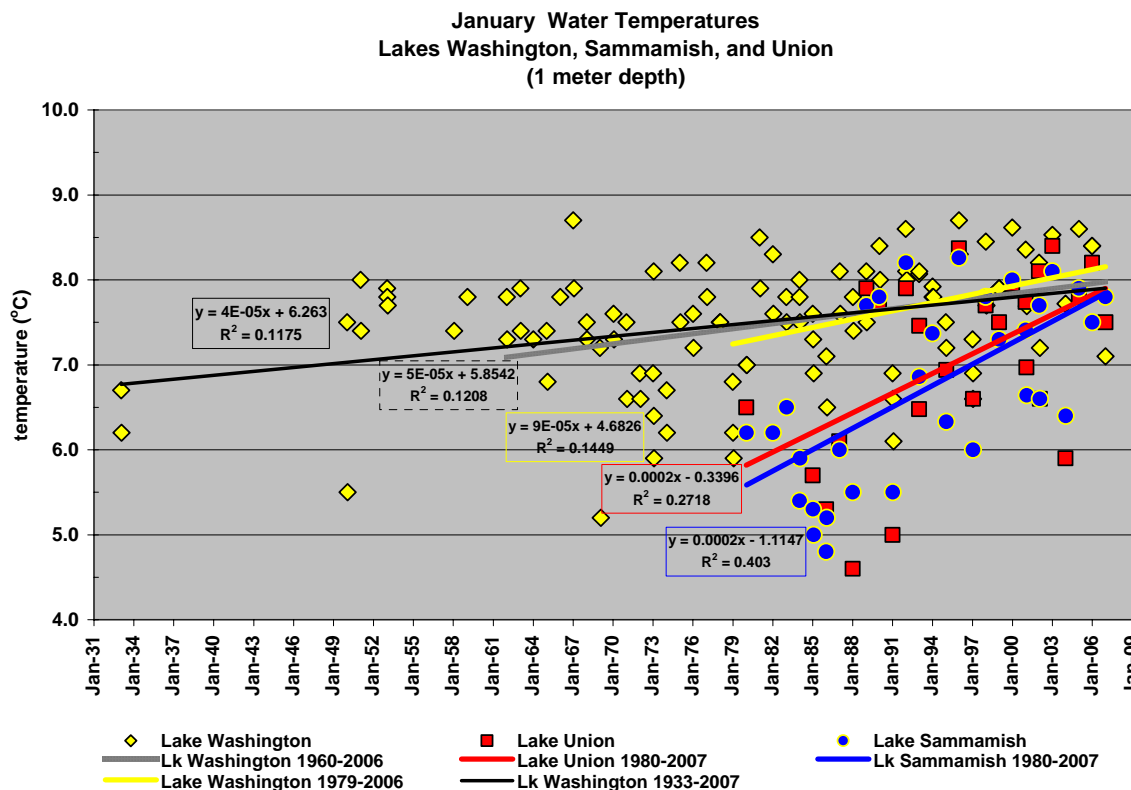
## Water Temperature—Effects of Climate Change

Global climate change is having an impact on our local weather patterns and subsequently on county aquatic resources. On average, ambient air temperatures in the Pacific Northwest have increased over the twentieth century by roughly 1.5°F.<sup>3</sup> Air temperatures in the region are expected to continue to increase by another 2 to 9°F over the next 80 years.

Warmer temperatures have reduced the snow pack levels in Washington and, thus, the timing and quantity of flows in regional rivers and streams. Higher air temperatures and changes in wind patterns also increase lake temperatures through surface heat exchange processes. January water temperatures are taken at a 1-meter depth from the mid-lake monitoring stations in Lakes Washington, Sammamish, and Union (Figure O–12). Because the lakes are well mixed during January, temperatures at the surface reflect the temperatures throughout the water column.

The University of Washington has measured temperatures in Lake Washington since 1960. King County (then Metro) began monitoring temperatures in Lakes Washington, Sammamish, and Union in 1979. Additional Lake Washington data were collected in 1913 and 1933. Lake temperatures vary annually, depending on seasonal weather conditions (wind, precipitation, cloudiness, ambient air temperatures). Overall, winter water temperatures have increased about 0.25°C (0.45°F) per decade since 1960 in Lake Washington and about 1°C (1.8°F) per decade since 1979 in Lakes Sammamish and Union. The smaller increase in Lake Washington is likely due to its larger volume, which is roughly 8 times greater than Lake Sammamish and 118 times greater than Lake Union.

<sup>3</sup> <http://www.cses.washington.edu/cig/pnwc/pnwc.shtml>



**Figure O-12. January Water Temperatures in Lakes Washington, Sammamish, and Union, 1933-2007**

## Rivers and Streams

This section describes the quality of water in King County rivers and streams in terms of overall water quality (Water Quality Index) and normative streamflows.

### Monitoring Locations

Fifty-six sites in rivers and streams in Water Resource Inventory Areas (WRIAs) 8 and 9 (Cedar-Sammamish and Duwamish-Green watersheds) have been sampled monthly, some for over 30 years, for numerous water quality parameters, including those used to determine the Water Quality Index (Figure O-13).

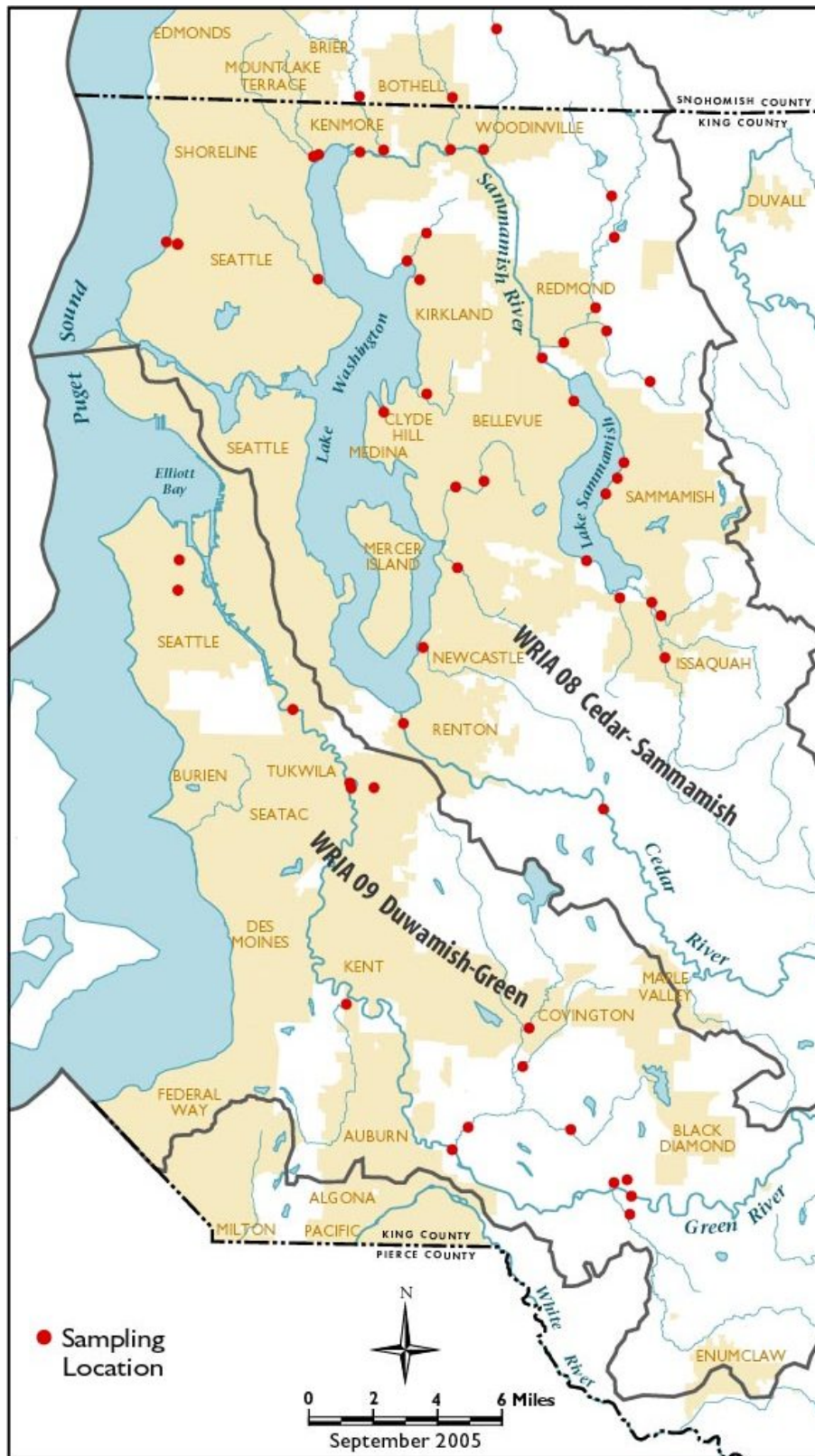


Figure O-13. River and Stream Monitoring Locations

## Overall Quality—Water Quality Index

The Water Quality Index (WQI) for rivers and streams attempts to integrate a series of key water quality indicators into a single number that can be used for comparison over time and among locations. The WQI is based on a version proposed by the Washington State Department of Ecology and originally derived from the Oregon Water Quality Index. The WQI is a number ranging from 10 to 100—the higher the number, the better the water quality. For temperature, pH, fecal coliform bacteria, and dissolved oxygen (DO), the index expresses results relative to state standards required to maintain beneficial uses. For nutrient and sediment measures, where the state standards are not specific, results are expressed relative to expected conditions in a given eco-region. Multiple constituents are combined, results are aggregated over time to produce a single score, and a rating of low, moderate, or high concern is assigned for each sampling station.

Given a population of almost two million residents and the intense urbanization of the area, overall stream water quality in King County is fairly good. Water quality at 35 of the 56 sampled sites (63 percent) during the 2005–2006 water year were considered good to moderate water quality, with either low concern or moderate concern ratings, while 21 sites (37 percent) were rated high concern because of serious water quality concerns (Figure O–14).

In WRIA 9, four of the sixteen sites were rated of low concern, ten sites were of moderate concern, and two sites were of high concern (Figure O–15). Of the forty sites in the WRIA 8, one site rated of low concern, nineteen sites were of moderate concern, and twenty were of high concern (Figure O–16). Overall, high-concern ratings at all high-concern sites were, at least in part, a result of excessive nutrients (nitrogen and/or phosphorus). In addition, high bacteria levels at four sites and low DO concentrations at six sites contributed to the overall high-concern ratings. None of the high-concern sites were the result of high temperatures.

While cumulative rainfall in 2006 was average compared to historical values, the summer (mid-June to mid-Sept) was the second driest on record. This dry summer was followed by record-breaking precipitation in November and severe windstorms in December. Flooding and high stormwater flows contribute to poor water quality in a variety of ways.

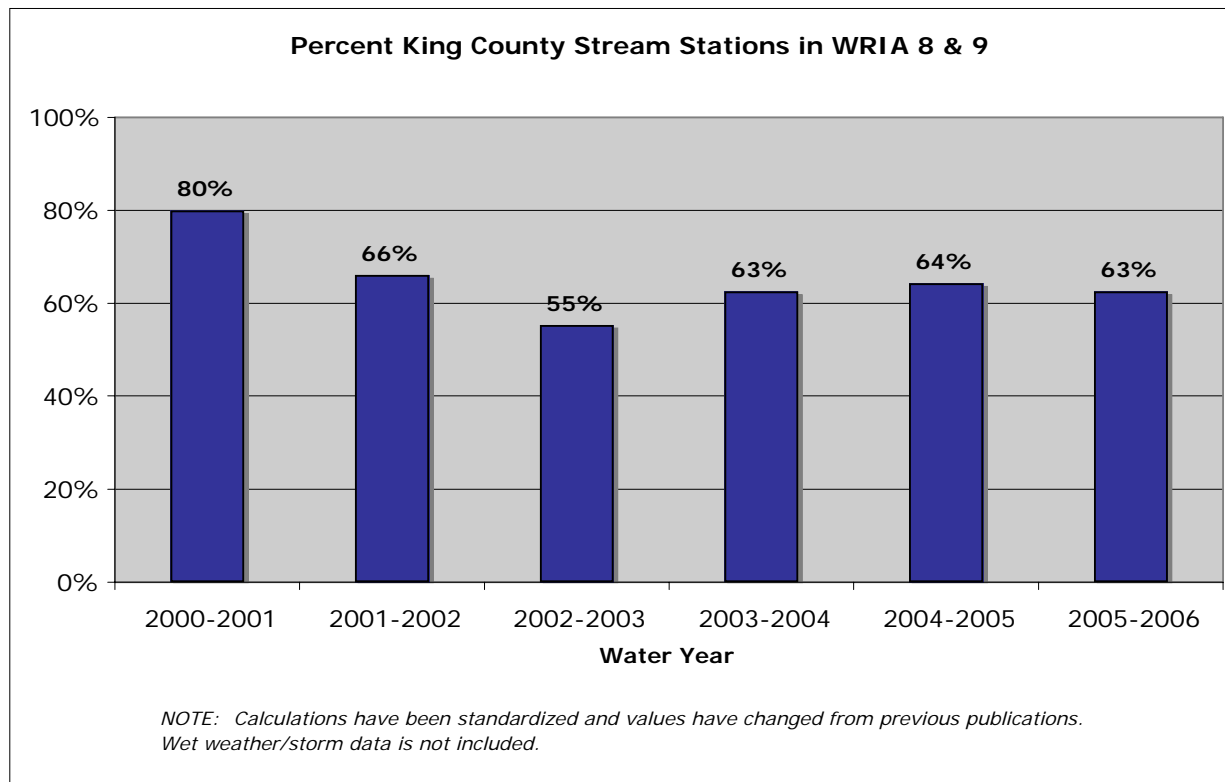
Fecal coliform bacteria enters the aquatic environment from household or farm animals, wildlife, stormwater runoff, untreated wastewater effluent, wastewater overflows, and failing septic systems. Poor livestock management practices and failing septic systems can be a potential source of bacteria in agricultural and in suburban areas. Wildlife and stagnant water conditions in wetlands can lead to elevated bacteria counts. Elevated phosphorus concentrations are often linked to similar sources as bacteria because high phosphorus concentrations are found in fecal material. Elevated phosphorus concentrations are also linked to areas undergoing development.

Low DO concentrations can be associated with low flows, high temperatures (colder water holds more oxygen), and high levels of organic matter (bacteria use up oxygen in the process of decomposition).

## Normative Streamflows

In urban areas, streams respond more quickly to rainfall, with higher peak flows rising and falling more rapidly, than under forested conditions. Because less rainfall is being absorbed by vegetation and soil, more surface runoff occurs. Higher, more rapid, and frequent pulses of runoff (“flashiness”) lead to flooding and channel erosion. From a biological perspective, streams with more frequent peak flows are disturbed more often. Organisms that survive in these conditions are those that have adapted to more frequent and severe disturbances.

Flows from 17 stream sites, including 4 sites monitored by the U.S. Geological Survey, were measured and their flashiness calculated during the 2006 water year (October 2005–September 2006) (Figure O–17). The “flashiness index” is based on the reciprocal of the fraction of days during the year that the flow rises above the annual mean daily flow ( $1/T_{Q_{mean}}$ ). The stream flashiness index was also calculated for previous years using historical data. The number of streams where data were available varies from one stream in 1941 to twenty-one streams in 2001. The median of the flashiness index scores across all streams measured in King County has increased between 1945 and 2006 (Figure O–18). These data suggest that increased urbanization in King County has resulted in faster surface runoff and peak streamflow rise and fall (increased flashiness) than previously occurred for at least some streams.



**Figure O–14. Percentage of Streams in WRIs 8 and 9 with Low or Moderate Concerns Based on Water Quality Index, 2000–2006**

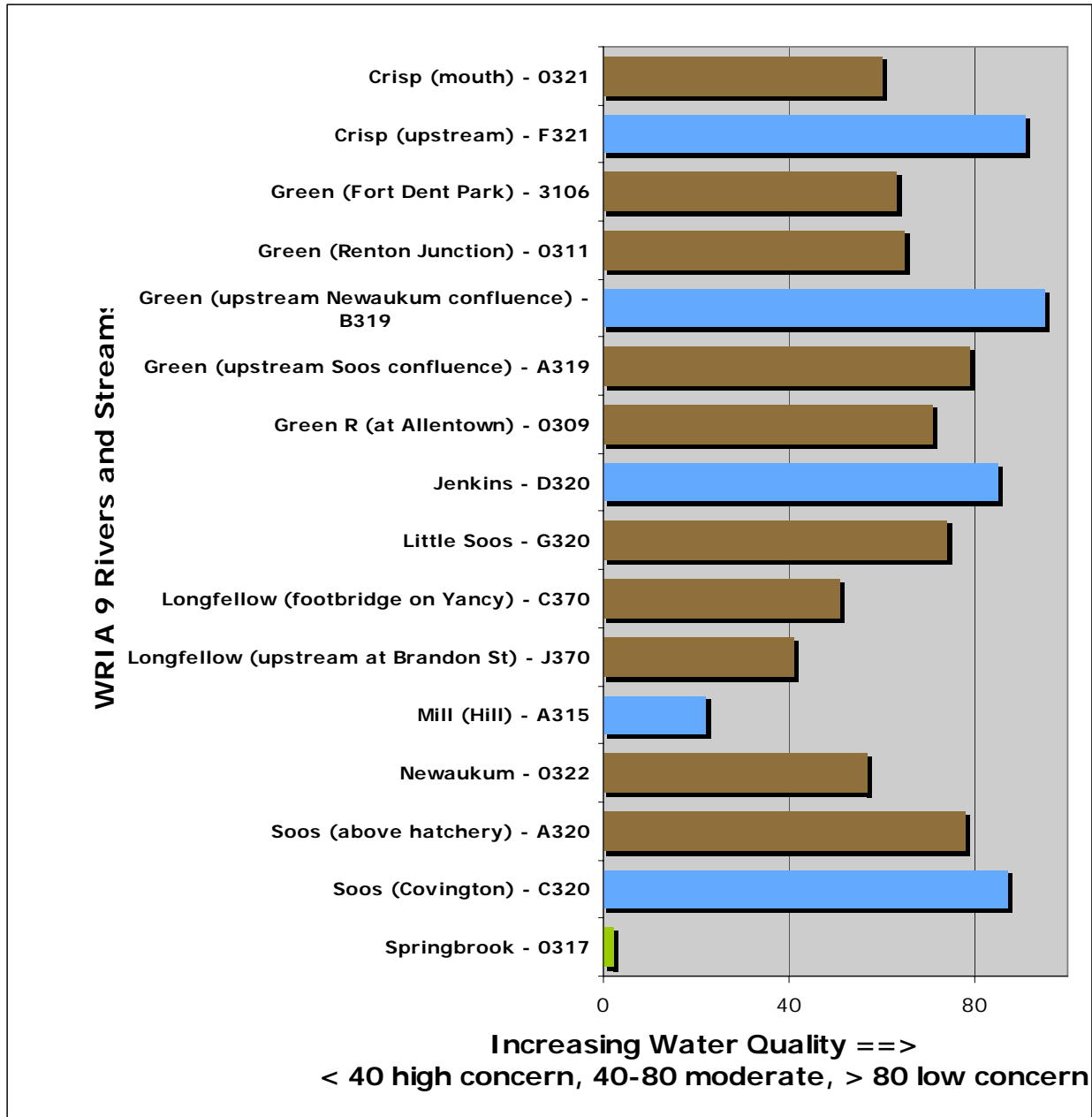


Figure O–15. Water Quality Index Rankings for Rivers and Streams in WRIA 9, 2005–2006

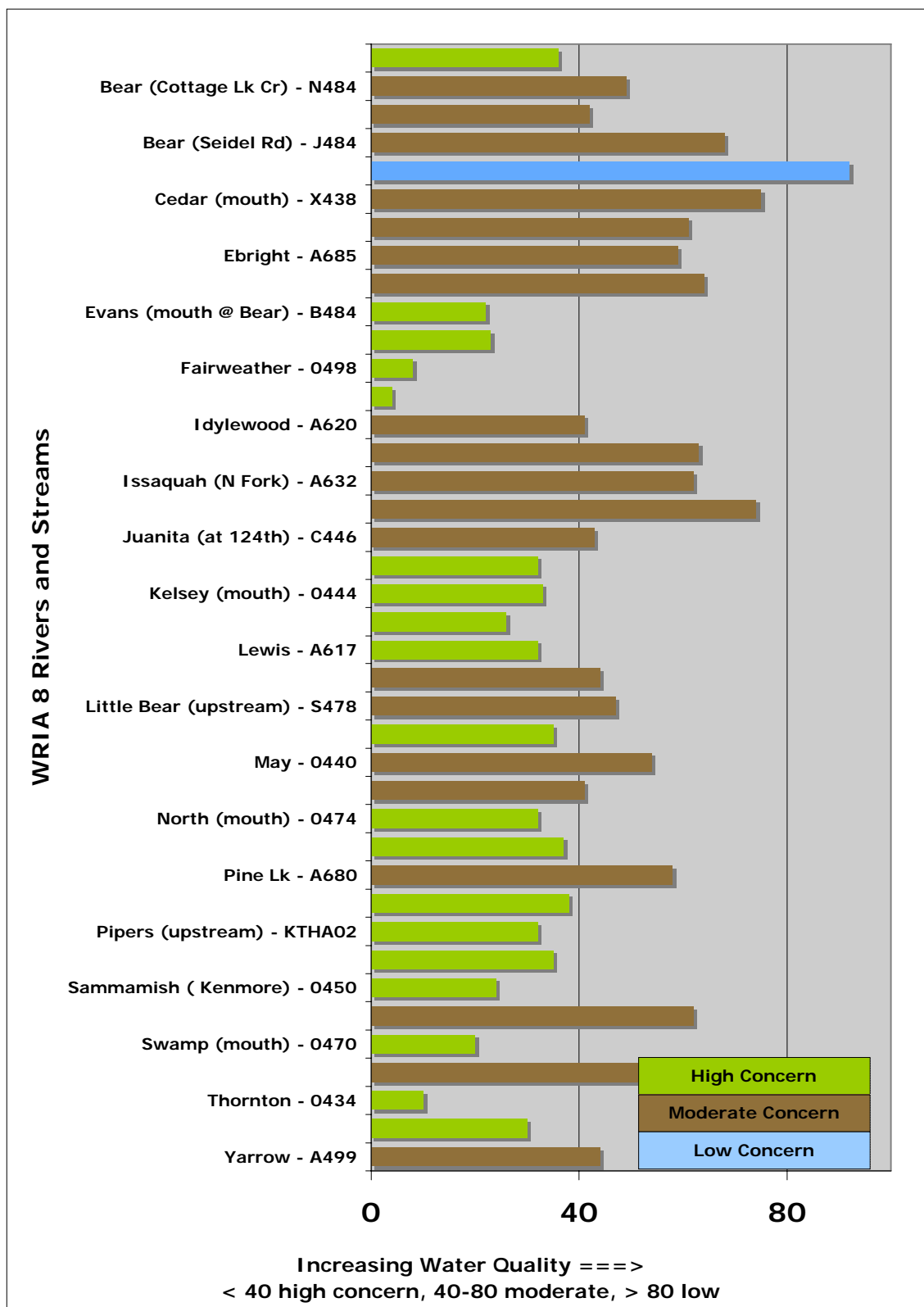
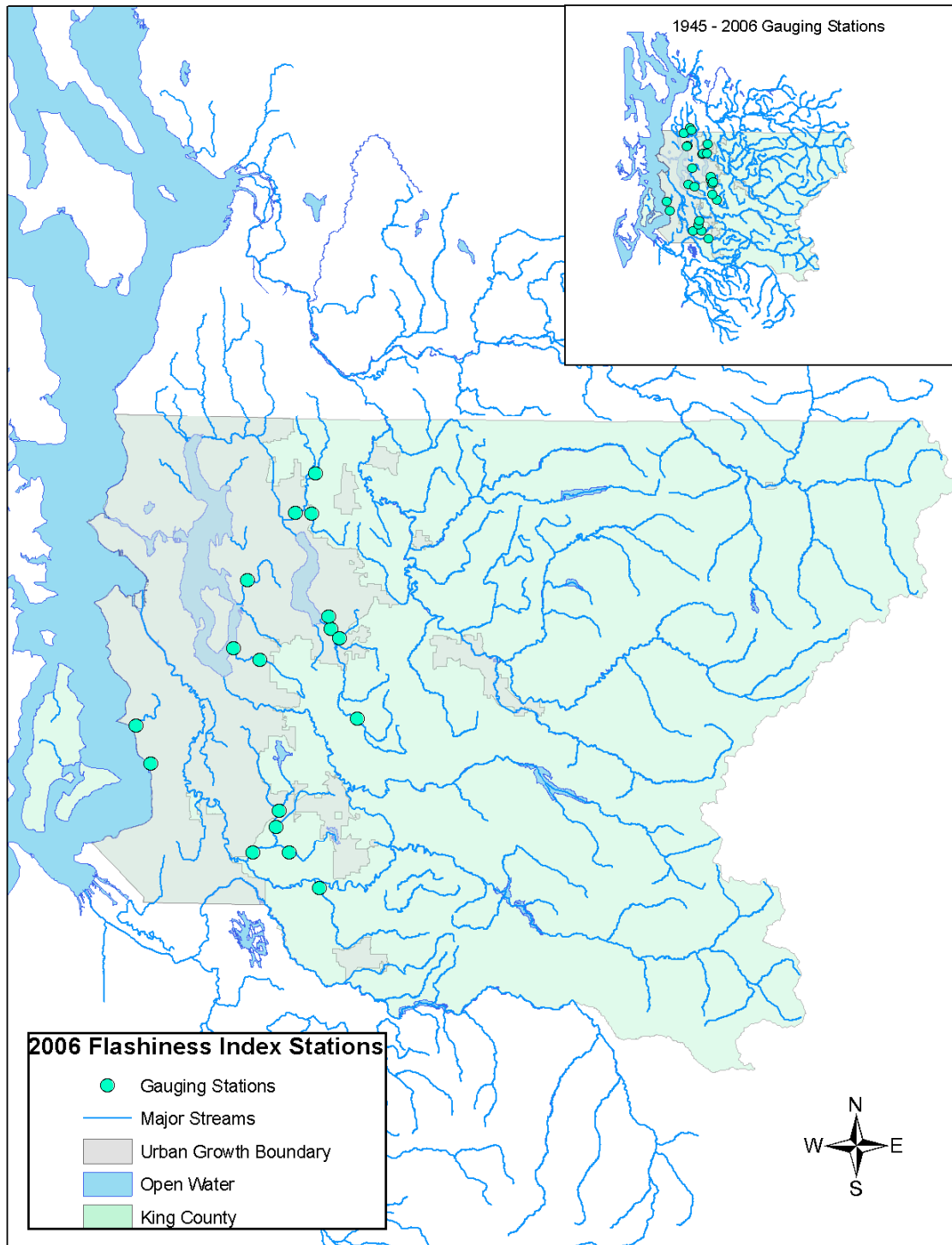
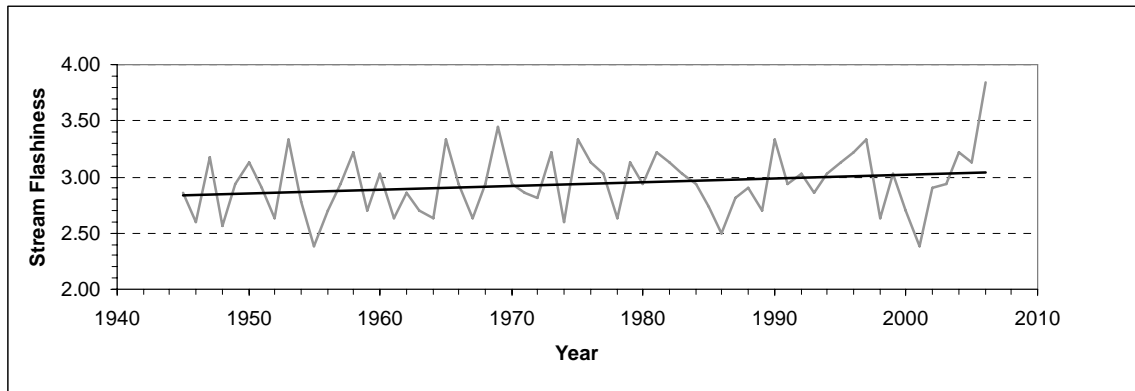


Figure O-16. Water Quality Index Rankings for Rivers and Streams in WRIA 8, 2005-2006





**Figure O–17. Hydrologic Monitoring Stations Used to Calculate the Stream Flashiness Index, 1945–2006**



**Figure O–18. Median Stream Flashiness Index per Year, 1945–2006**

Appendix P

## "Robinswood Agreement" Letter





Metropolitan King County Council  
***Regional Water Quality Committee***

November 16, 1998

The Honorable Ron Sims  
Room 400  
516 Third Avenue  
Seattle, WA 98104

Dear Executive Sims,

This letter is a follow-up to the Regional Water Quality Committee retreat you attended on October 29 at Robinswood House in Bellevue. As you recall, the purpose of the retreat was to discuss outstanding finance issues and come to an agreement on how to finance the Regional Wastewater Services Plan (RWSP). The financing policies for the RWSP provide the framework for establishing the funding mechanism necessary to implement the plan.

The Regional Water Quality Committee (RWQC), which includes representatives of King County, suburban cities, the City of Seattle, and sewer districts is considering a Regional Wastewater Services Plan to manage wastewater in the Puget Sound through the year 2030. The RWQC will soon make a recommendation to the full King County Council who will adopt the final RWSP.

The following guiding principles framed the discussion at the retreat:

1. The wastewater system is a regional system. As one participant said at the retreat, "All for one and one for all. from this day forward."
2. As a region, we are committed to protecting the water quality of our waterways, lakes, and Puget Sound.
3. The Regional Water Quality Committee shall provide periodic, substantive review of RWSP implementation.
4. The regional wastewater financing structure should reflect uniform regional rates for existing and new customers and achieve the principle of "growth pays for growth."

The principle of growth pays for growth is best implemented at this time through specific policies whereby existing customers pay for existing capacity and new customers pay for excess existing capacity and new capacity.

Listed below are the points of consensus developed at the retreat along with a brief explanation:

***Base Rate/Capacity Charge***

- Maintain a uniform monthly sewer rate for both existing and new customers such that, in general, existing customers pay for the existing system and new customers pay for growth
- Establish a uniform capacity charge within the service area to cover growth costs not captured by the monthly sewer rate for new customers
- Develop a strategy to increase and restructure the capacity charge and build a coalition for support in the State Legislature
- Maintain the current rate structure until the capacity charge is increased

A capacity charge will be levied against new connections, reconnections, ~~or~~ new services that meet the definition of new growth. This charge and the monthly service rates paid by both existing and new customers is intended to ensure that system capacity built to serve new customers recovers the revenue necessary to pay for system expansion.

King County will achieve this objective by allocating wastewater system costs to new and existing customers. The revenue needed to recover costs allocated to existing customers will be used to establish the monthly rate for all customers. The revenue required to recover costs allocated to new customers not recovered by the monthly rates paid by new customers will become the capacity charge subject to the 15-year term per new connection.

Costs allocated to existing customers will include current treatment plant conveyance and solids capacity, Inflow / Infiltration (I/I) assessment and reduction, and new conveyance for existing customers. Costs allocated to new customers include new treatment, conveyance and solids capacity, and existing excess capacity. Costs allocated proportionally to existing and new customers include CSO control, operations, maintenance and administration for the entire system.

***Regional Inflow / Infiltration (I/I) Assessment & Pilots; and CSO Control***

- King County pays 100 percent of the cost of I/I assessments and any pilot projects that are done to demonstrate I/I effectiveness
- Discontinue CSO benefit charge when changes in state legislation authorizing the capacity charge increases are passed by the Washington State Legislature (Seattle CSO payment)

- Over the next five years, perform a substantive technical and financial review of the I/I assessments & pilot projects and the CSO control efforts for potential adjustments

The RWQC will review and consider the I / I and CSO program elements over the next five years, following the King County Council's adoption of the plan. The RWQC may make recommendations for modifying or amending the plan to the King County Council after the five-year program reviews. These program reviews may include:

- compliance with federal and state laws affecting water quality (e.g., ESA and the RWSP Habitat Conservation Plan);
- legal decisions impacting the implementation of the RWSP;
- scientific and economic evaluations of the methodologies for addressing water quality protection; and
- integration of the wastewater system with other water quality programs for the region.

#### ***Uniform Interceptor Policy***

- Establish uniform financing, construction, operation, maintenance, and replacement policies for all interceptors in its service area
- Assume responsibility for interceptors under this policy at the time the RWSP is adopted

RWQC members will continue to review the financial implications of this policy as it is developed.

#### ***RWQC involvement in RWSP implementation***

The RWQC expects to review the RWSP during implementation at key decision points and wants to ensure that there is language in the plan that ensures these reviews are done on a regular basis.

#### ***Liability Protection***

In developing its response to Endangered Species Act (ESA) listings, the King County Wastewater Treatment Division could evaluate the opportunity and feasibility to include the programs of its component agency customers in any permits or agreements that may include local sewer operations, maintenance and construction activities. The feasibility analysis could include identifying the responsibilities for component agency participation in a King County Wastewater Treatment Division Habitat Conservation Plans or other ESA response and any protection to be obtained from participating.

In order to implement these points of consensus, the RWQC will be considering and incorporating amendments to the policies in the Executive' Preferred Plan and will vote on these amendments when the RWQC votes on the RWSP.

Sincerely,

Members, Regional Water Quality Committee

<u>John P. F.</u>	<u>Larry Pullen</u>
<u>William A. Fager</u>	<u>Louise Miller</u>
<u>James D. Quake</u>	<u>Richard Conlin</u>
<u>Connie King</u>	<u>Margaret Rogers</u>
<u>Patrick H. Hawkins</u>	
<u>Brian D. Dinkowich</u>	

CC: Regional Water Quality Committee Members



Appendix Q

# RWSP Project Reports



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## Appendix Q

# RWSP Project Reports

The RWSP reporting policies call for details on RWSP capital projects, including a project schedule, an expenditures summary (including staff labor and miscellaneous services), a description of any adjustments to costs and schedules, and a status of the project contracts. This appendix meets these requirements and includes a project report for the year 2005 on the following RWSP capital projects that are in design or construction:

- Brightwater Treatment Plant, project #423484<sup>1</sup>
- Brightwater Conveyance, project #423575
- Brightwater Reclaimed Water Pipeline, project #423600
- Vashon Treatment Plant, project #423460
- Carnation Treatment Plant, project #423557
- Bellevue Pump Station, project #423521
- Black Diamond Storage, project #423373, subproject 621
- Kent/Auburn Conveyance System Improvements, project #423582
- Hidden Lake Pump Station and Boeing Creek Trunk, project #423365
- Fairwood Interceptor Sewer Project, project #423494
- Juanita Bay Pump Station, project #423406
- North Creek Pipeline, project # 423596
- Pacific Pump Station, project #423518
- RWSP Local System I/I Control, project #423297
- Sediment Management Program, project #423368
- Lower Duwamish Waterway Superfund, project #423589
- West Point Digestion Improvements, project #423593

Each report is generated from the Wastewater Treatment Division (WTD) Project Management and Financial Forecast Database. An explanation of the information provided in each report follows.

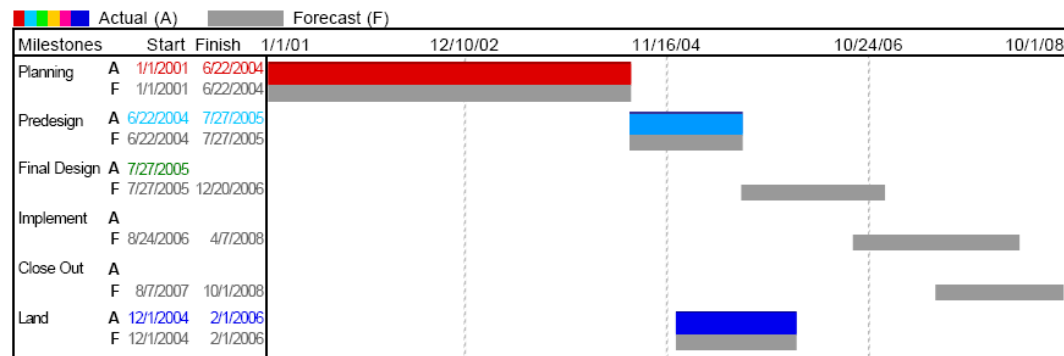
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<sup>1</sup>Each wastewater capital project is assigned a six-digit number such as 423484. The first two numbers (42) identify this as a wastewater project (as opposed to a transit or roads project). The third number (3) identifies the project as capital project (as opposed to operating) and the last three numbers are sequential numbers reflecting the order the projects were assigned in a particular year.

## Schedule and Cost Summary Page

The second page of each report shows the project's milestone schedule in a bar graph format. The graph includes timelines for the various phases of a project: planning, predesign, final design, implementation, close out, and land acquisition. An example of a project schedule follows.

### Milestone Schedule



The cost summary table provides expenditure information for the year 2006 and lifetime budget information based on the adopted 2006 budget. An example of a project cost summary table and an explanation of how to read the summary follows.

### Cost Summary

Expenses	2006 Actual Expenditure and Plan			Lifetime Actual Expenditure and Budget		
	IBIS YTD Dec-06	Adopted Plan	Updated Plan	IBIS LTD Dec-06	Lifetime Budget	Updated Budget
CONSTRUCTION	6,887,028	7,135,180	9,905,690	8,507,574	24,152,079	22,964,516
Construction Contracts	6,865,870	7,053,810	9,792,000	8,486,416	23,911,274	22,684,448
Outside Agency Construction	0	0	15,000	0	0	30,450
Other Capital Charges	21,158	81,370	98,690	21,158	240,805	249,618
NON-CONSTRUCTION	1,913,048	1,057,824	1,783,031	10,525,414	11,583,473	14,012,401
Engineering	783,309	504,863	1,050,600	6,279,148	6,861,058	8,670,261
Planning & Management Svcs.	33,876	0	0	104,680	50,261	70,804
Permitting & Other Agency Support	42,108	1,567	1,567	93,395	202,435	214,318
Right-of-Way	0	0	0	1,541,751	1,516,377	1,541,751
Misc. Services & Materials	47,270	0	5,000	123,525	20,043	86,405
Staff Labor	1,006,485	551,393	725,864	2,382,915	2,933,299	3,428,862
CREDITS AND REVENUES	0	-515,000	0	0	31,363	0
Credits and Revenues	0	-515,000	0	0	31,363	0
<b>Total \$</b>	<b>8,800,077</b>	<b>7,678,004</b>	<b>11,688,721</b>	<b>19,032,988</b>	<b>35,766,916</b>	<b>36,976,917</b>

Expenses
CONSTRUCTION
Construction Contracts
Owner Furnished Equipment
Outside Agency Construction
Other Capital Charges
NON-CONSTRUCTION
Engineering
Planning & Management Svc
Permitting & Other Agency Su
Right-of-Way
Misc. Services & Materials
Staff Labor
PROJECT RESERVE
Project Reserve
ADJUSTMENTS
Adjustments
CREDITS AND REVENUES
Credits and Revenues

The Expense column of the cost summary table is broken down into four main headings.

- Costs associated with Construction.
- Non-Construction Costs. These are the costs associated with outside engineering services, permitting and other agency support (costs for permits), planning and management services, right-of-way (costs associated with acquisition and easements), and WTD and other county staff labor costs.
- Project Reserve Costs. These are costs associated with project contingency.
- Credits and Revenues. Credits and revenues reflect grants received, rents received, or salvage/surplus revenues.

2006 Actual Expenditure and Plan		
IBIS YTD Dec-06	Adopted Plan	Updated Plan
6,887,028	7,135,180	9,905,690
6,865,870	7,053,610	9,792,000
0	0	15,000
21,158	81,370	98,690
1,913,048	1,057,624	1,783,031
783,309	504,663	1,050,600
33,876	0	0
42,108	1,567	1,567
0	0	0
47,270	0	5,000
1,006,485	551,393	725,864
0	-515,000	0
0	-515,000	0
8,800,077	7,678,004	11,688,721

The columns under 2006 Actual Expenditure and Plan of the cost summary table reflect expenditures for 2006. The three headings under annual expenditures include:

- IBIS\* YTD DEC-06. This column reflects the expenditures for the year 2006, from January through December 2006.
- Adopted Plan. These costs reflect the approved appropriation and breakdown by expense category for the year 2006.
- Updated Plan. The costs in this column reflect what was anticipated to be expended of the 2006 council-approved project budget in preparation for the 2007–2012 adopted budget submittal.

Project Managers begin developing their project budget submittals nine months before a budget is adopted and appropriated. Changes may occur from the time a budget is developed as compared to the actual budget year. These changes may cause an annual budget to be over or under expended. Such changes may result from new information that could affect the project's scope or schedule, construction delays, or permitting and environmental review complexities.

\* IBIS refers to King County's financial reporting system.

Lifetime Actual Expenditure and Budget		
IBIS LTD Dec-06	Lifetime Budget	Updated Budget
8,507,574	24,152,079	22,964,516
8,486,416	23,911,274	22,684,448
0	0	30,450
21,158	240,805	249,618
10,525,414	11,583,473	14,012,401
6,279,148	6,861,058	8,670,261
104,680	50,261	70,804
93,395	202,435	214,318
1,541,751	1,516,377	1,541,751
123,525	20,043	86,405
2,382,915	2,933,299	3,428,862
0	31,363	0
0	31,363	0
19,032,988	35,766,916	36,976,917

The columns under Lifetime Actual Expenditure and Budget of the cost summary table include the following three columns:

- IBIS LTD Dec-06. The costs in this column refer to total project expenditures through December 2006.
- Lifetime Budget. The costs in this column refer to projected total inflated project costs as adopted in the 2006-2011 budget (November 2005).
- Updated Budget. The costs in this column reflect the projected total inflated project costs as adopted in the 2007-2012 budget (November 2006). As noted earlier, project managers begin developing their project budget submittals around nine months before a budget is adopted and appropriated. The next year's (2007) budget submittal takes into account changes to the project scope or schedule, or new information identified since the current year's (2006) budget was adopted.

## Contract Status

The third page of each project report includes information on contract status, if there are contracts associated with the project.

The contract status table provides the name of the contract, the original contract amount, amounts associated with amendments or change orders, and percentage paid of contract. The "Phased Amendments" column refers to additional planned phases of the contract; the value of those planned phase amendments are included in the "Phased Amendment" column. An example of the contract status table follows.

### Contract Status

Contract	Original Contract Amount	Phased Amends	Base Contract Amount	Change Amends or COs	Change Percentage	Nbr of Amends/CO's to Date	Current Contract Amount	Amount Paid	Thru Pmt No.	% Paid
Juanita Bay Pump Station Replacement	\$18,988,000 C43085C	\$0	\$18,988,000	\$28,957	0%	2	\$19,016,957	\$7,896,688	12	42%
Eng'g Services for Juanita Bay & Forcemain Update	\$1,849,364 E03037E	\$4,725,798	\$6,575,153	\$0	0%	1	\$6,575,153	\$6,295,200	68	96%

# RWSP Project Report

## DECEMBER 2006

### 423484 Brightwater Treatment Plant



#### Project Description

This project will design and construct a treatment plant to provide 39 million gallons per day (mgd) of treatment capacity (average wet weather flow) by 2010 and 54 mgd of capacity by 2040. The Brightwater Treatment Plant will be located just east of State Route 9 and north of State Route 522 and Woodinville. Treatment and support facilities will cover approximately 43.0 acres (with additional area for storm water treatment, open space, wildlife habitat and wetlands). The Brightwater plant will include membrane bioreactor (MBR) secondary treatment systems, Class B biosolids, reclaimed water production, odor control systems, and disinfection.

#### Project Phase: 3 Final Design

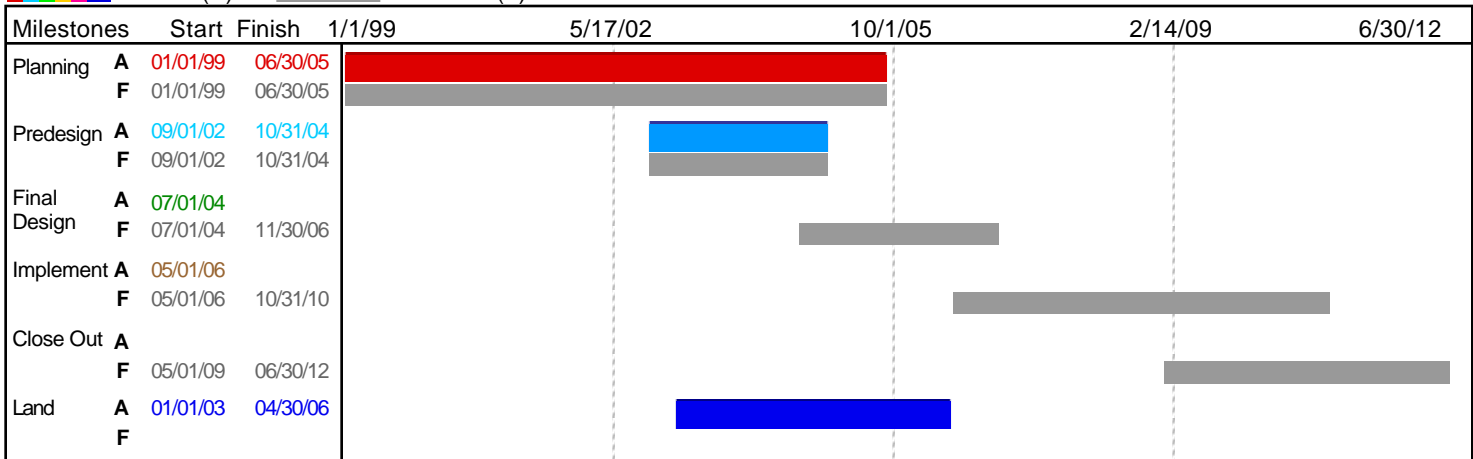


**King County**

Department of Natural Resources and Parks  
Wastewater Treatment Division

## Milestone Schedule

Actual (A) Forecast (F)



## Schedule Adjustments

## Cost Summary

Expenses	2006 Actual Expenditure and Plan			Lifetime Actual Expenditure and Budget		
	IBIS YTD Dec-06	Adopted Plan	Updated Plan	IBIS LTD Dec-06	Lifetime Budget	Updated Budget
CONSTRUCTION	21,448,761	16,522,503	32,403,786	24,708,222	384,509,178	478,861,442
Construction Contracts	21,384,905	16,522,503	31,760,908	24,516,276	384,421,268	478,130,950
Owner Furnished Equipment	0	0	0	34,431	34,384	34,431
Outside Agency Construction	62,699	0	0	62,699	0	0
Other Capital Charges	1,157	0	642,878	94,817	53,526	696,061
NON-CONSTRUCTION	74,239,034	21,949,888	65,317,016	233,524,729	239,384,265	306,271,754
Engineering	12,529,837	4,228,930	8,816,389	56,361,048	76,178,630	56,867,396
Planning & Management Svcs.	2,761,237	0	2,486,875	11,959,683	6,434,013	24,754,525
Permitting & Other Agency Support	38,813,634	7,202,567	35,688,118	41,317,655	24,373,345	88,175,072
Right-of-Way	16,388,720	7,624,335	14,821,560	105,360,126	101,641,682	103,792,966
Misc. Services & Materials	302,819	313,795	313,795	3,300,761	4,736,486	4,826,964
Staff Labor	3,442,787	2,580,262	3,190,279	15,225,456	26,020,109	27,854,832
PROJECT RESERVE	0	0	0	0	31,226,400	19,508,447
Project Reserve	0	0	0	0	31,226,400	19,508,447
ADJUSTMENTS	0	0	0	0	0	0
Adjustments	0	0	0	0	0	0
CREDITS AND REVENUES	-1,004,494	-1,063,135	-1,032,170	-2,625,056	-10,290,757	-10,609,482
Credits and Revenues	-1,004,494	-1,063,135	-1,032,170	-2,625,056	-10,290,757	-10,609,482
<b>Total \$</b>	<b>94,683,302</b>	<b>37,409,256</b>	<b>96,688,632</b>	<b>255,607,896</b>	<b>644,829,087</b>	<b>794,032,162</b>

## Cost/Budget Adjustments

The project lifetime cost was updated as a result of the December 2005 Trend Cost review provided to Council in early 2006. The Lifetime Updated Budget column reflects an increase from the prior baseline budget of \$644.8 million to \$794 million primarily due to the impact of inflation and mitigation costs. A portion of this increase was offset by decreases in Conveyance and land costs.

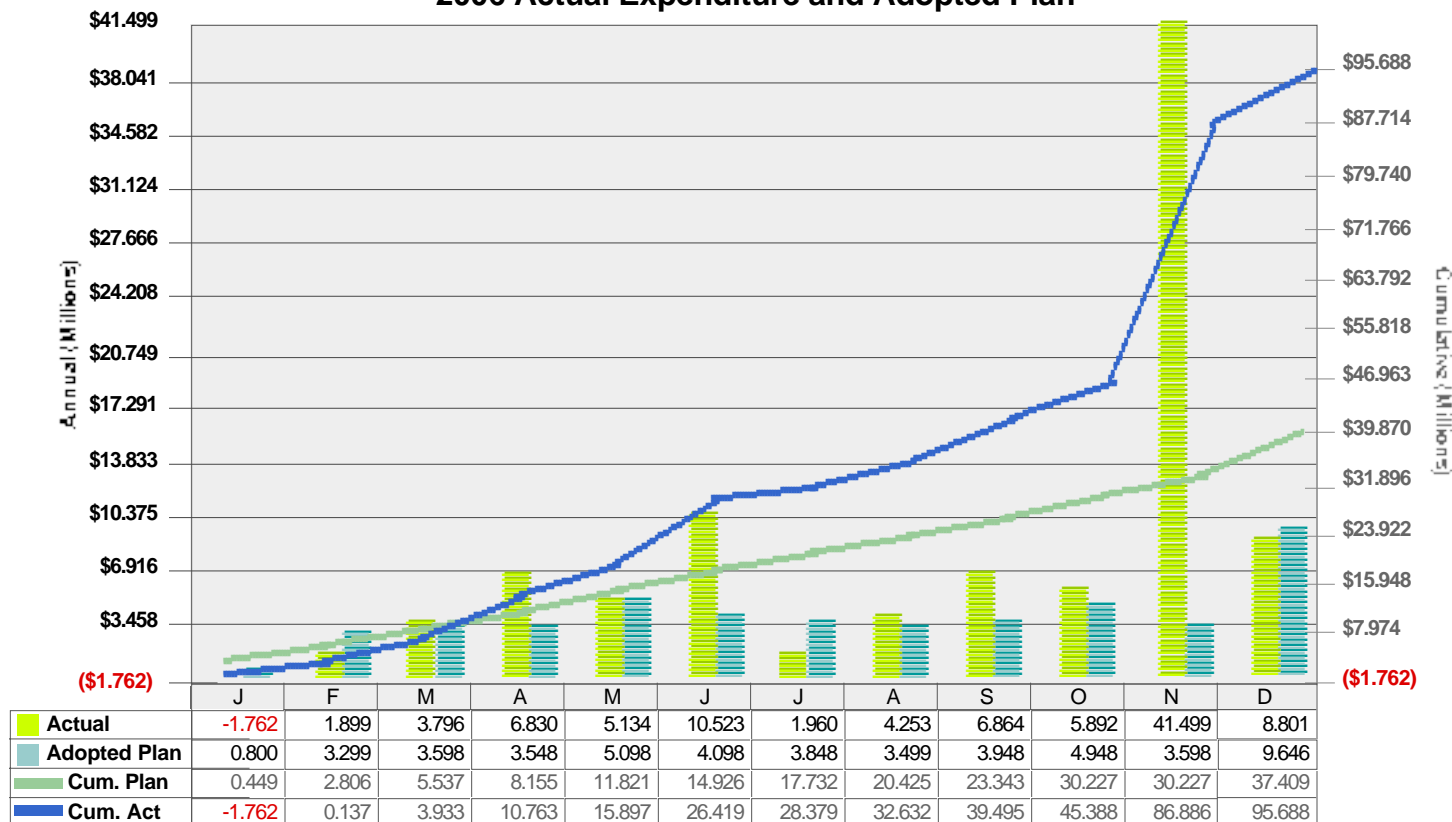


## Contract Status

Contract	Original Contract Amount	Phased Amends	Base Contract Amount	Change Amends or COs	Change Percentage	Nbr of Amends/CO's to Date	Current Contract Amount	Amount Paid	Thru Pmt No.	% Paid
Engineering Services for Brightwater Treatment Plant E13035E	\$9,719,364	\$31,747,643	\$41,467,007	\$17,999,079	43%	30	\$59,466,086	\$53,000,167	334	89%
RWSP Program Management Services Development P03012P	\$8,205,521	\$0	\$8,205,521	\$1,245,617	15%	4	\$9,451,138	\$9,328,574	47	99%
North Treatment Facilities Site Selection P93012P	\$4,617,000	\$0	\$4,617,000	\$7,629,920	165%	11	\$12,246,920	\$12,000,349	70	98%
Brightwater Legal Services Agreement/Brightwater legal Svcs	\$3,500,000	\$0	\$3,500,000	\$0	0%		\$3,500,000	\$154,205	10	4%
Construction Management Services for the Treatment Plant P53007P	\$1,497,206	\$0	\$1,497,206	\$2,770,004	185%	1	\$4,267,210	\$804,240	10	19%
GCCM Contract for Brightwater C38138C	\$1,424,428	\$0	\$1,424,428	\$719,295	2,273%	6	\$33,800,779	\$15,312,617	106	45%
NTF Legal Services T01129T	\$1,150,000	\$0	\$1,150,000	\$2,150,000	187%	3	\$3,300,000	\$2,887,846	59	88%
NTF Legal Services T01130T	\$1,150,000	\$0	\$1,150,000	\$2,463,000	214%	3	\$3,613,000	\$3,184,255	63	88%
NTF Legal Services T01129T	\$1,150,000	\$0	\$1,150,000	\$2,150,000	187%	3	\$3,300,000	\$2,887,846	59	88%
NTF Legal Services T01130T	\$1,150,000	\$0	\$1,150,000	\$2,463,000	214%	3	\$3,613,000	\$3,184,255	63	88%
Brightwater Treatment Plant Testing and Inspection P00001P06	\$100,000	\$0	\$100,000	\$0	0%		\$100,000	\$57,304	5	57%
Brightwater Team Facilitation P56016P	\$69,932	\$0	\$69,932	\$24,374	35%	2	\$94,306	\$68,744	7	73%

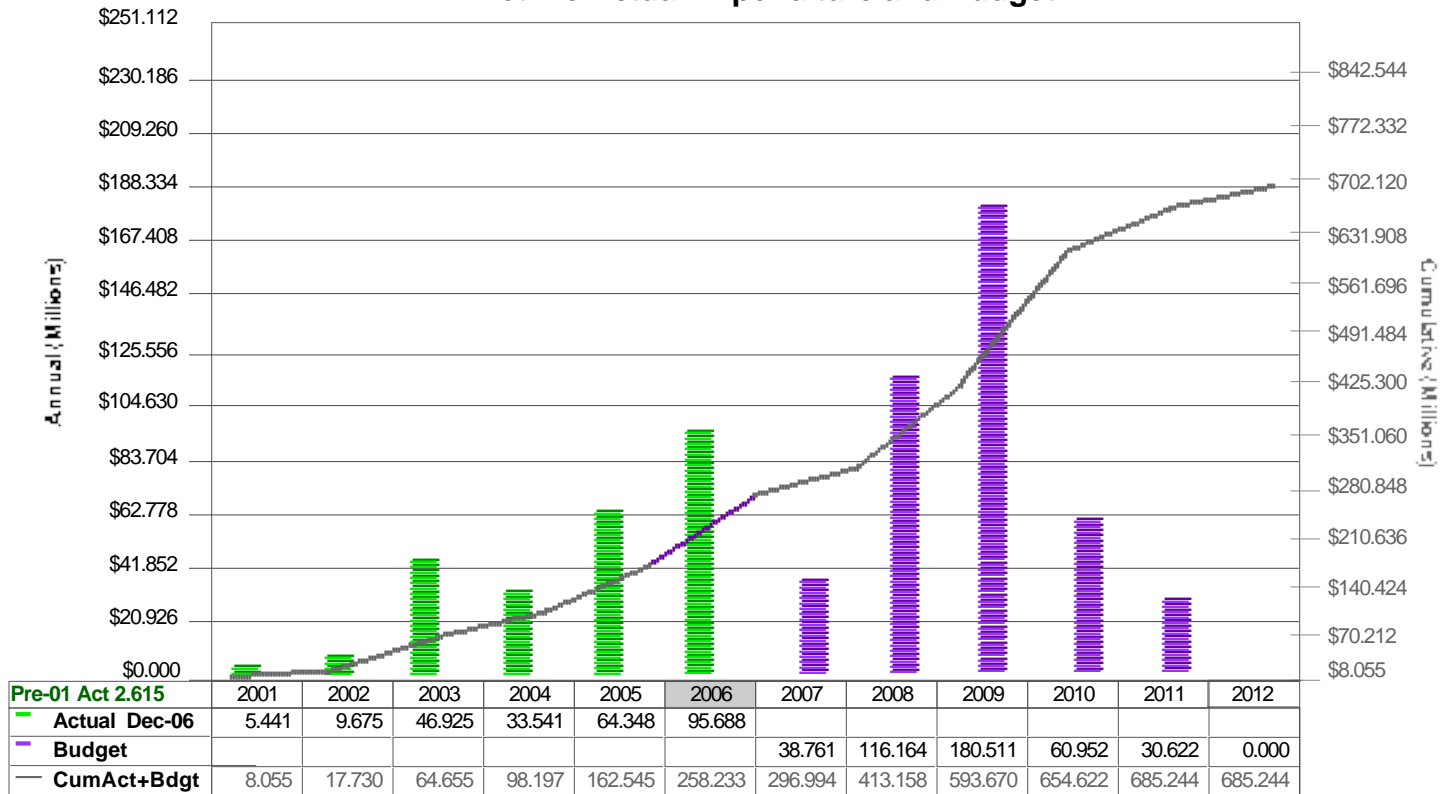
## Annual Cash Flow

### 2006 Actual Expenditure and Adopted Plan



## Lifetime Cash Flow

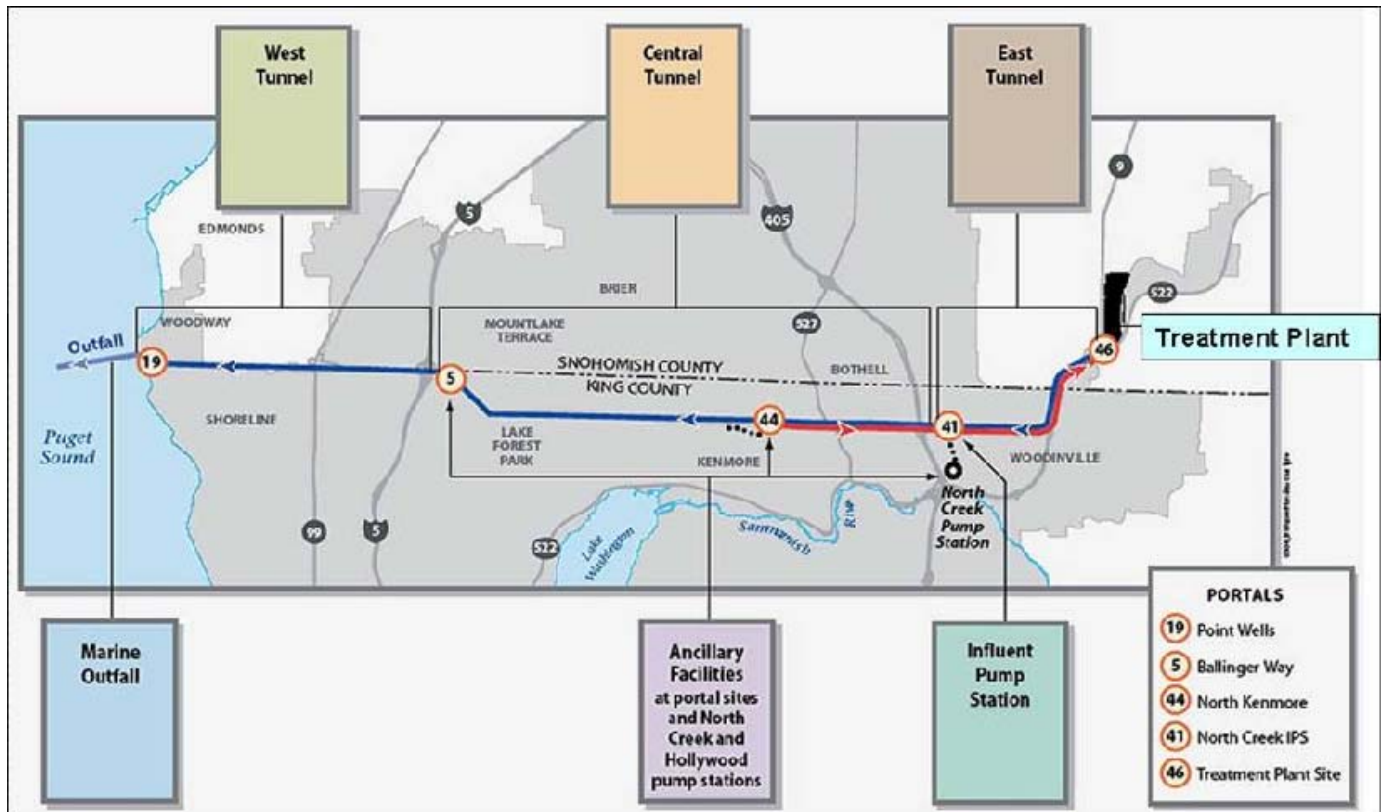
### Lifetime Actual Expenditure and Budget



# RWSP Project Report

## DECEMBER 2006

### 423575 Brightwater Conveyance



#### Project Description

This project will carry treated and untreated wastewater to and from the Brightwater treatment plant located north of Woodinville along State Route 9. The Brightwater project will serve south Snohomish County and north King County once it becomes operational in late 2010. The 14.9 mile long Brightwater conveyance system is composed of a deep large diameter tunnel extending from the treatment plant to Puget Sound. The tunnel will discharge highly treated effluent through a new outfall located one mile offshore of point Wells at a depth of 600'.

#### Project Phase: 4 Implementation

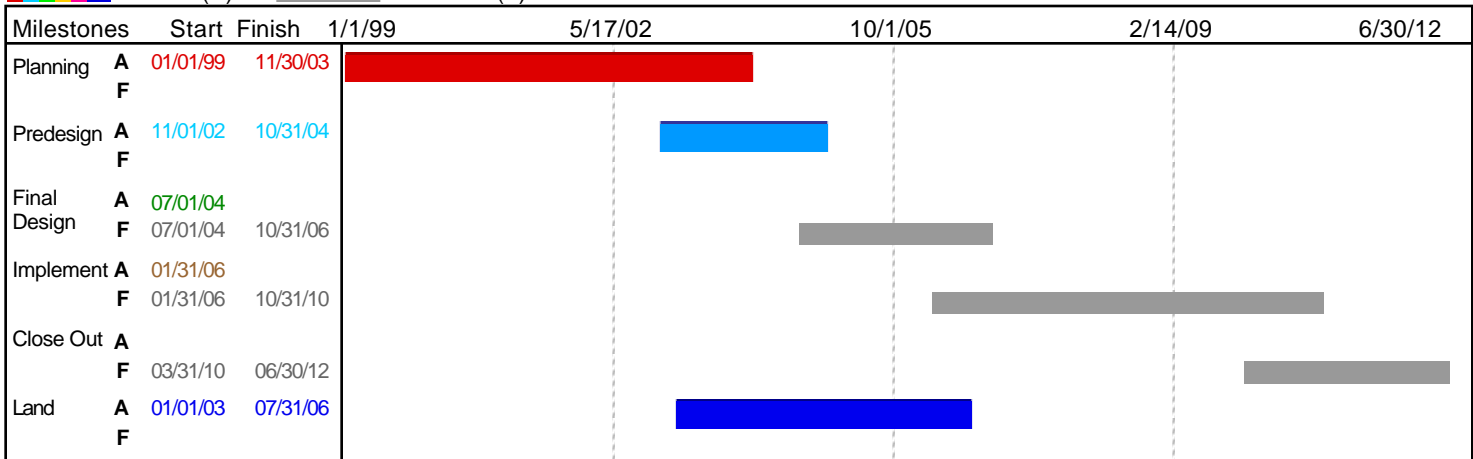


**King County**

Department of Natural Resources and Parks  
Wastewater Treatment Division

## Milestone Schedule

Actual (A) Forecast (F)



## Schedule Adjustments

N/A

## Cost Summary

Expenses	2006 Actual Expenditure and Plan			Lifetime Actual Expenditure and Budget		
	IBIS YTD Dec-06	Adopted Plan	Updated Plan	IBIS LTD Dec-06	Lifetime Budget	Updated Budget
CONSTRUCTION	51,034,483	23,469,496	41,227,021	56,193,179	705,313,807	660,848,472
Construction Contracts	50,584,831	23,469,496	35,409,535	55,598,767	705,052,251	650,047,986
Owner Furnished Equipment	0	0	0	87,999	87,580	87,999
Outside Agency Construction	318,561	0	3,720,871	322,429	130,000	3,724,740
Other Capital Charges	131,091	0	2,096,615	183,984	43,975	6,987,748
NON-CONSTRUCTION	23,501,764	32,746,766	31,199,365	117,928,574	228,844,011	206,563,963
Engineering	9,128,059	17,225,852	12,085,007	58,157,891	136,819,655	82,878,546
Planning & Management Svcs.	4,782,580	0	4,392,285	20,518,043	13,318,665	57,860,431
Permitting & Other Agency Support	371,608	11,408,478	6,260,688	1,548,410	22,088,832	13,924,480
Right-of-Way	5,209,639	0	4,348,948	17,574,760	21,245,987	16,714,069
Misc. Services & Materials	496,734	341,315	341,315	3,237,135	4,822,349	4,799,717
Staff Labor	3,513,143	3,771,121	3,771,121	16,892,334	30,548,523	30,386,720
PROJECT RESERVE	0	0	0	0	89,486,135	93,094,949
Project Reserve	0	0	0	0	89,486,135	93,094,949
ADJUSTMENTS	0	0	0	0	0	0
Adjustments	0	0	0	0	0	0
CREDITS AND REVENUES	-3,501	0	0	-5,351	0	-1,850
Credits and Revenues	-3,501	0	0	-5,351	0	-1,850
<b>Total \$</b>	<b>74,532,745</b>	<b>56,216,262</b>	<b>72,426,386</b>	<b>174,116,402</b>	<b>1,023,643,953</b>	<b>960,505,535</b>

## Cost/Budget Adjustments

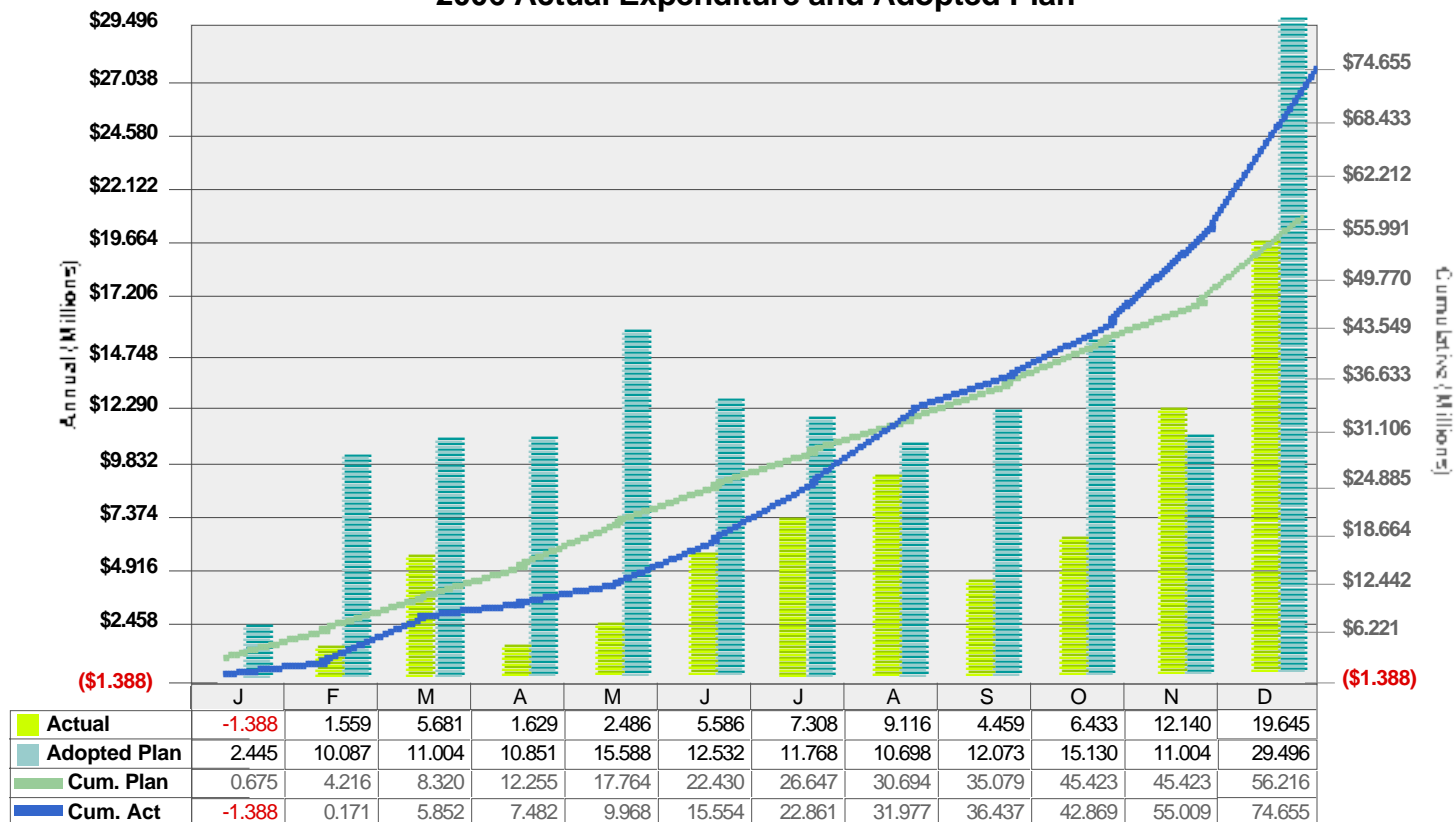
N/A

## Contract Status

Contract	Original Contract Amount	Phased Amends	Base Contract Amount	Change Amends or COs	Change Percentage	Nbr of Amends/CO's to Date	Current Contract Amount	Amount Paid	Thru Pmt No.	% Paid
Brightwater Conveyance Sys, Central Contract, BW Tunnel, C00005C06	\$211,076,058	\$0	\$211,076,058	\$6,558	0%	1	\$211,082,616	\$20,769,834	7	10%
East Combined Tunnel C53060C	\$130,848,750	\$0	\$130,848,750	\$71,963	0%	2	\$130,920,713	\$25,241,994	7	19%
CM Services for BW Conveyance P43020P	\$13,327,255	\$0	\$13,327,255	\$962,548	7%	1	\$14,289,803	\$4,873,722	19	34%
Geotechnical Services for the Brightwater Conveyance E23007E	\$11,474,386	\$10,386,010	\$21,860,396	\$285,657	1%	4	\$22,146,053	\$14,375,858	463	65%
Brightwater Conveyance E33015E/A	\$11,173,313	\$2,291,578	\$13,464,890	\$0	0%	1	\$13,464,890	\$10,995,350	28	82%
Prof Svcs for Brightwater Conveyance Final Design E33015E/C	\$7,167,571	\$1,581,546	\$8,749,117	\$0	0%	1	\$8,749,117	\$5,503,157	28	63%
Prof Svcs for Brightwater Conveyance Final Design E33015E/B	\$5,672,837	\$1,234,040	\$6,906,877	\$0	0%	1	\$6,906,877	\$4,085,786	28	59%
Brightwater Reclaimed Water Conveyance Facility E43010E	\$1,918,771	\$1,300,972	\$3,219,743	<b>-\$469,808</b>	<b>-15%</b>	4	\$2,749,936	\$1,914,918	28	70%
Construction Management Services for the Brightwater P53017P	\$933,568	\$0	\$933,568	\$0	0%		\$933,568	\$86,278	5	9%
Brightwater Oversight Monitoring Consultant P43024P	\$475,916	\$337,636	\$813,552	\$0	0%	1	\$813,552	\$371,830	22	46%
Brightwater Conveyance Testing & Inspection P53018P	\$250,000	\$0	\$250,000	\$0	0%		\$250,000	\$15,114	8	6%

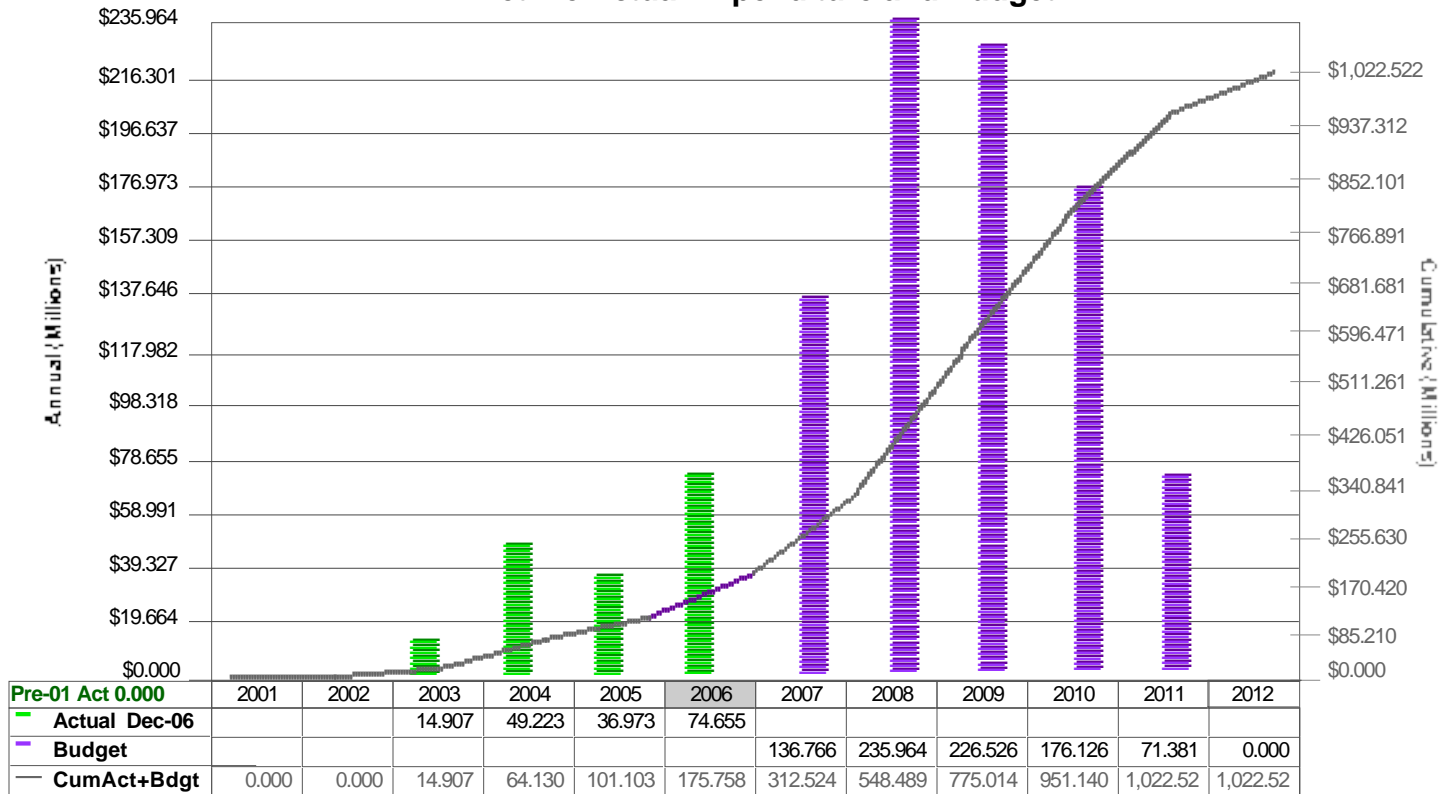
## Annual Cash Flow

### 2006 Actual Expenditure and Adopted Plan



## Lifetime Cash Flow

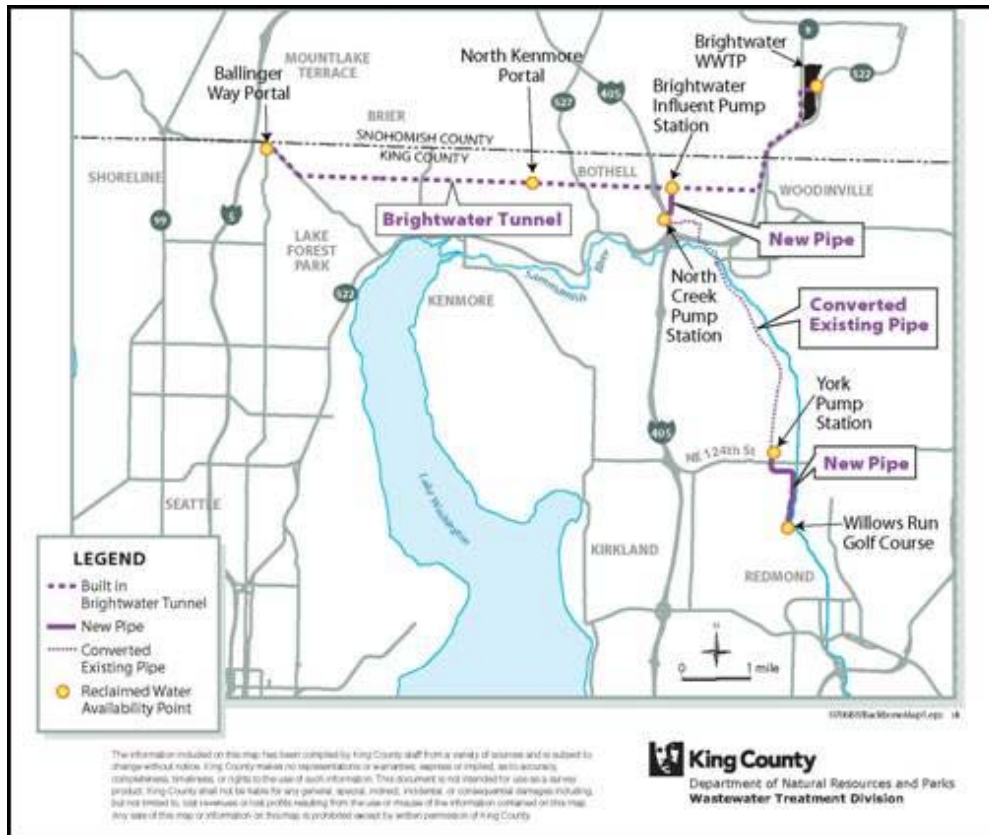
### Lifetime Actual Expenditure and Budget



# RWSP Project Report

## DECEMBER 2006

### 423600 Brightwater Reclaimed Water Pipeline



#### Project Description

This project will convey Class A reclaimed water produced at the Brightwater Treatment Plant to the Sammamish Valley and to potential customers along the effluent pipeline system starting in 2011. The system initially (Phase I) will provide up to 7 mgd of reclaimed water to the area by gravity. Second phase of the BWRW (Phase II) involves bringing the West segment of the backbone into service by adding pumping capacity as needed to match demand, providing up to 14 mgd of additional reclaimed water for a total 21 mgd.

#### Project Phase: 4 Implementation

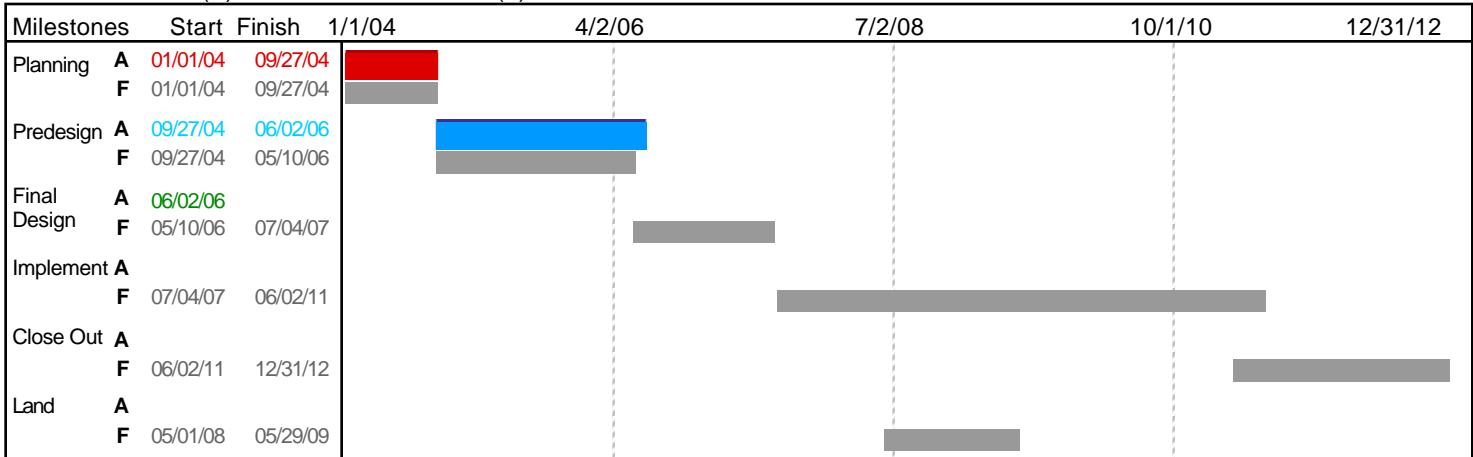


**King County**

Department of Natural Resources and Parks  
Wastewater Treatment Division

## Milestone Schedule

 Actual (A)
  Forecast (F)



## Schedule Adjustments

### Cost Summary

Expenses	2006 Actual Expenditure and Plan			Lifetime Actual Expenditure and Budget		
	IBIS YTD Dec-06	Adopted Plan	Updated Plan	IBIS LTD Dec-06	Lifetime Budget	Updated Budget
CONSTRUCTION	255	154,500	130,000	255	17,413,745	17,771,168
Construction Contracts	0	103,000	0	0	17,198,288	17,552,440
Other Capital Charges	255	51,500	130,000	255	215,457	218,728
NON-CONSTRUCTION	1,704,557	1,730,989	1,500,708	1,704,557	7,599,995	6,884,874
Engineering	1,022,941	987,500	933,684	1,022,941	3,546,628	3,519,460
Permitting & Other Agency Support	4,683	51,500	30,000	4,683	420,853	159,273
Right-of-Way	0	103,000	0	0	215,551	266,955
Misc. Services & Materials	29,998	60,083	34,627	29,998	352,821	197,709
Staff Labor	646,935	528,906	502,397	646,935	3,064,142	2,741,476
PROJECT RESERVE	0	0	0	0	2,300,283	2,830,985
Project Reserve	0	0	0	0	2,300,283	2,830,985
<b>Total \$</b>	1,704,811	1,885,489	1,630,708	1,704,811	27,314,023	27,487,026

### Cost/Budget Adjustments

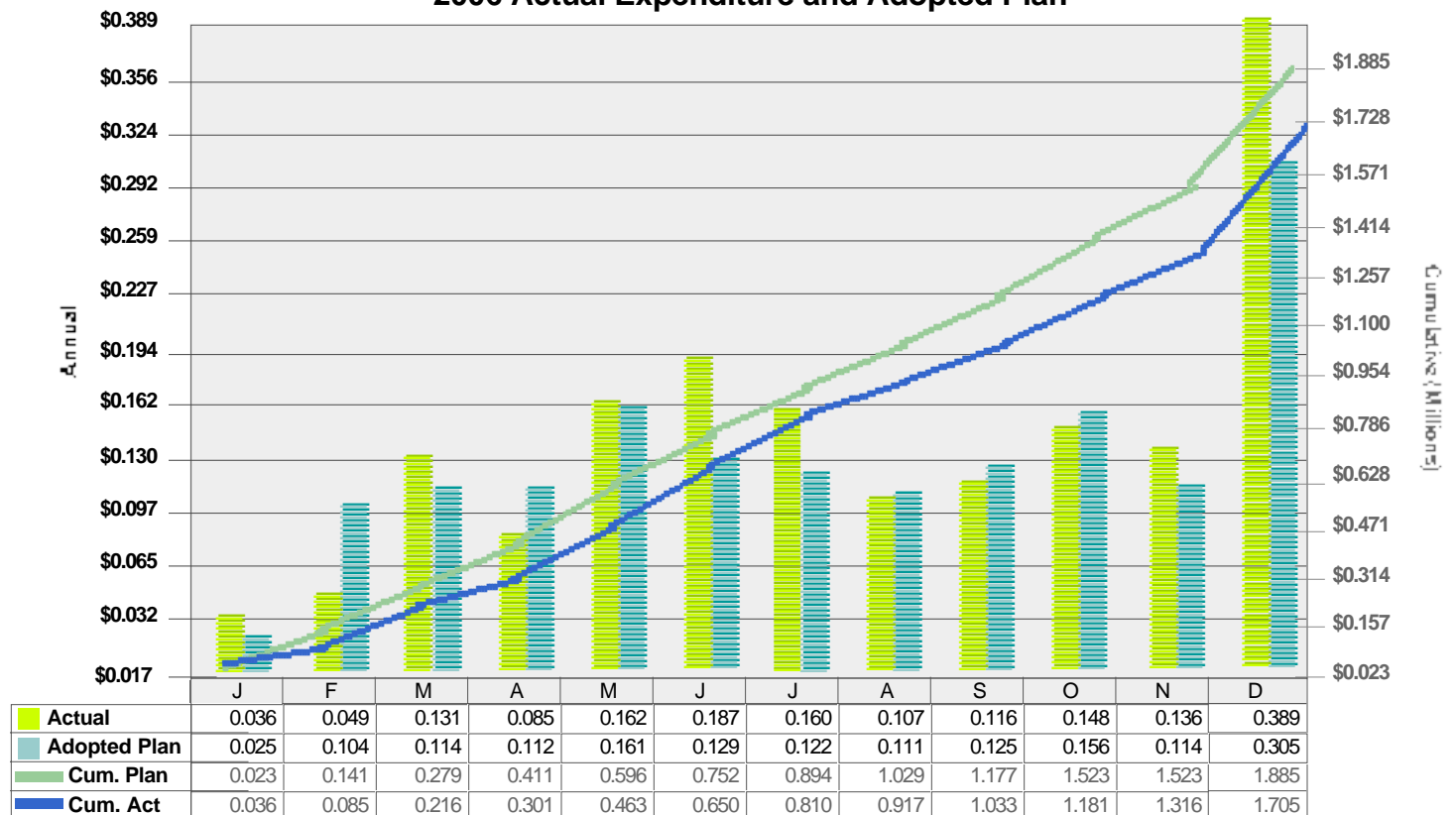


## Contract Status

Contract	Original Contract Amount	Phased Amends	Base Contract Amount	Change Amends or COs	Change Percentage	Nbr of Amends/CO's to Date	Current Contract Amount	Amount Paid	Thru Pmt No.	% Paid
Brightwater Reclaimed Water Conveyance Facility	\$1,918,771	\$1,300,972	\$3,219,743	-\$469,808	-15%	4	\$2,749,936	\$1,914,918	28	70%
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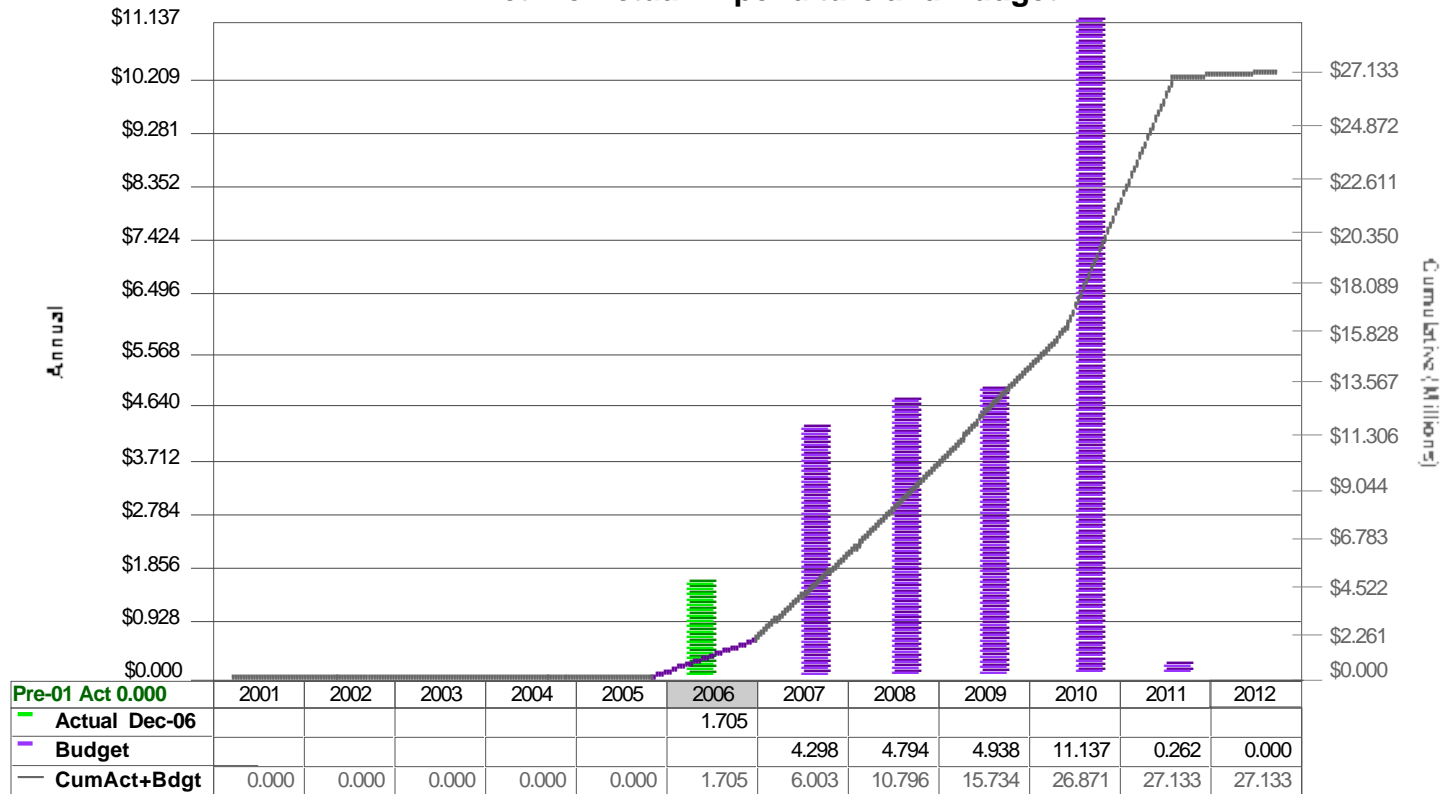
## Annual Cash Flow

### 2006 Actual Expenditure and Adopted Plan



## Lifetime Cash Flow

### Lifetime Actual Expenditure and Budget



# RWSP Project Report

## DECEMBER 2006

### 423460 Vashon Island T.P. Upgrade



#### Project Description

This project expands and upgrades the existing Vashon Island Wastewater Treatment Plant and outfall in accordance with a contract executed in 1999 with the Vashon Sewer District. Under this agreement, King County has also worked with the local sewer district to implement operational and safety improvements to the local sewage collection systems. Construction on the treatment plant upgrades to increase capacity and add back-up treatment systems began in 2004. Substantial completion of these improvements was achieved on schedule in December 2006. Other related improvements implemented via this project include: moving the marine outfall farther out into Puget Sound, removal of derelict fish nets, installation of a telemetry system to allow communication and coordination with King County's South Treatment plant and various safety improvements.

#### Project Phase: 4 Implementation

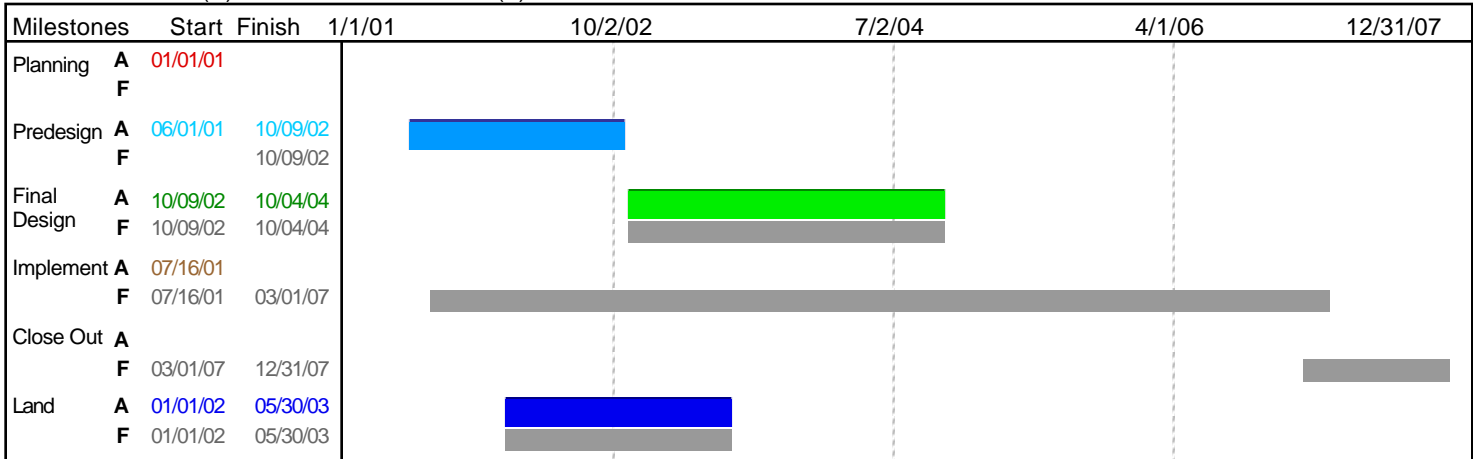


**King County**

Department of Natural Resources and Parks  
Wastewater Treatment Division

## Milestone Schedule

Actual (A) Forecast (F)



## Schedule Adjustments

The new Vashon WWTP began receiving wastewater in October 2006, exceeding the Department of Ecology compliance order requirement that the plant to be in operation by the first quarter of 2007. Achieving this milestone has been a challenge as there have been a number of delays during the construction phase. In 2006 construction progress has been steady but slow due to late delivery of control equipment and severe weather later in the year. During 2006, via Change Orders, the date of substantial completion of the Vashon Wastewater Treatment Plant Upgrade was revised from July 15, 2006 to December 6, 2006.

## Cost Summary

Expenses	2006 Actual Expenditure and Plan			Lifetime Actual Expenditure and Budget		
	IBIS YTD Dec-06	Adopted Plan	Updated Plan	IBIS LTD Dec-06	Lifetime Budget	Updated Budget
CONSTRUCTION	4,258,179	3,858,380	3,768,998	13,885,444	13,825,566	13,855,429
Construction Contracts	4,254,954	3,858,380	3,768,998	13,728,602	13,671,948	13,701,812
Owner Furnished Equipment	0	0	0	4,839	4,839	4,839
Outside Agency Construction	0	0	0	0	0	0
Other Capital Charges	3,225	0	0	152,003	148,778	148,778
NON-CONSTRUCTION	1,646,194	637,750	914,125	7,000,406	5,564,635	6,513,211
Engineering	389,335	354,500	328,000	3,206,374	3,108,367	3,227,039
Planning & Management Svcs.	471,573	0	180,000	914,963	19,302	643,390
Permitting & Other Agency Support	15,178	12,875	12,875	190,473	258,518	183,851
Right-of-Way	0	0	0	0	0	0
Misc. Services & Materials	44,616	0	0	421,200	342,292	376,584
Staff Labor	725,491	270,375	393,250	2,267,396	1,836,156	2,082,347
PROJECT RESERVE	0	0	0	0	0	0
Project Reserve	0	0	0	0	0	0
ADJUSTMENTS	0	0	0	0	0	0
Adjustments	0	0	0	0	0	0
CREDITS AND REVENUES	-433,900	0	0	-433,900	0	0
Credits and Revenues	-433,900	0	0	-433,900	0	0
<b>Total \$</b>	<b>5,470,473</b>	<b>4,496,130</b>	<b>4,683,123</b>	<b>20,451,950</b>	<b>19,390,201</b>	<b>20,368,640</b>

## Cost/Budget Adjustments

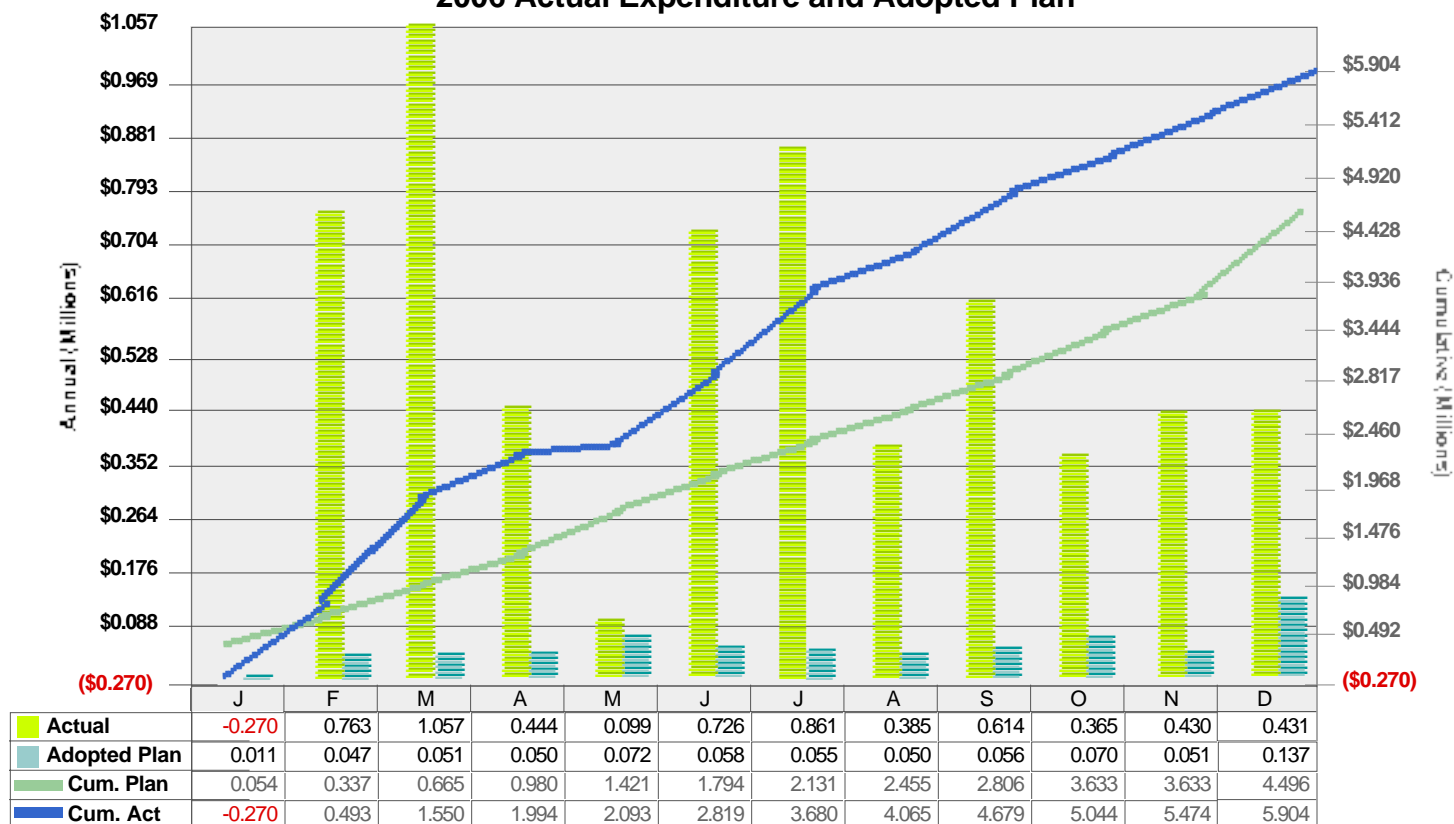
During 2006 modifications to the construction and weather delays required the construction contract amount to be increased. Change Orders Nos. 5-11 to the construction contract were issued in 2006. Some of the more significant changes were required to meet permit requirements, including additions to the fire control system for the administration and Electrical buildings, additional earthwork and landscaping of stockpile areas, and electrical panel revisions. Also some of the additional costs are related change orders issued in 2005 that added work related to the discovery of metal contaminated surface soils and revisions to the grading plan which totalled \$1.15 million.

## Contract Status

Contract	Original Contract Amount	Phased Amends	Base Contract Amount	Change Amends or COs	Change Percentage	Nbr of Amends/CO's to Date	Current Contract Amount	Amount Paid	Thru Pmt No.	% Paid
Vashon Island Treatment Plant Upgrade	\$7,164,201	\$0	\$7,164,201	\$1,576,181	22%	12	\$8,740,382	\$8,657,863	28	99%
Vashon Island Treatment Plant Upgrade Project	\$599,681	\$1,617,764	\$2,217,445	\$382,312	17%	6	\$2,599,757	\$2,508,632	79	96%
Vashon WWTP Interim Improvements	\$500,000	\$0	\$500,000	\$50,000	10%	1	\$550,000	\$518,965	8	94%
Outfall Improvements Vashon Island Treatment Plant	\$204,454	\$0	\$204,454	\$0	0%		\$204,454	\$204,454	2	100%

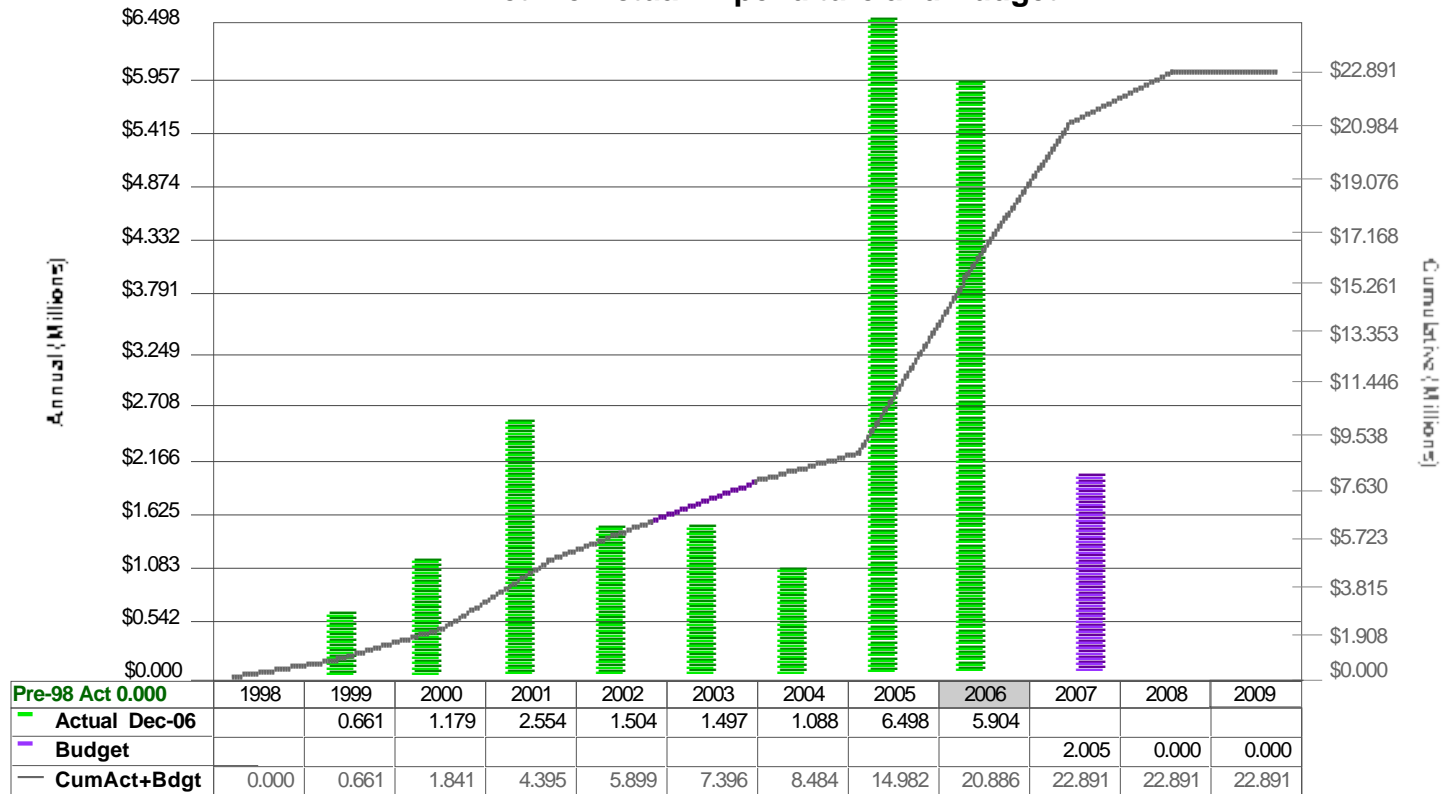
## Annual Cash Flow

### 2006 Actual Expenditure and Adopted Plan



## Lifetime Cash Flow

### Lifetime Actual Expenditure and Budget



# RWSP Project Report

## DECEMBER 2006

### 423557 Carnation Treatment Plant



#### Project Description

This project will provide the City of Carnation with a new state of the art 0.43 mgd MBR treatment facility that will be owned and operated by King County. The plant will produce Class A reclaimed water that will initially be used to enhance existing wetlands at the Chinook Bend Natural Area. The project includes all work to implement this objective including planning, permitting, design and construction of a new treatment plant. The City of Carnation is replacing its on-site septic systems with a collection system to protect public health and the environment, achieve the city's comprehensive plan goals, and maintain and enhance community livability. The city is responsible for the design and construction of the local wastewater collection system. Construction of the sewage collection system is scheduled to be substantially complete by the end of 2007. Construction of Carnation Wastewater Treatment Facility is scheduled to be substantially complete in mid-2008. In 2006 an amendment to the Carnation Wastewater Facilities Plan was completed that will allow the new Carnation WWTF to produce reclaimed water that will be used to enhance wetlands at the Chinook Bend Natural Area.

#### Project Phase: 4 Implementation



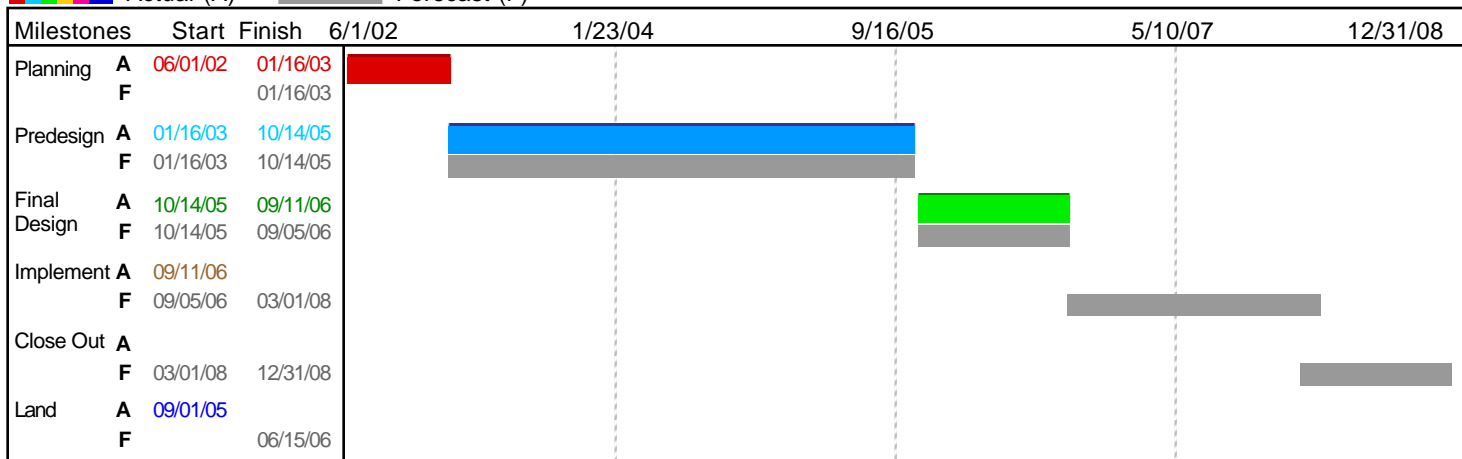
**King County**

Department of Natural Resources and Parks  
Wastewater Treatment Division



## Milestone Schedule

Actual (A) Forecast (F)



## Schedule Adjustments

Severe weather in November and December 2006 caused some construction delays adding 20 days to the original contract. Construction is proceeding and is projected to be substantially complete in mid-2008.

## Cost Summary

Expenses	2006 Actual Expenditure and Plan			Lifetime Actual Expenditure and Budget		
	IBIS YTD Dec-06	Adopted Plan	Updated Plan	IBIS LTD Dec-06	Lifetime Budget	Updated Budget
CONSTRUCTION	1,495,874	4,461,445	3,021,551	1,508,233	9,056,733	14,660,230
Construction Contracts	1,495,874	3,946,445	2,841,951	1,508,233	8,011,283	13,740,678
Owner Furnished Equipment	0	515,000	179,600	0	1,045,450	919,552
NON-CONSTRUCTION	1,245,841	854,847	-221,237	5,299,236	4,746,384	5,257,920
Engineering	776,044	412,000	-275,684	3,385,413	2,585,673	2,807,368
Planning & Management Svcs.	150,844	0	175,000	183,012	13,099	761,213
Permitting & Other Agency Support	120,745	3,433	3,429	161,047	130,897	94,351
Right-of-Way	153,352	113,300	0	164,602	223,300	320,250
Misc. Services & Materials	63,481	9,059	-3,390	114,236	67,806	55,387
Staff Labor	-18,624	317,055	-120,592	1,290,926	1,725,609	1,219,351
<b>Total \$</b>	2,741,715	5,316,292	2,800,314	6,807,469	13,803,117	19,918,150

## Cost/Budget Adjustments

The project budget was increased as part of the 2007 budget process to \$19,918,150 to address higher than budgeted cost of the Carnation Wastewater Treatment Facility. Raising the elevation of the plant site to prevent flooding, changes to odor control to meet community concerns, and significant increases in the cost of construction materials contribute to the increase.

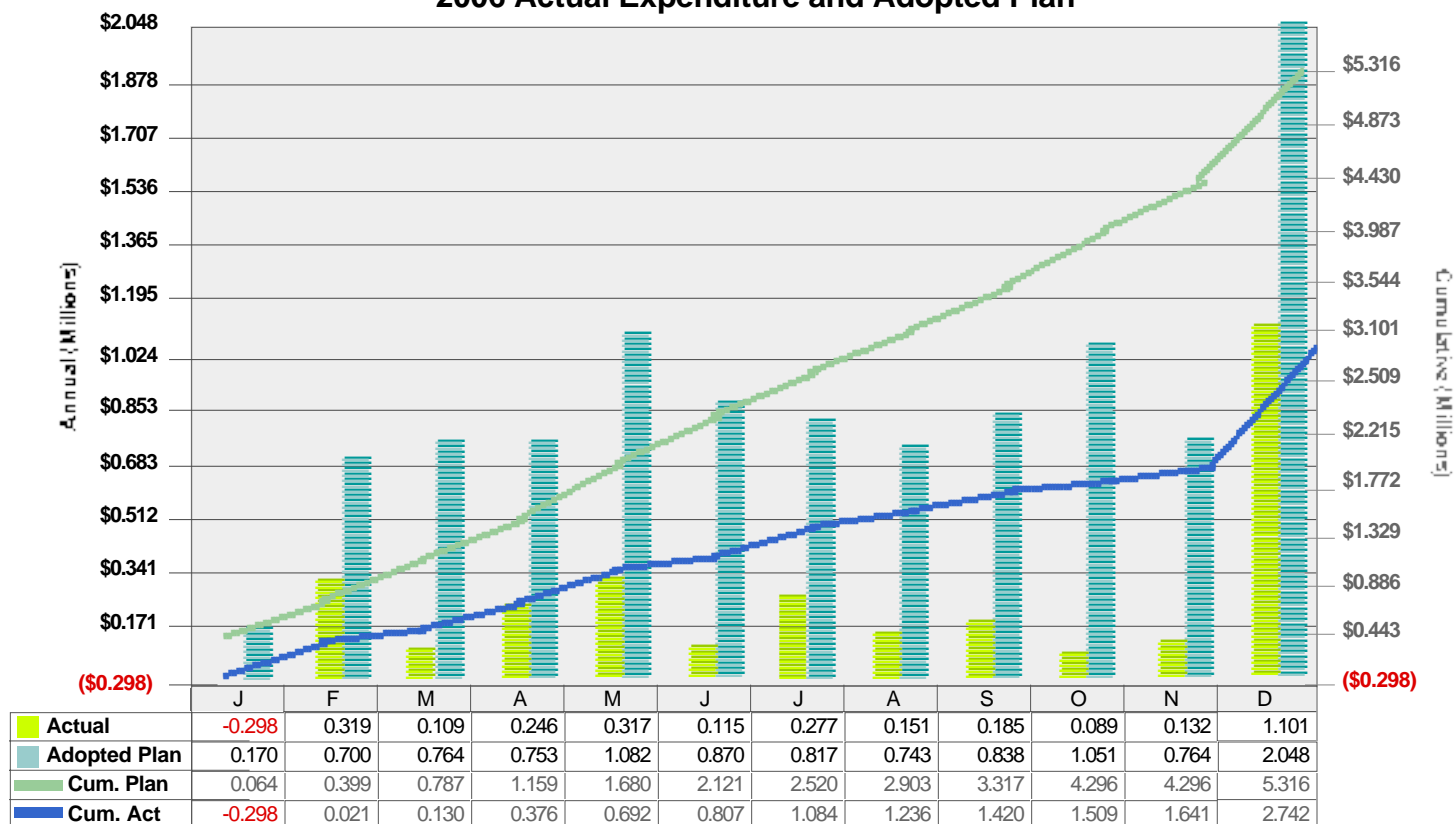


## Contract Status

Contract	Original Contract Amount	Phased Amends	Base Contract Amount	Change Amends or COs	Change Percentage	Nbr of Amends/CO's to Date	Current Contract Amount	Amount Paid	Thru Pmt No.	% Paid
Carnation Wastewater Treatment Facility	\$11,794,500	\$0	\$11,794,500	\$1,315,161	11%	2	\$13,109,661	\$1,277,105	3	10%
Carnation Treatment Facility	\$629,804	\$2,587,391	\$3,217,195	\$864,753	27%	4	\$4,081,948	\$3,227,460	45	79%
Hazardous Materials Inspection, monitoring and abatement	\$200,000	\$0	\$200,000	\$0	0%	1	\$200,000	\$130,282	22	65%
Professional Archaeological Services	\$100,000	\$0	\$100,000	\$0	0%		\$100,000	\$47,015	17	47%

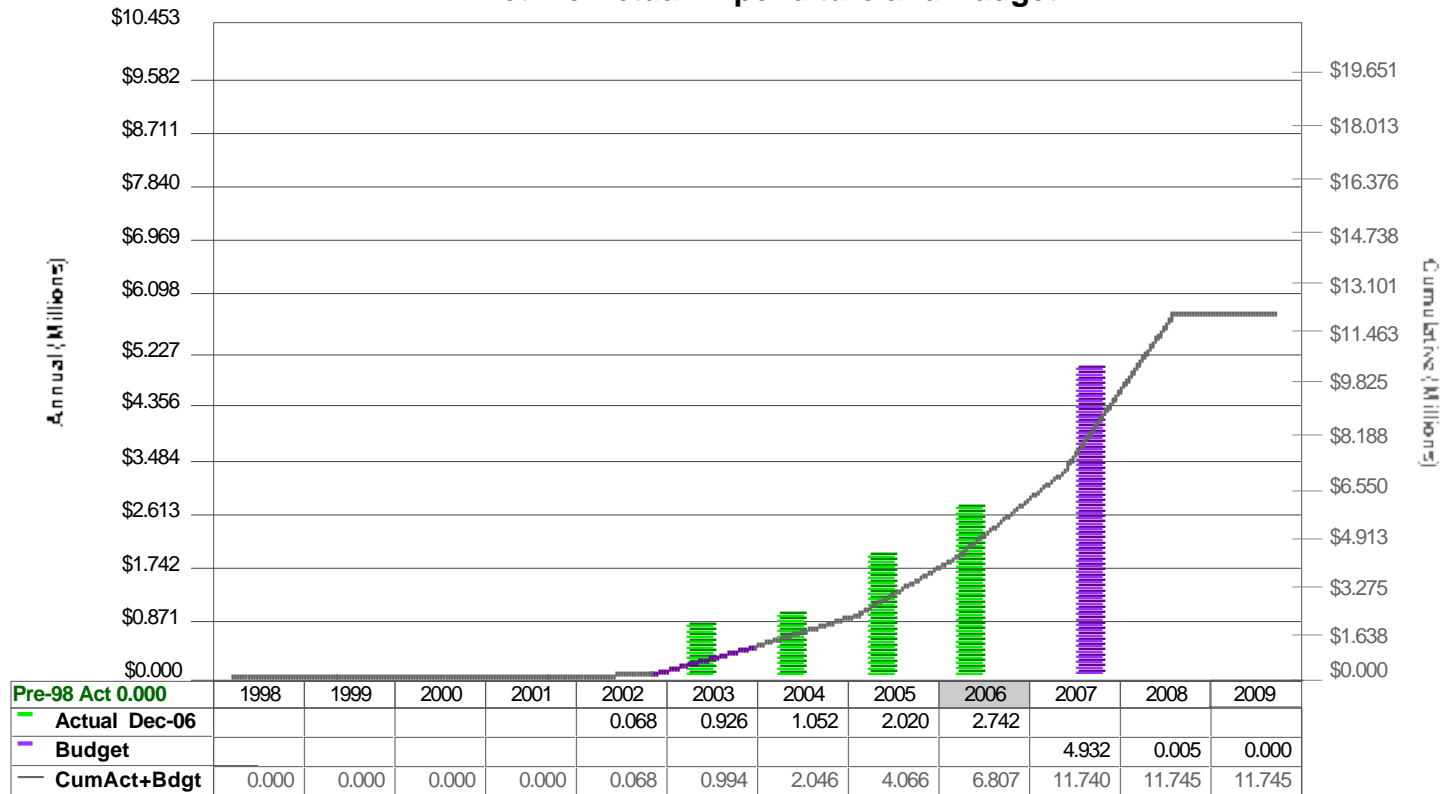
## Annual Cash Flow

### 2006 Actual Expenditure and Adopted Plan



## Lifetime Cash Flow

### Lifetime Actual Expenditure and Budget



# RWSP Project Report

## DECEMBER 2006

### 423521 Bellevue Pump Station



#### Project Description

This will upgrade the Bellevue Pump Station from 8 mgd to 11 mgd. A new 5,500 feet 24-inch force main will be constructed to convey the flows from the pump station to the East Side Interceptor. For a major portion of the pipe installation, a Horizontal Direction Drill (HDD) method will be used. The pump station improvements include new pumps, new electrical, mechanical, and odor equipment, and better access for maintenance vehicles and workers.

**Project Phase: 3 Final Design**

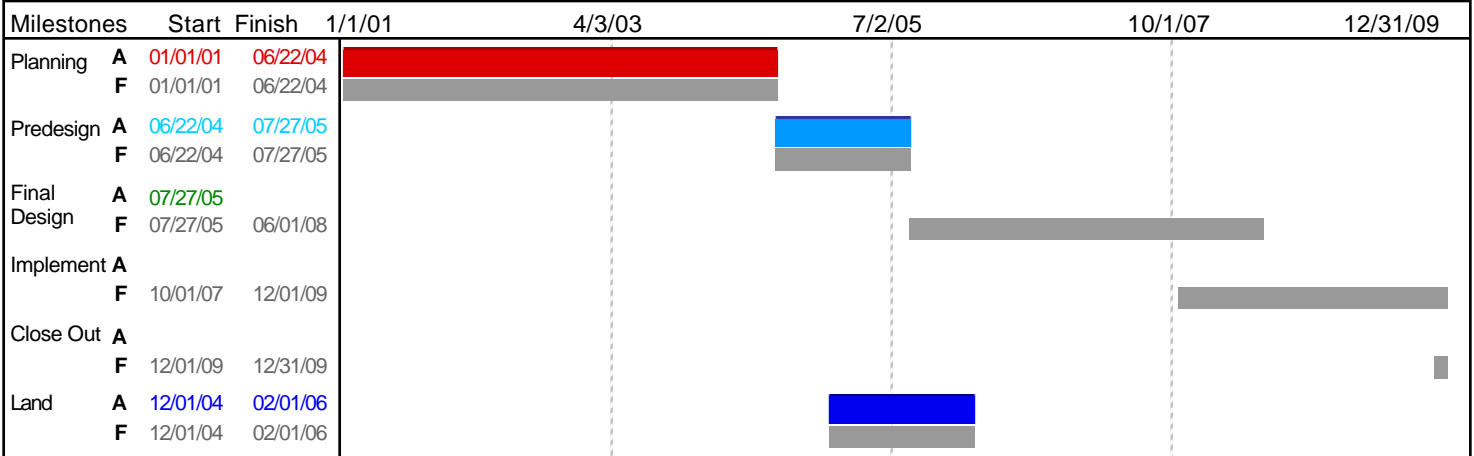


**King County**

Department of Natural Resources and Parks  
Wastewater Treatment Division

## Milestone Schedule

Actual (A) Forecast (F)



## Schedule Adjustments

The Pump Station contract is expected to be advertised in Nov. 2007 and awarded in early 2008. The project remains scheduled for completion in 2010.

## Cost Summary

Expenses	2006 Actual Expenditure and Plan			Lifetime Actual Expenditure and Budget		
	IBIS YTD Dec-06	Adopted Plan	Updated Plan	IBIS LTD Dec-06	Lifetime Budget	Updated Budget
CONSTRUCTION	0	4,337,673	554,000	0	13,403,049	13,408,748
Construction Contracts	0	4,327,373	544,000	0	13,371,213	13,367,848
Outside Agency Construction	0	10,300	10,000	0	31,836	40,900
NON-CONSTRUCTION	2,657,924	924,008	1,979,319	4,945,791	4,720,294	5,793,431
Engineering	2,129,485	551,050	1,589,794	3,915,996	2,935,911	4,201,255
Planning & Management Svcs.	23,415	0	15,897	48,803	181	66,364
Permitting & Other Agency Support	60,972	0	48,667	62,134	150,636	92,917
Right-of-Way	32,850	7,725	40,000	37,850	117,225	45,000
Misc. Services & Materials	31,278	6,094	6,094	39,810	23,812	24,455
Staff Labor	379,925	359,139	278,866	841,197	1,492,530	1,363,440
PROJECT RESERVE	0	0	0	0	200,000	1,786,025
Project Reserve	0	0	0	0	200,000	1,786,025
<b>Total \$</b>	2,657,924	5,261,682	2,533,319	4,945,791	18,323,343	20,988,204

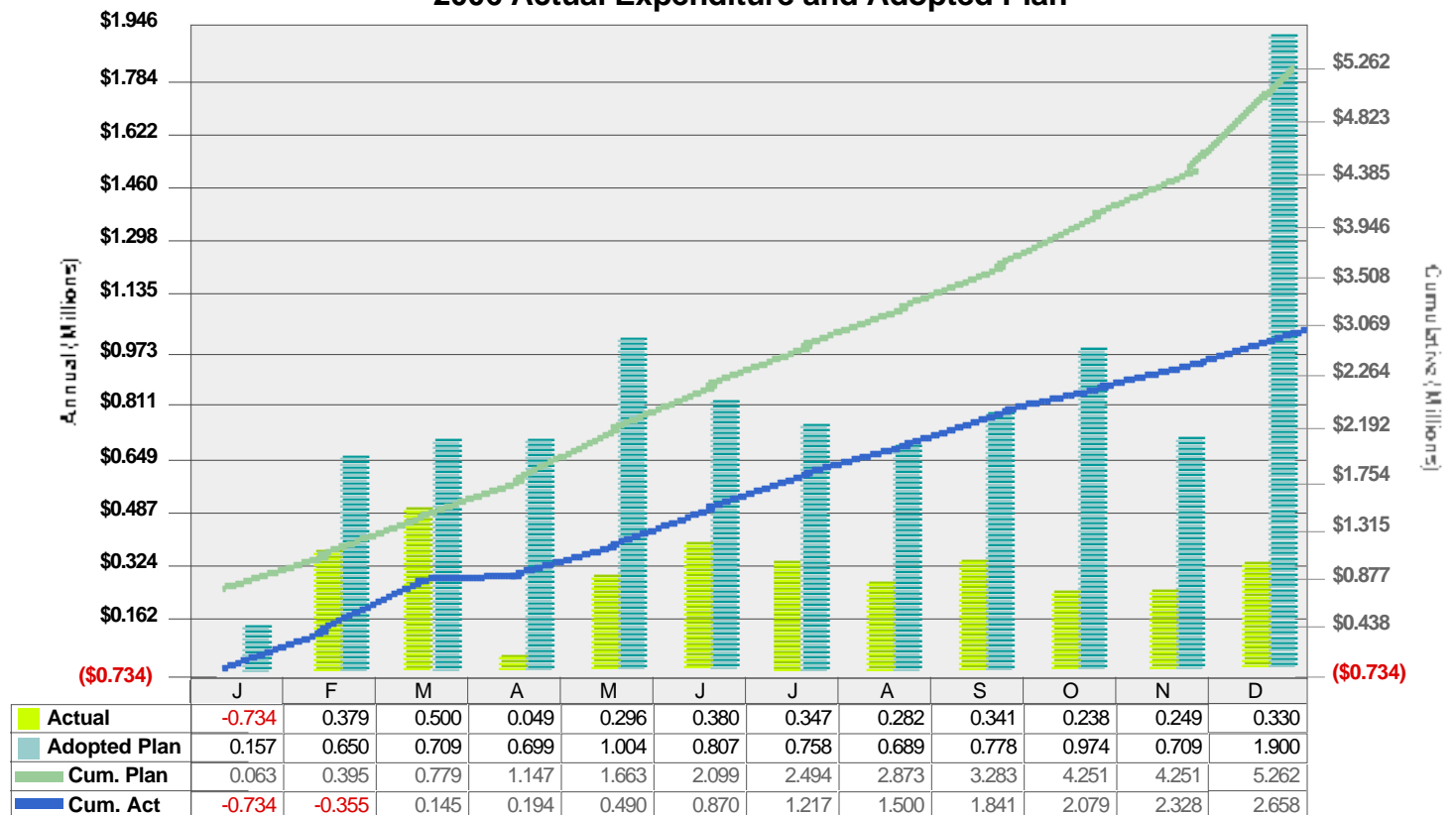
## Cost/Budget Adjustments

## Contract Status

Contract	Original Contract Amount	Phased Amends	Base Contract Amount	Change Amends or COs	Change Percentage	Nbr of Amends/CO's to Date	Current Contract Amount	Amount Paid	Thru Pmt No.	% Paid
Engineering Services for the Bellevue Pump Station	\$775,015	\$3,614,297	\$4,389,312	\$0	0%	1	\$4,389,312	\$3,752,199	32	85%
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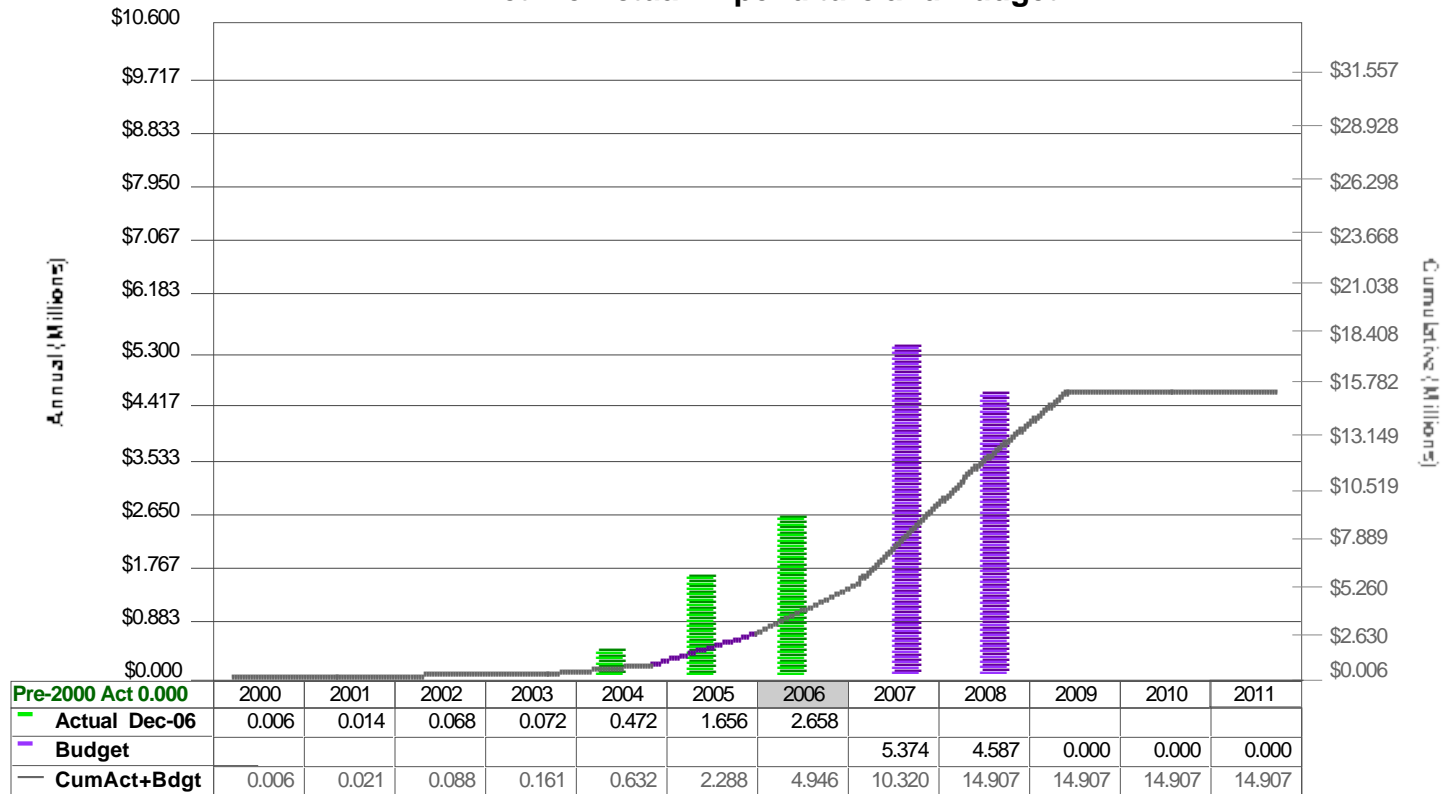
## Annual Cash Flow

### 2006 Actual Expenditure and Adopted Plan



## Lifetime Cash Flow

### Lifetime Actual Expenditure and Budget





## **423373 CONVEYANCE SYSTEM IMPROVEMENTS**

### **621 Black Diamond Storage Facility**



#### **Project Description**

This project will design & construct approximately 600,000 gallons of wastewater flow equalization storage located in the City of Black Diamond. The facility is anticipated to be operational in 2010.

**Project Phase: 2 Predesign**

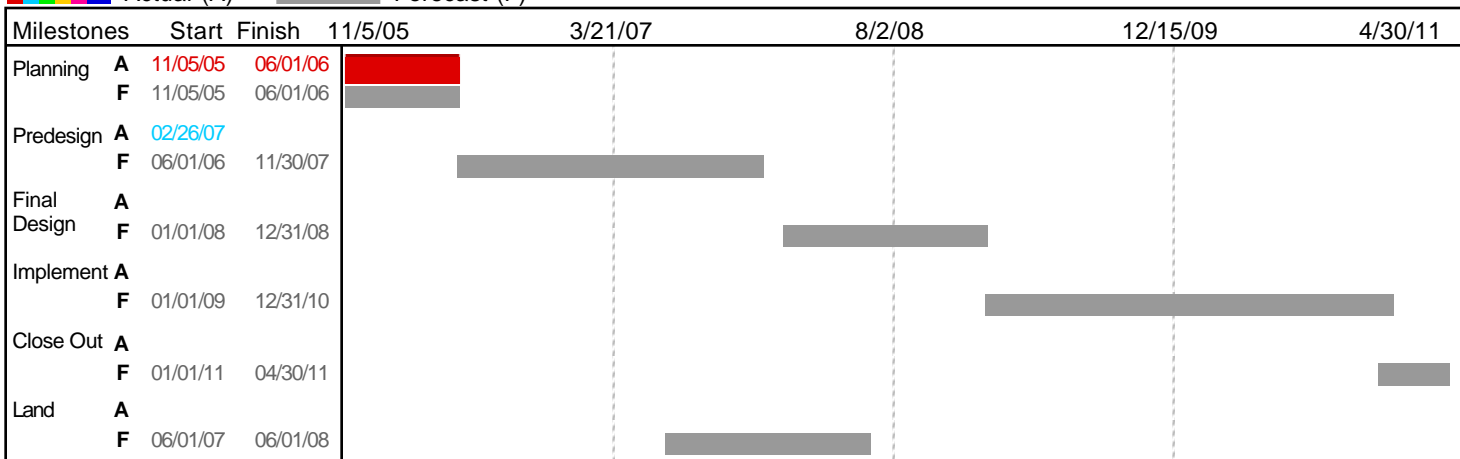


**King County**

Department of Natural Resources and Parks  
Wastewater Treatment Division

## Milestone Schedule

 Actual (A)
  Forecast (F)



## Schedule Adjustments

None at this time.

## Cost Summary

Expenses	2006 Actual Expenditure and Plan			Lifetime Actual Expenditure and Budget		
	IBIS YTD Dec-06	Adopted Plan	Updated Plan	IBIS LTD Dec-06	Lifetime Budget	Updated Budget
CONSTRUCTION	0	0	0	0	0	2,713,724
Construction Contracts	0	0	0	0	0	2,495,184
Outside Agency Construction	0	0	0	0	0	218,540
NON-CONSTRUCTION	26,912	0	213,156	49,567	261,297	2,347,542
Engineering	0	0	142,857	0	200,000	1,000,000
Planning & Management Svcs.	0	0	0	0	0	23,340
Permitting & Other Agency Support	0	0	0	0	0	106,090
Right-of-Way	0	0	0	0	0	424,360
Misc. Services & Materials	1,314	0	0	2,359	1,124	42,432
Staff Labor	25,599	0	70,298	47,208	60,172	751,320
PROJECT RESERVE	0	0	0	0	0	590,888
Project Reserve	0	0	0	0	0	590,888
<b>Total \$</b>	26,912	0	213,156	49,567	261,297	5,652,154

## Cost/Budget Adjustments

None at this time.

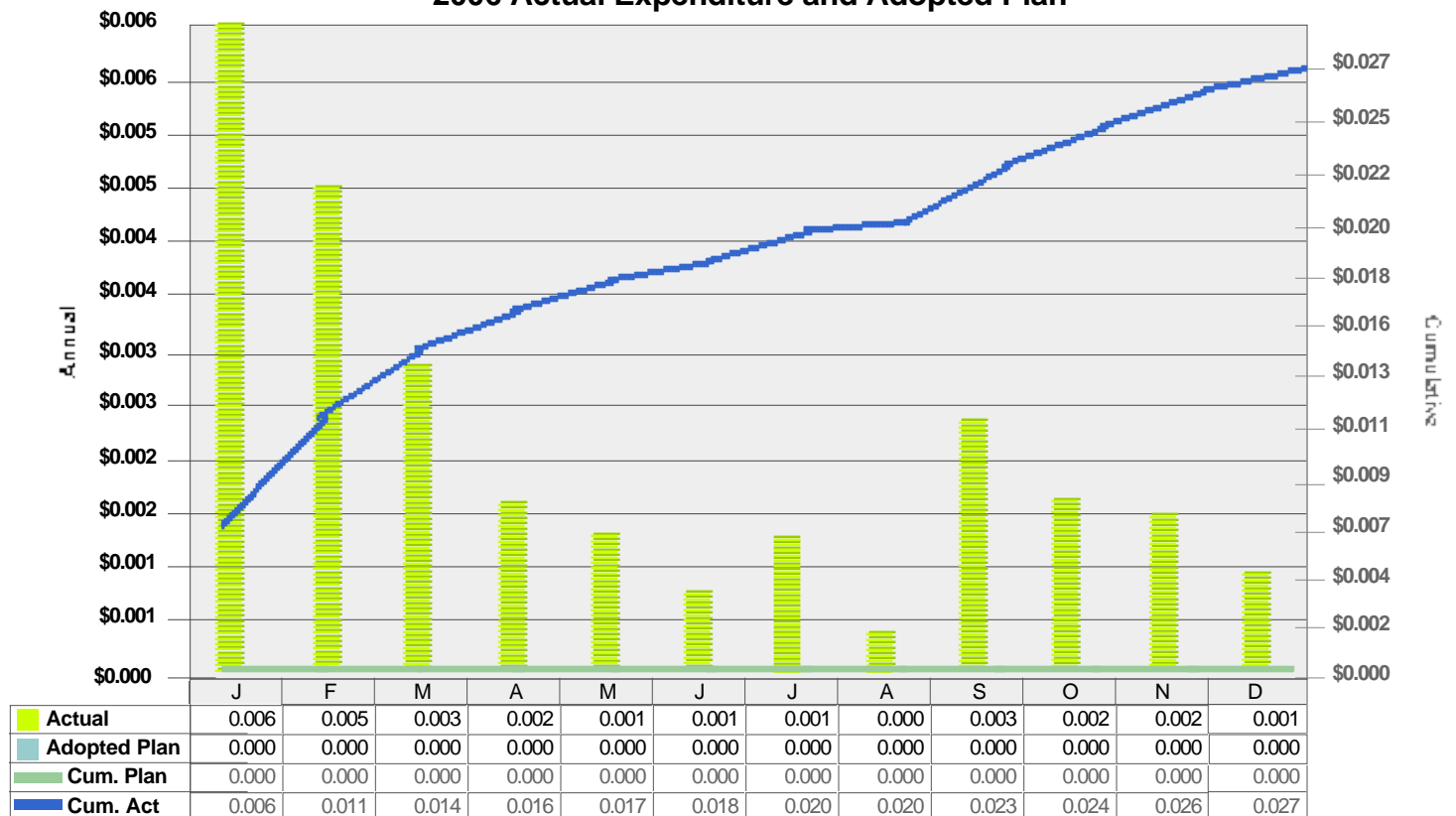


## Contract Status

Contract	Original Contract Amount	Phased Amends	Base Contract Amount	Change Amends or COs	Change Percentage	Nbr of Amends/CO's to Date	Current Contract Amount	Amount Paid	Thru Pmt No.	% Paid
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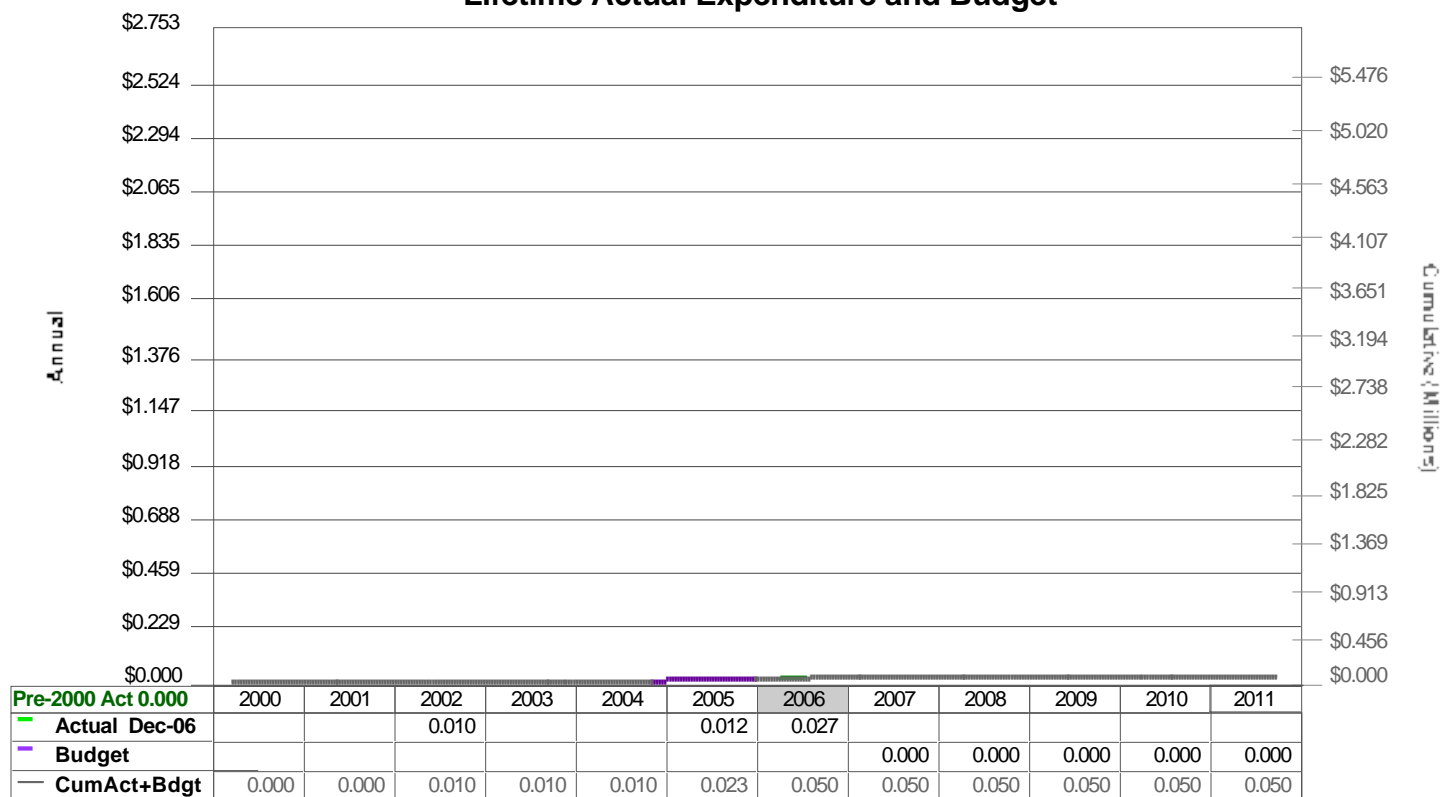
## Annual Cash Flow

### 2006 Actual Expenditure and Adopted Plan



## Lifetime Cash Flow

### Lifetime Actual Expenditure and Budget



# RWSP Project Report

## DECEMBER 2006

### 423582 SW Interceptor (Kent/Auburn Conveyance Improvements)



#### Project Description

This project will construct approximately 5 miles of new sewer in Kent and Auburn ranging from 18 inch diameter to 54 inch diameter. There are 3 distinct project elements: 1) Auburn West Valley parallel interceptor, located in Pacific, Algona and Auburn, this pipe will run north and add capacity, 2) the Stuck River Trunk in Auburn will convey sewage flow away from the M-Street Trunk to the new parallel interceptor listed above, and 3) the Mill Creek Relief Sewer, in Kent, will remove some flow out of the Mill Creek Interceptor and convey it west to the Auburn Interceptor.

**Project Phase: 2 Predesign**

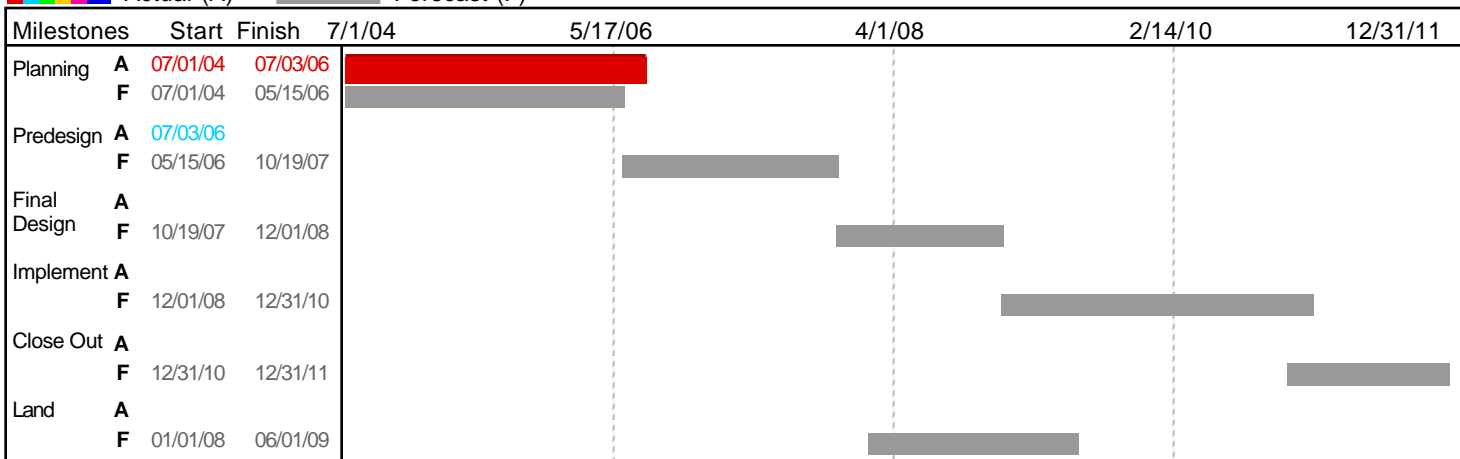


**King County**

Department of Natural Resources and Parks  
Wastewater Treatment Division

## Milestone Schedule

Actual (A)      Forecast (F)



## Schedule Adjustments

## Cost Summary

Expenses	2006 Actual Expenditure and Plan			Lifetime Actual Expenditure and Budget		
	IBIS YTD Dec-06	Adopted Plan	Updated Plan	IBIS LTD Dec-06	Lifetime Budget	Updated Budget
CONSTRUCTION	0	0	0	0	28,875,404	31,967,529
Construction Contracts	0	0	0	0	28,875,404	31,967,529
Owner Furnished Equipment	0	0	0	0	0	0
Outside Agency Construction	0	0	0	0	0	0
Other Capital Charges	0	0	0	0	0	0
NON-CONSTRUCTION	643,479	2,113,668	1,083,668	745,206	10,889,660	10,737,423
Engineering	446,855	1,519,392	788,394	446,855	6,949,741	6,904,768
Planning & Management Svcs.	0	0	0	0	0	0
Permitting & Other Agency Support	0	0	0	0	200,449	208,187
Right-of-Way	0	0	0	0	200,449	1,039,270
Misc. Services & Materials	5,860	0	0	11,868	330	6,008
Staff Labor	190,764	594,275	295,274	286,484	3,538,690	2,579,191
PROJECT RESERVE	0	0	0	0	5,364,273	1,857,075
Project Reserve	0	0	0	0	5,364,273	1,857,075
ADJUSTMENTS	0	0	0	0	0	0
Adjustments	0	0	0	0	0	0
CREDITS AND REVENUES	0	-515,000	0	0	64,637	0
Credits and Revenues	0	-515,000	0	0	64,637	0
<b>Total \$</b>	643,479	1,598,668	1,083,668	745,206	45,193,974	44,562,028

## Cost/Budget Adjustments

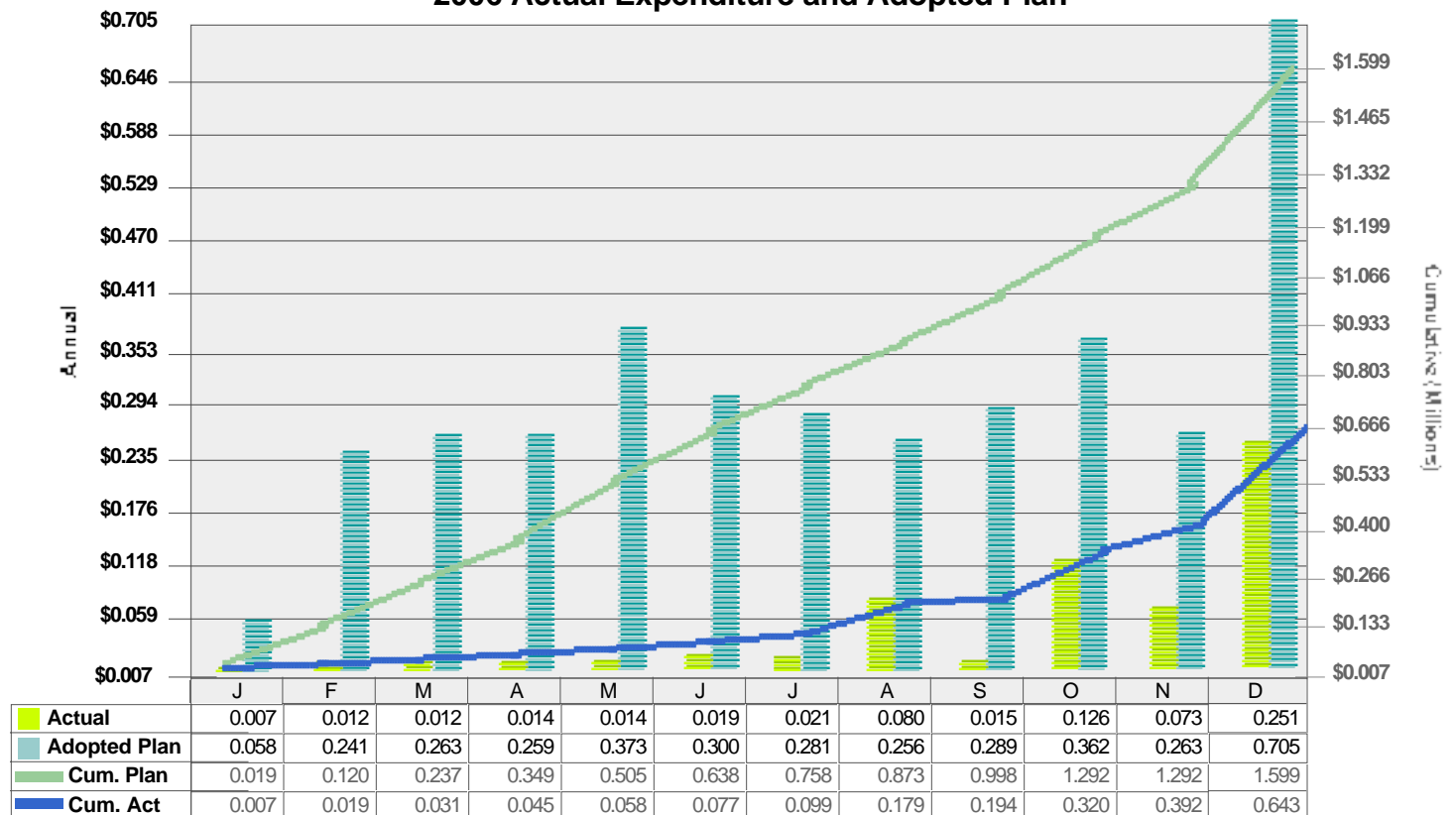
None at this time.

## Contract Status

Contract	Original Contract Amount	Phased Amends	Base Contract Amount	Change Amends or COs	Change Percentage	Nbr of Amends/CO's to Date	Current Contract Amount	Amount Paid	Thru Pmt No.	% Paid
Engineering Services for Kent Auburn Conveyance System E53009E	\$2,686,967	\$0	\$2,686,967	\$0	0%		\$2,686,967	\$452,649	6	17%

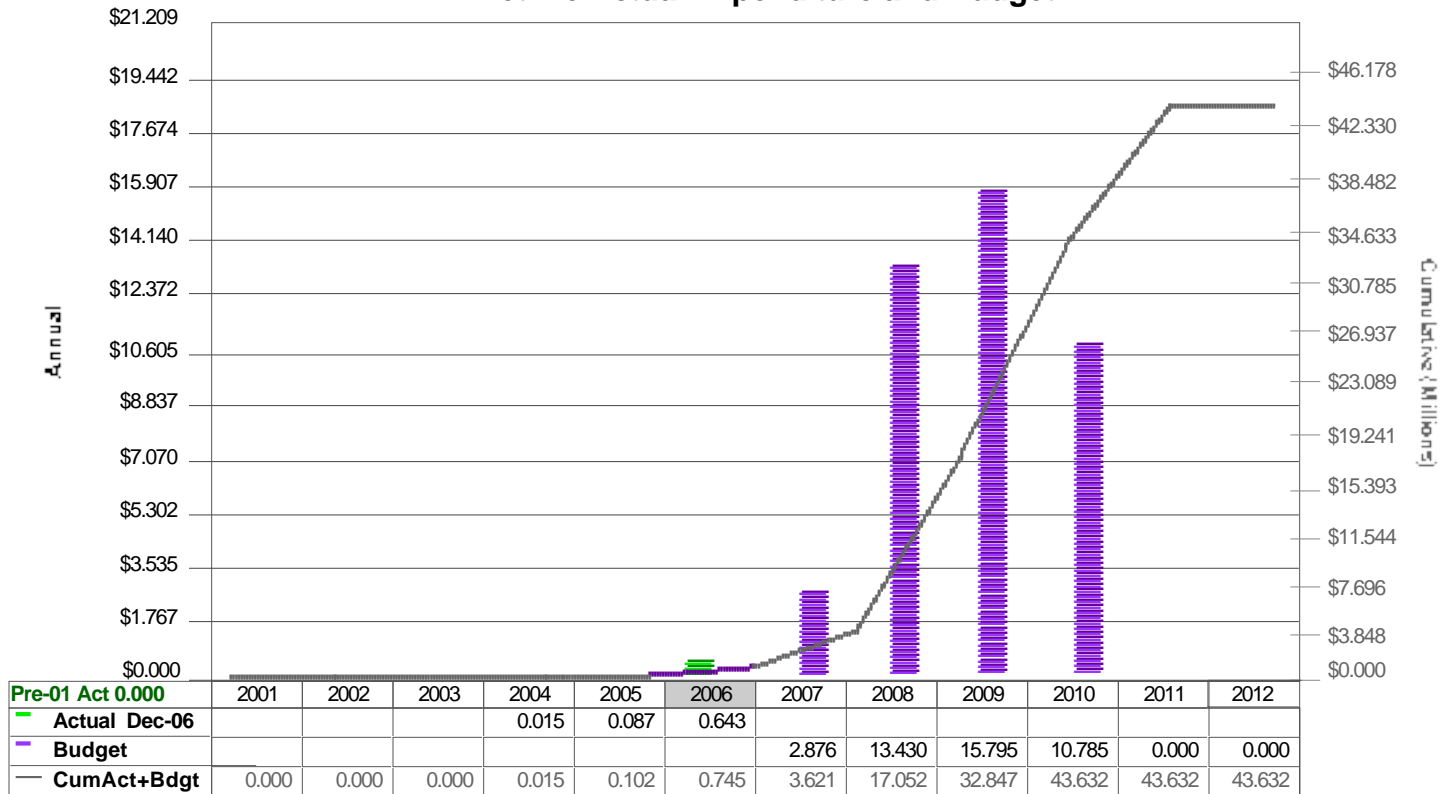
## Annual Cash Flow

### 2006 Actual Expenditure and Adopted Plan



## Lifetime Cash Flow

### Lifetime Actual Expenditure and Budget



# RWSP Project Report

## DECEMBER 2006

### 423365 HIDDEN LAKE PS/BOEING CREEK TRUNK



#### Project Description

This project will construct a new Hidden Lake pump station, approximately 12,000 feet of new sewer pipeline, and a 500,000 gallon underground storage pipe. The project is located in the City of Shoreline. The pipelines will be constructed by open trenching and microtunneling. The pump station will be constructed by conventional above ground methods. Construction started in May 2006 and should be complete by the end of 2008/early 2009.

#### Project Phase: 4 Implementation

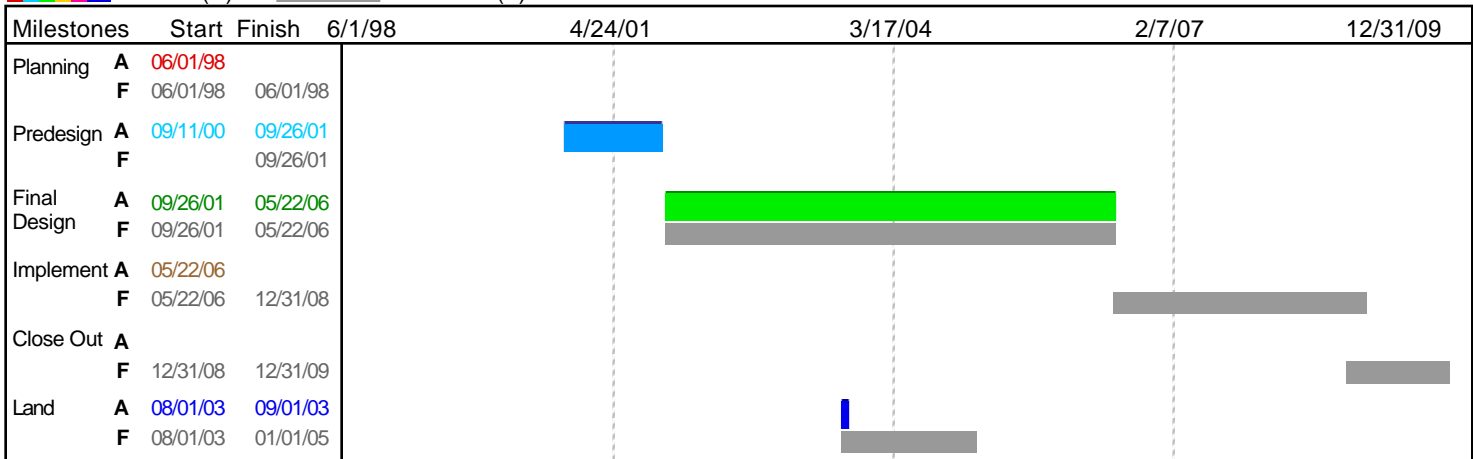


**King County**

Department of Natural Resources and Parks  
Wastewater Treatment Division

## Milestone Schedule

Actual (A) Forecast (F)



## Schedule Adjustments

none

## Cost Summary

Expenses	2006 Actual Expenditure and Plan			Lifetime Actual Expenditure and Budget		
	IBIS YTD Dec-06	Adopted Plan	Updated Plan	IBIS LTD Dec-06	Lifetime Budget	Updated Budget
CONSTRUCTION	8,511,406	10,425,017	2,421,631	8,672,810	25,837,411	27,572,644
Construction Contracts	8,498,896	10,425,017	2,336,886	8,660,300	25,837,411	26,539,828
Outside Agency Construction	0	0	84,745	0	0	1,032,816
Other Capital Charges	12,510	0	0	12,510	0	0
NON-CONSTRUCTION	1,589,406	1,412,255	643,870	8,131,187	8,718,157	10,091,741
Engineering	212,027	971,484	274,178	4,269,524	6,691,190	5,140,453
Planning & Management Svcs.	337,303	0	199,354	409,701	1,207	1,676,343
Permitting & Other Agency Support	90,616	0	7,037	1,251,567	53,816	1,212,527
Right-of-Way	0	145,402	0	149,633	331,835	149,633
Misc. Services & Materials	94,443	13,733	0	230,297	128,354	133,988
Staff Labor	855,018	281,636	163,301	1,820,465	1,511,755	1,778,798
PROJECT RESERVE	0	0	0	0	0	1,201,970
Project Reserve	0	0	0	0	0	1,201,970
CREDITS AND REVENUES	0	-515,000	-101,613	0	79,581	-465,834
Credits and Revenues	0	-515,000	-101,613	0	79,581	-465,834
<b>Total \$</b>	10,100,812	11,322,272	2,963,888	16,803,997	34,635,150	38,400,522

## Cost/Budget Adjustments

Construction started in May of 2006. The contractor accelerated the construction of the Boeing Creek Storage Facility during the summer of 2006 and completed the majority of it by October 2006. The accelerated construction work also increased the amount of construction management staff costs expended. Also, the contractor purchased all of the new plastic trunk sewer pipe in 2006. These factors resulted in a significantly higher 2006 budget expenditure.

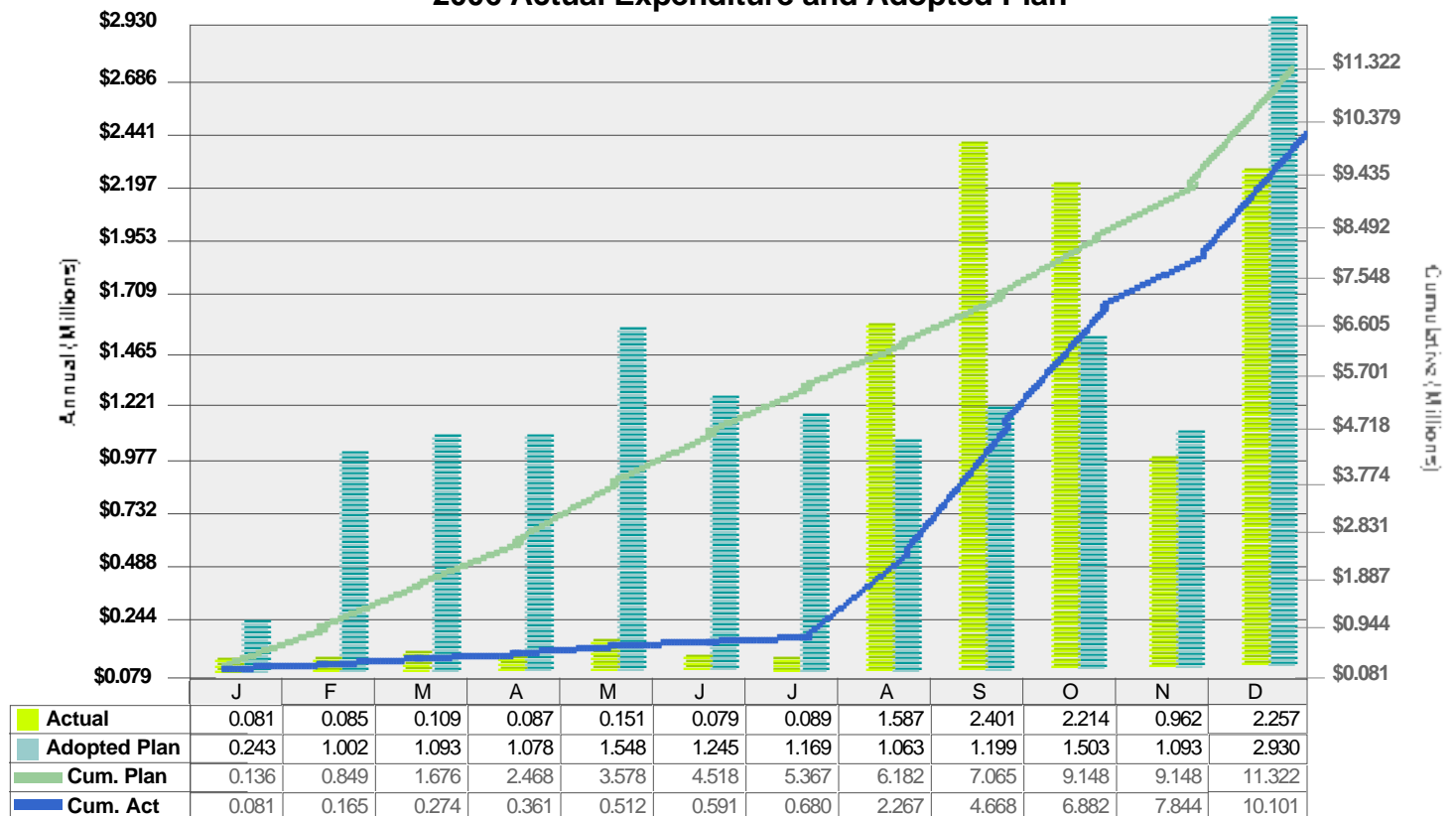


## Contract Status

Contract	Original Contract Amount	Phased Amends	Base Contract Amount	Change Amends or COs	Change Percentage	Nbr of Amends/CO's to Date	Current Contract Amount	Amount Paid	Thru Pmt No.	% Paid
Hidden Lake Project C53108C	\$20,929,000	\$0	\$20,929,000	\$17,493	0%	1	\$20,946,493	\$5,230,408	3	25%
Hidden Lake Pump Station E03036E	\$2,699,191	\$0	\$2,699,191	\$2,381,297	88%	5	\$5,080,487	\$4,186,258	56	82%
Construction Management Services for the Hidden P43017P	\$1,500,071	\$0	\$1,500,071	\$0	0%		\$1,500,071	\$211,177	8	14%
Mitigation for Hidden Lk PS and boeing Creek Trunk Sewer MOA 3415	\$1,100,000	\$0	\$1,100,000	\$0	0%		\$1,100,000	\$0		0%
Permanent Underground Svcs for Hidden Lake PS Agreement/SCL	\$60,000	\$0	\$60,000	\$0	0%		\$60,000	\$0		0%

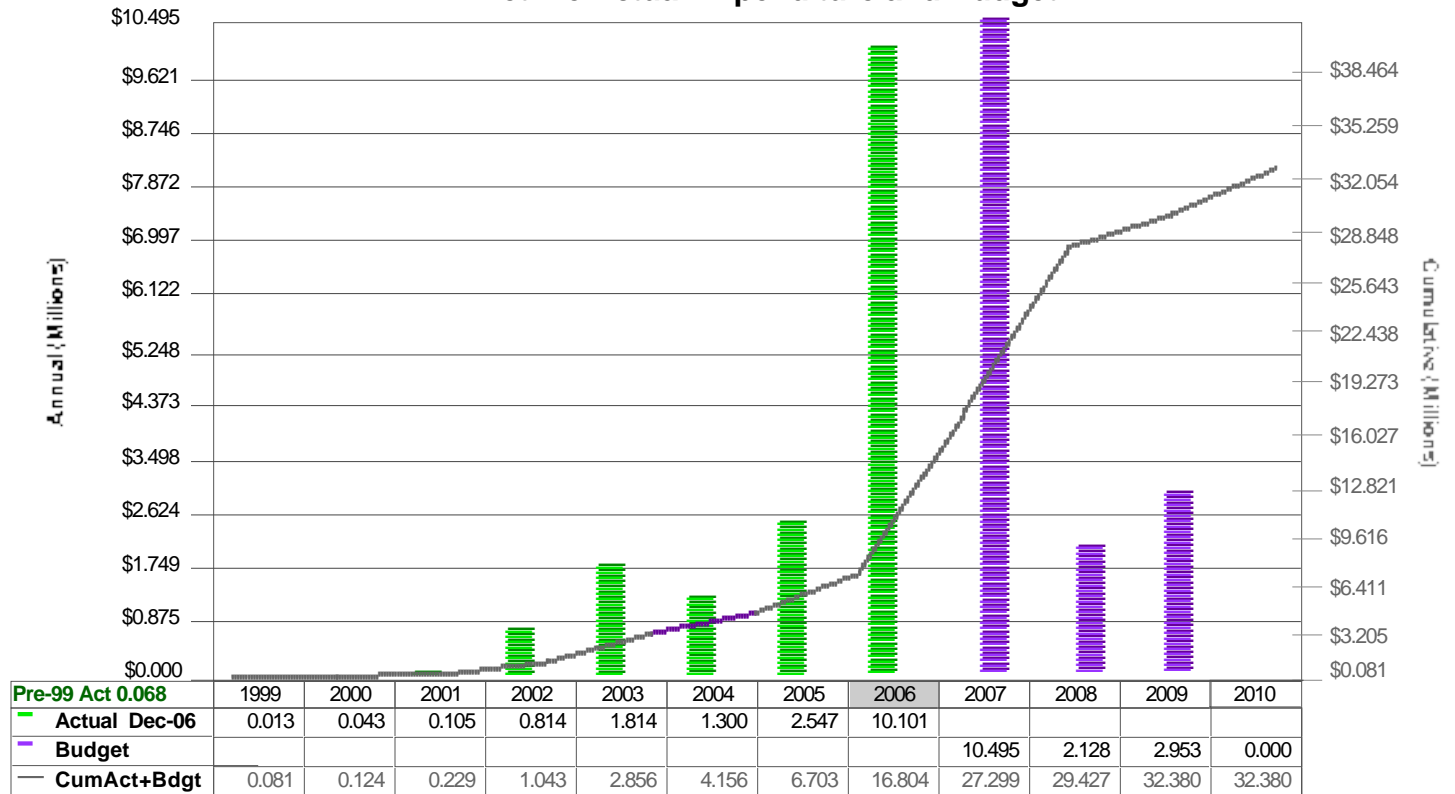
## Annual Cash Flow

### 2006 Actual Expenditure and Adopted Plan



## Lifetime Cash Flow

### Lifetime Actual Expenditure and Budget



# RWSP Project Report

## DECEMBER 2006

### 423494 Fairwood Interceptor (formerly Madsen Creek)



#### Project Description

This project abandoned existing erosion prone and unstable Madsen Creek sewer pipeline which conveyed sewage from the Fairwood area near SE Renton to the Maple Valley trunk and replaced it with a deep gravity sewer in a new alignment, outside the Madsen Creek ravine. The new alignment follows Fairwood Blvd. for several blocks, and includes an inverted siphon underneath the west Madsen Creek tributary, from the Fairwood Elementary School to the Bonneville Power Administration right of way near 140th Avenue. This new deep gravity interceptor avoids the need for a pump station to be located in the Fairwood area. The project was divided into 3 major phases: Phase 1 - Inverted Siphon, Phase 2A Pipe bursting, and Phase 2B Microtunneling. Construction was substantially complete in December 2006.

#### Project Phase: 4 Implementation

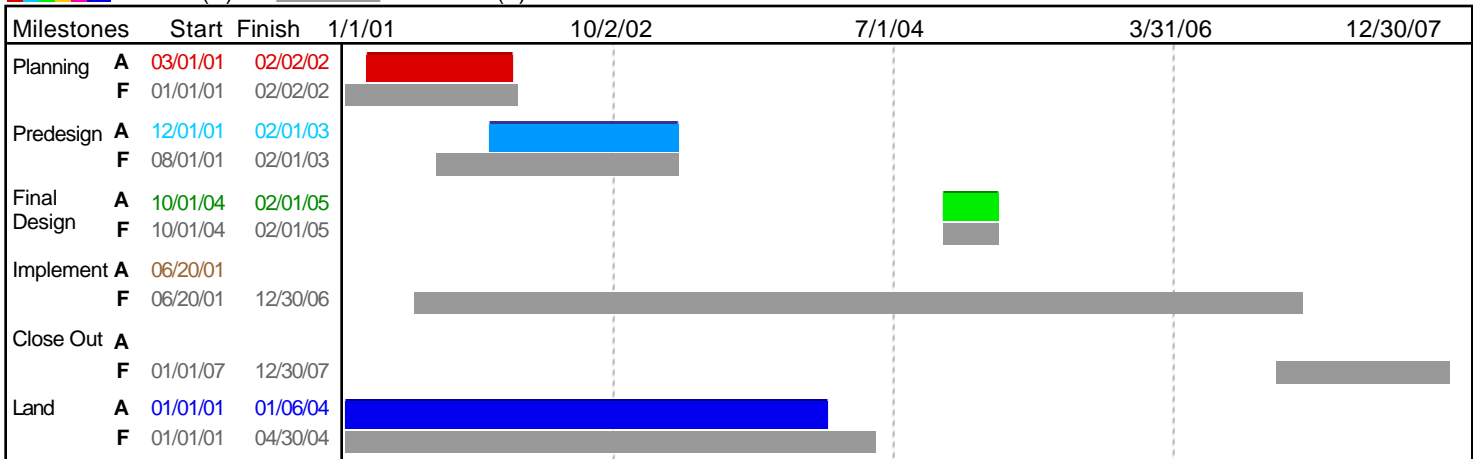


**King County**

Department of Natural Resources and Parks  
Wastewater Treatment Division

## Milestone Schedule

Actual (A) Forecast (F)



## Schedule Adjustments

N/A

## Cost Summary

Expenses	2006 Actual Expenditure and Plan			Lifetime Actual Expenditure and Budget		
	IBIS YTD Dec-06	Adopted Plan	Updated Plan	IBIS LTD Dec-06	Lifetime Budget	Updated Budget
CONSTRUCTION	5,068,407	6,372,073	5,656,859	16,529,526	17,457,149	17,117,978
Construction Contracts	5,030,532	6,371,880	5,656,666	16,491,525	17,456,644	17,117,660
Other Capital Charges	37,875	193	193	38,001	506	319
NON-CONSTRUCTION	849,774	388,921	1,044,112	4,394,219	4,122,450	4,588,557
Engineering	179,751	129,809	565,000	2,281,521	2,329,632	2,666,770
Planning & Management Svcs.	47,813	0	0	64,062	15,384	16,248
Permitting & Other Agency Support	2,638	0	0	337,275	433,186	334,637
Right-of-Way	32,952	7,210	7,210	231,134	235,440	205,392
Misc. Services & Materials	35,957	20,892	20,892	77,170	62,964	62,106
Staff Labor	550,663	231,010	451,010	1,403,057	1,045,844	1,303,405
CREDITS AND REVENUES	0	-1,030,000	0	0	30,900	0
Credits and Revenues	0	-1,030,000	0	0	30,900	0
<b>Total \$</b>	5,918,181	5,730,994	6,700,971	20,923,745	21,610,499	21,706,537

## Cost/Budget Adjustments

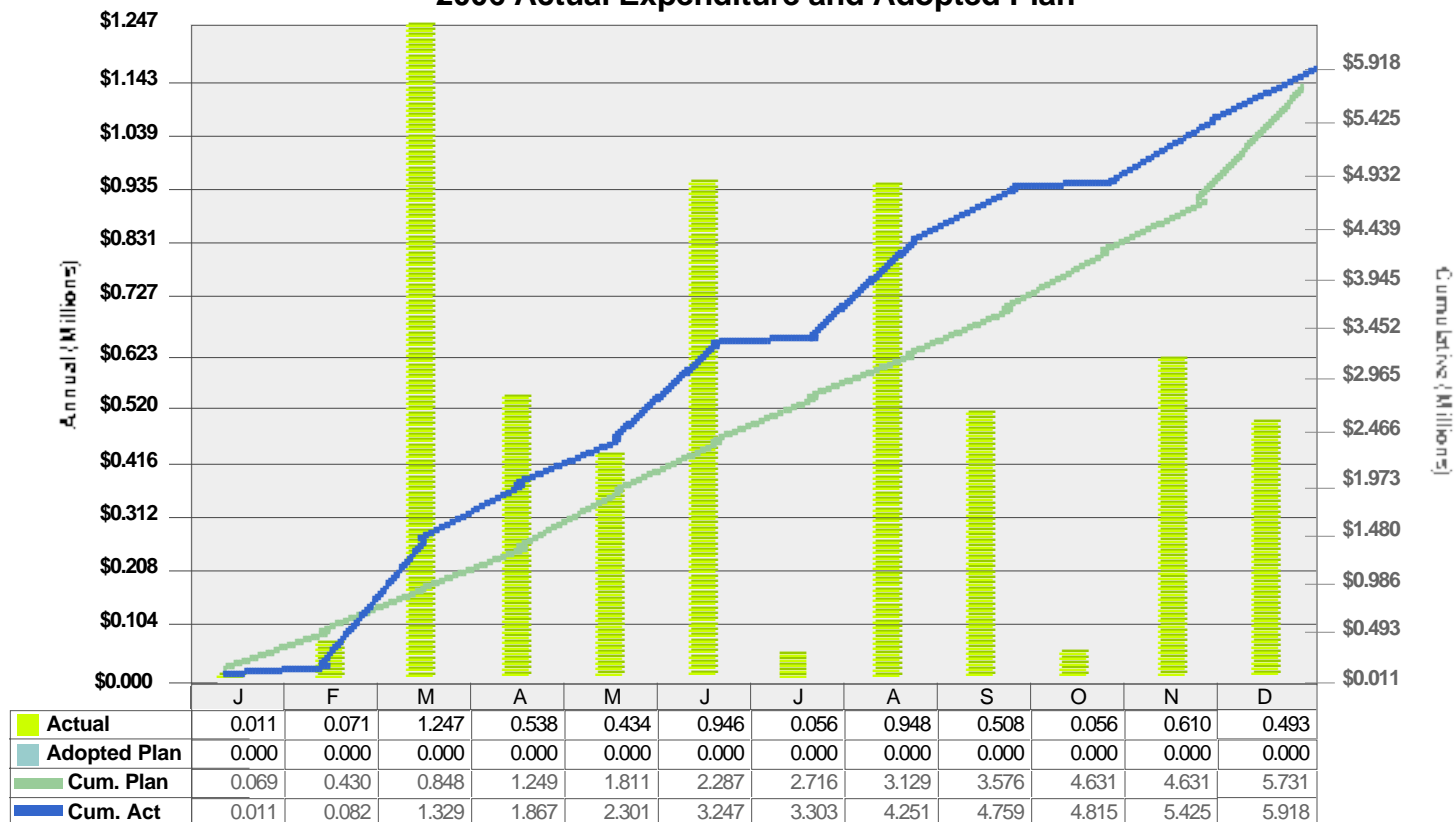
- Approximately \$1 million was deleted from overall project contingency in early 2006 as construction was proceeding apace and bid came in low.
- Some unspent budget for engineering will be transferred to construction contingency to pay for change orders, including additional road and sidewalk restoration that was originally unanticipated. Overall change order rate is very low to date.
- No overall increase to budget is anticipated at this time, and no change to overall yearly cash flow estimates.

## Contract Status

Contract	Original Contract Amount	Phased Amends	Base Contract Amount	Change Amends or COs	Change Percentage	Nbr of Amends/CO's to Date	Current Contract Amount	Amount Paid	Thru Pmt No.	% Paid
Fairwood Interceptor Phase 2B, Microtunneling	\$7,699,750	\$0	\$7,699,750	\$14,452	0%	2	\$7,714,202	\$7,150,387	15	93%
Fairwood - Evaluation and Design of Madsen Creek	\$385,376	\$2,058,746	\$2,444,123	\$189,325	8%	3	\$2,633,447	\$2,146,805	74	82%

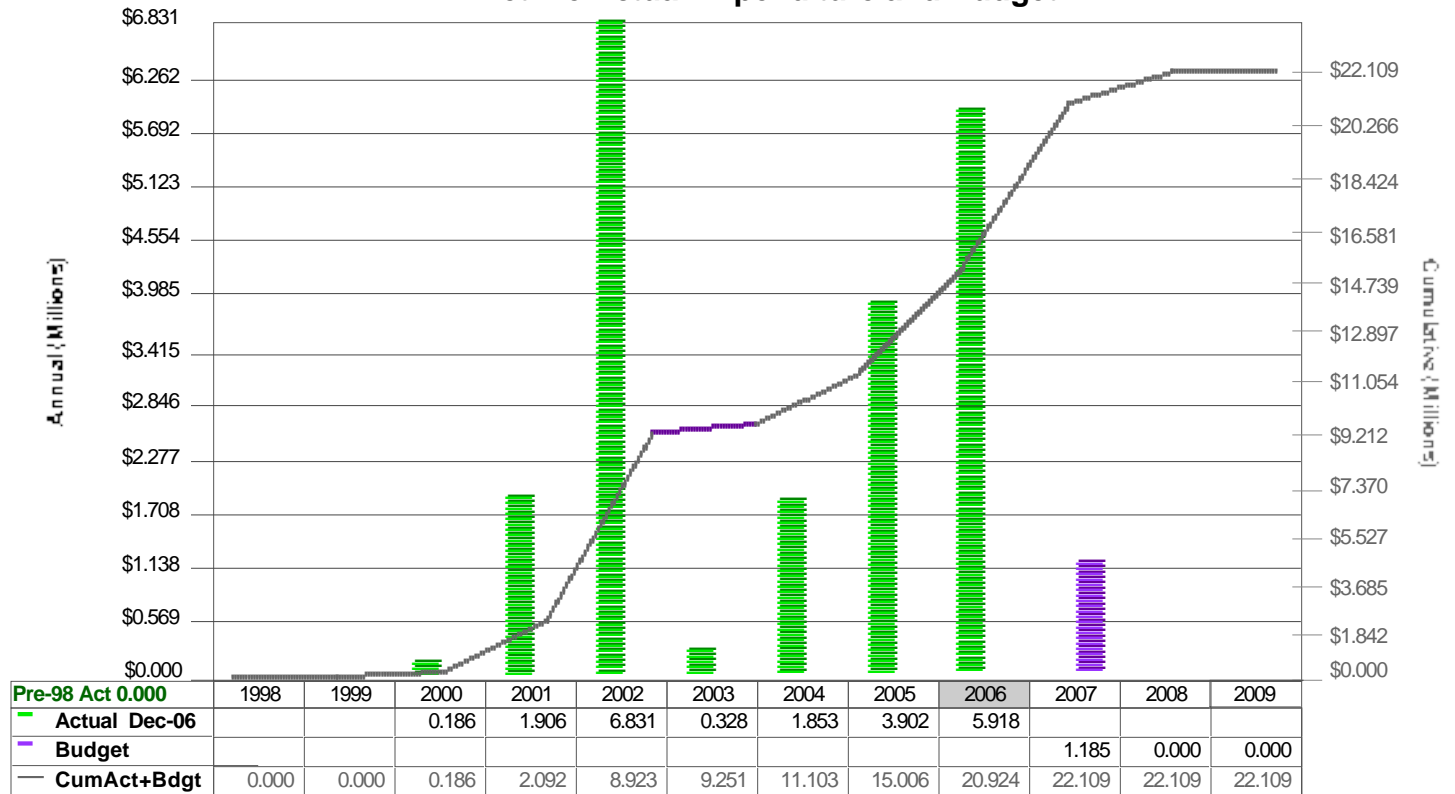
## Annual Cash Flow

### 2006 Actual Expenditure and Adopted Plan



## Lifetime Cash Flow

### Lifetime Actual Expenditure and Budget





# RWSP Project Report

## DECEMBER 2006

### 423406 JUANITA BAY PS - MODIFICATIONS



#### Project Description

This project will construct a 30.6 million gallon per day wastewater pump station to increase the capacity of and replace an aging pump station. The existing and future pump stations are located at the intersection of NE Juanita Drive and 93rd Ave NE in Kirkland. The station will include four pairs of two-stage pumps, odor control and chemical addition systems for odor and corrosion prevention, equipment lifting devices, equipment sound attenuation, and a standby generator. A large portion of the facility will be in an underground 86-foot diameter, 50-foot deep circular structure. The underground structure will be constructed with 4-foot diameter reinforced concrete secant (interlocking) piles. This project will also evaluate the capacity and alignment of the existing Juanita Force Mains which operate in tandem with the pump station.

#### Project Phase: 4 Implementation

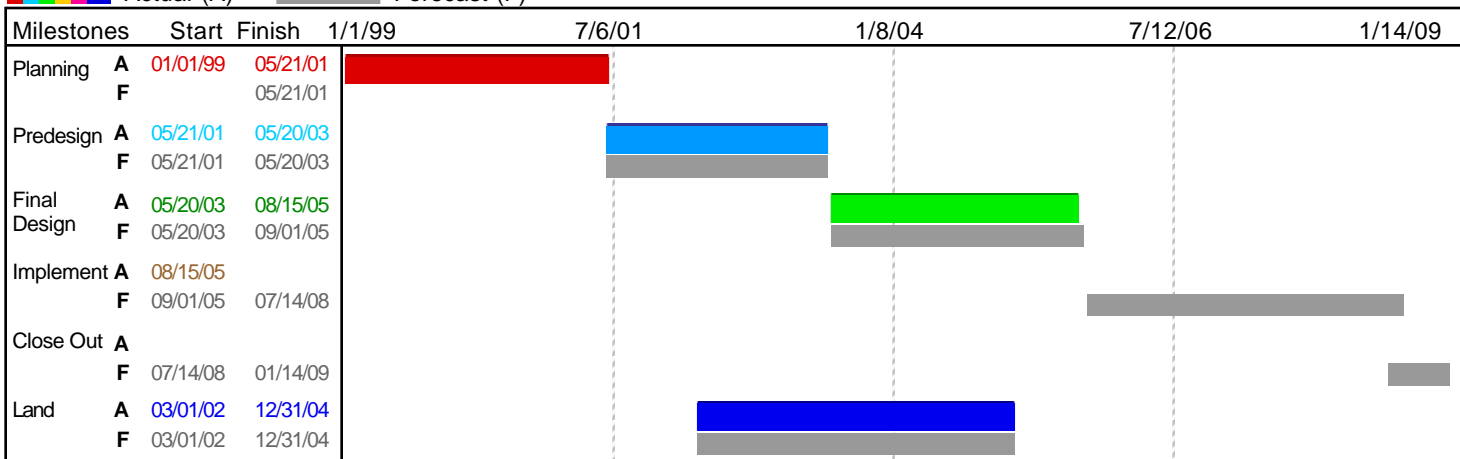


**King County**

Department of Natural Resources and Parks  
Wastewater Treatment Division

## Milestone Schedule

 Actual (A) 
  Forecast (F)



## Schedule Adjustments

• NA

## Cost Summary

Expenses	2006 Actual Expenditure and Plan			Lifetime Actual Expenditure and Budget		
	IBIS YTD Dec-06	Adopted Plan	Updated Plan	IBIS LTD Dec-06	Lifetime Budget	Updated Budget
CONSTRUCTION	6,887,028	7,135,180	9,905,690	8,507,574	24,152,079	22,964,516
Construction Contracts	6,865,870	7,053,810	9,792,000	8,486,416	23,911,274	22,684,448
Outside Agency Construction	0	0	15,000	0	0	30,450
Other Capital Charges	21,158	81,370	98,690	21,158	240,805	249,618
NON-CONSTRUCTION	1,913,048	1,057,824	1,783,031	10,525,414	11,583,473	14,012,401
Engineering	783,309	504,863	1,050,600	6,279,148	6,861,058	8,670,261
Planning & Management Svcs.	33,876	0	0	104,680	50,261	70,804
Permitting & Other Agency Support	42,108	1,567	1,567	93,395	202,435	214,318
Right-of-Way	0	0	0	1,541,751	1,516,377	1,541,751
Misc. Services & Materials	47,270	0	5,000	123,525	20,043	86,405
Staff Labor	1,006,485	551,393	725,864	2,382,915	2,933,299	3,428,862
CREDITS AND REVENUES	0	-515,000	0	0	31,363	0
Credits and Revenues	0	-515,000	0	0	31,363	0
<b>Total \$</b>	8,800,077	7,678,004	11,688,721	19,032,988	35,766,916	36,976,917

## Cost/Budget Adjustments

NA

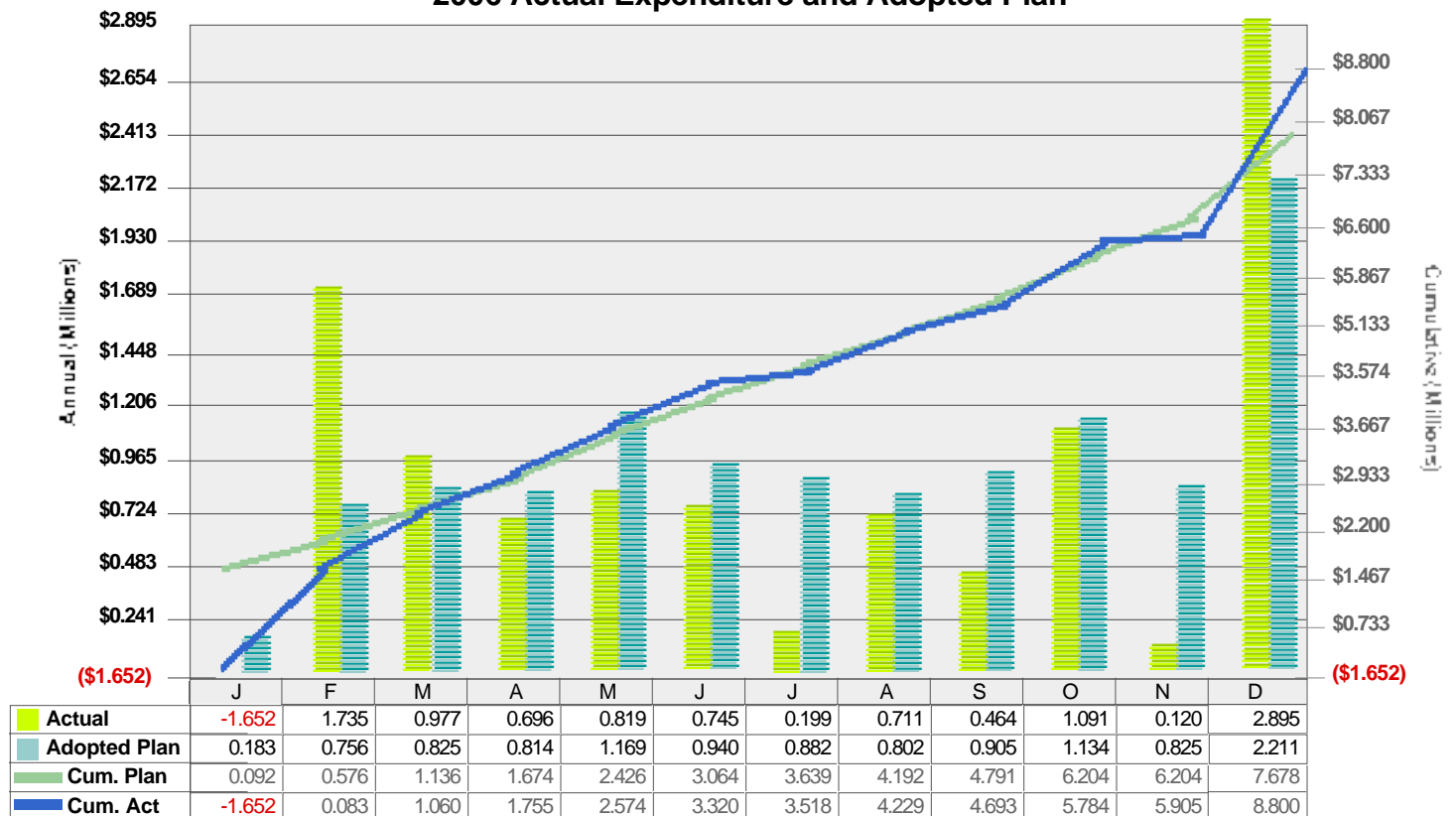


## Contract Status

Contract	Original Contract Amount	Phased Amends	Base Contract Amount	Change Amends or COs	Change Percentage	Nbr of Amends/CO's to Date	Current Contract Amount	Amount Paid	Thru Pmt No.	% Paid
Juanita Bay Pump Station Replacement	\$18,988,000	\$0	\$18,988,000	\$28,957	0%	2	\$19,016,957	\$7,896,688	12	42%
Eng'g Services for Juanita Bay & Forcmain Update	\$1,849,354	\$4,725,798	\$6,575,153	\$0	0%	1	\$6,575,153	\$6,295,200	68	96%

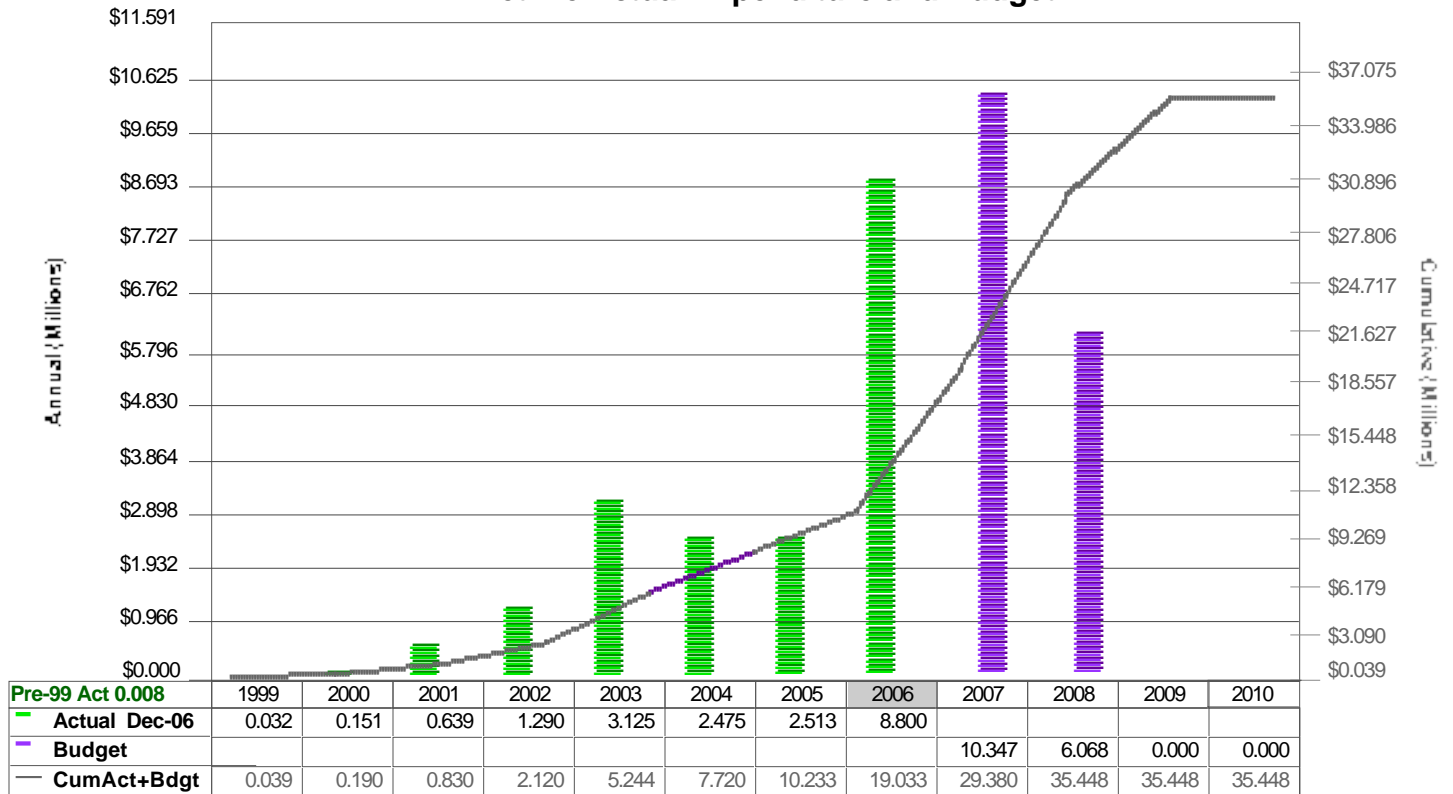
## Annual Cash Flow

### 2006 Actual Expenditure and Adopted Plan



## Lifetime Cash Flow

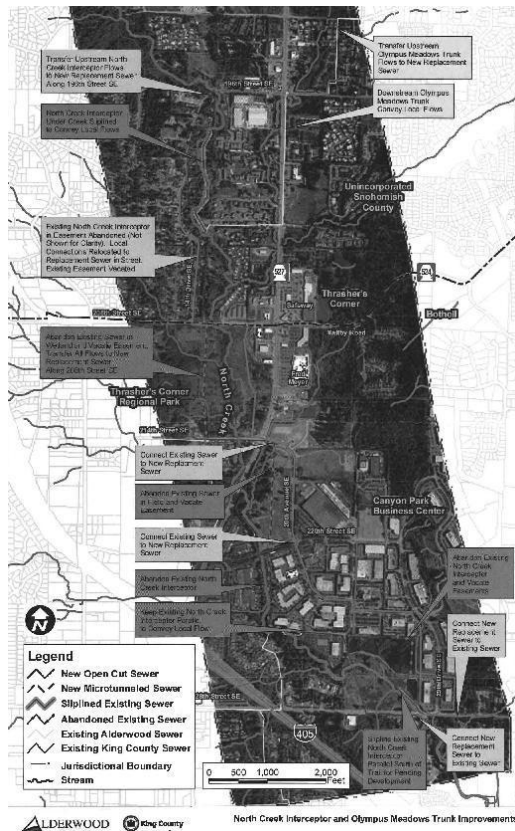
### Lifetime Actual Expenditure and Budget



# RWSP Project Report

## DECEMBER 2006

### 423596 North Creek Pipeline



#### Project Description

Improvements to the North Creek Interceptor are required to provide regional wastewater conveyance service to support current and future growth in the North Creek basin. The project area begins in the vicinity of 196th Street S.E. in unincorporated Snohomish County and extends south to 228th Street S.E. within the City of Bothell.

The improvements will consist of 16,400 feet of gravity sewer pipes, ranging from 21 inches to 48 inches that replace the existing pipes. The sewer pipes will be installed using open cut construction, with trenchless construction methods used for special crossings where the pipe crosses areas with high potential for traffic or environmental impacts.

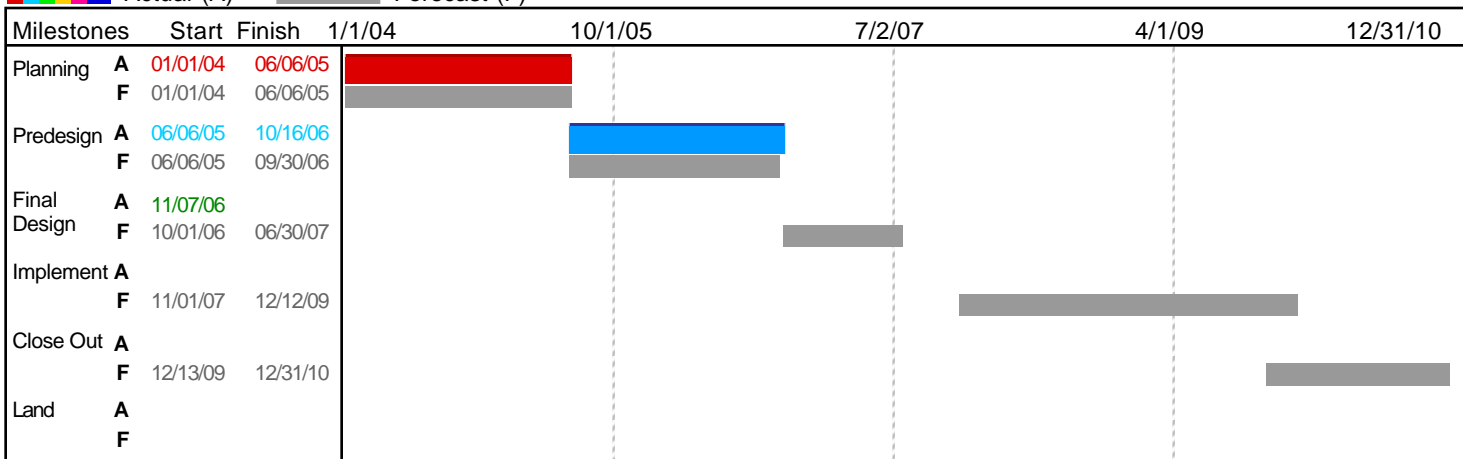
#### Project Phase: 3 Final Design



**King County**

Department of Natural Resources and Parks  
Wastewater Treatment Division

Actual (A)      Forecast (F)



Project completion schedule remains as 12/2009.

Cost Summary	2006 Actual Expenditure and Plan			Lifetime Actual Expenditure and Budget		
	IBIS YTD Dec-06	Adopted Plan	Updated Plan	IBIS LTD Dec-06	Lifetime Budget	Updated Budget
Expenses						
CONSTRUCTION	0	0	3,073,094	0	22,554,833	23,010,304
Construction Contracts	0	0	3,073,094	0	20,407,572	20,863,042
Outside Agency Construction	0	0	0	0	2,147,261	2,147,262
NON-CONSTRUCTION	1,094,195	2,937,217	2,649,483	1,094,195	5,730,655	5,343,423
Engineering	974,799	1,236,000	1,736,000	974,799	2,091,085	2,072,995
Right-of-Way	0	906,400	500,000	0	1,139,798	1,151,990
Misc. Services & Materials	5,396	0	0	5,396	0	0
Staff Labor	114,000	794,817	413,483	114,000	2,499,771	2,118,438
Total \$	1,094,195	2,937,217	5,722,577	1,094,195	28,285,488	28,353,727

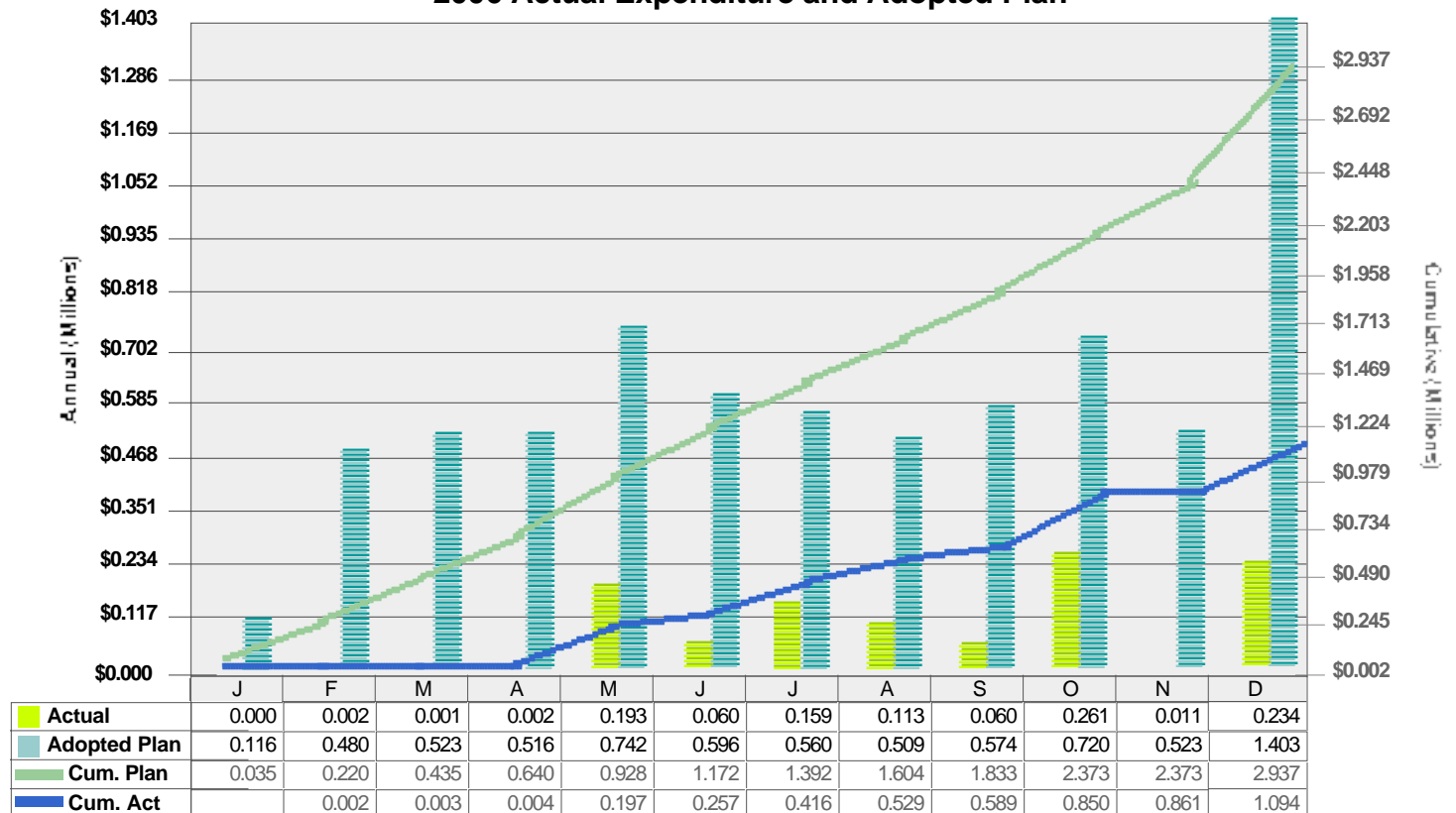
2

## Contract Status

Contract	Original Contract Amount	Phased Amends	Base Contract Amount	Change Amends or COs	Change Percentage	Nbr of Amends/CO's to Date	Current Contract Amount	Amount Paid	Thru Pmt No.	% Paid
North Creek Interceptor Improvements	\$31,100,000 A-NCI-2005	\$0	\$31,100,000	\$0	0%		\$31,100,000	\$1,309,805	18	4%

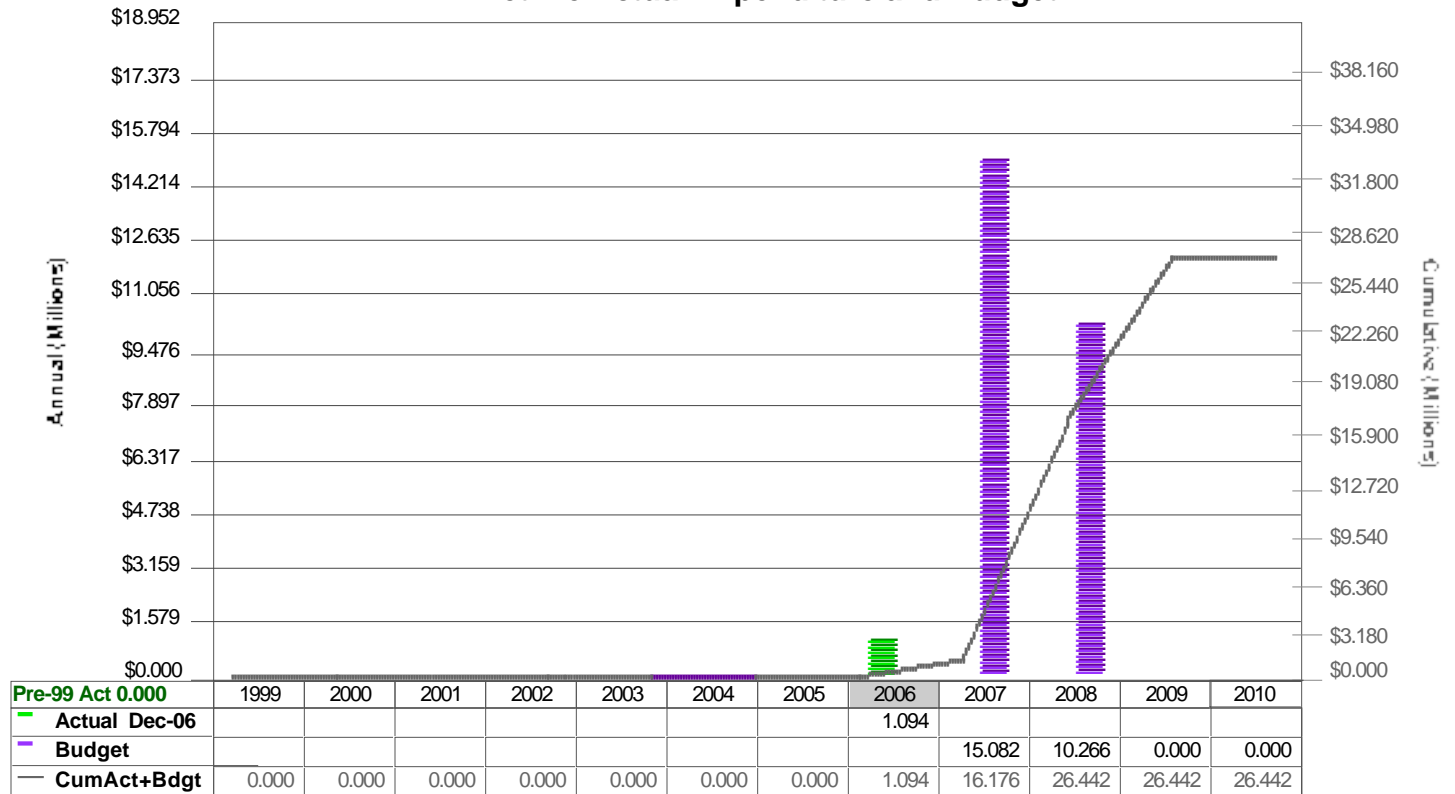
## Annual Cash Flow

### 2006 Actual Expenditure and Adopted Plan



## Lifetime Cash Flow

### Lifetime Actual Expenditure and Budget



## **423518 Pacific Pump Station**



### **Project Description**

This project will design and construct a new pump station and forcemain with a firm 5 year peak flow of 5.9 mgd and a maximum 20 year peak flow of 7 mgd. The project will include standby power, odor control, and improved telemetry in the new facility. The existing package-type pump station was constructed in 1970 and King County assumed responsibility for it in 1974. The existing capacity is approximately 3 mgd. The pump station discharges to a 12" forcemain, 2,940 linear feet to the Algona Pacific Interceptor. This project was completed in early 2007.

### **Project Phase: 4 Implementation**

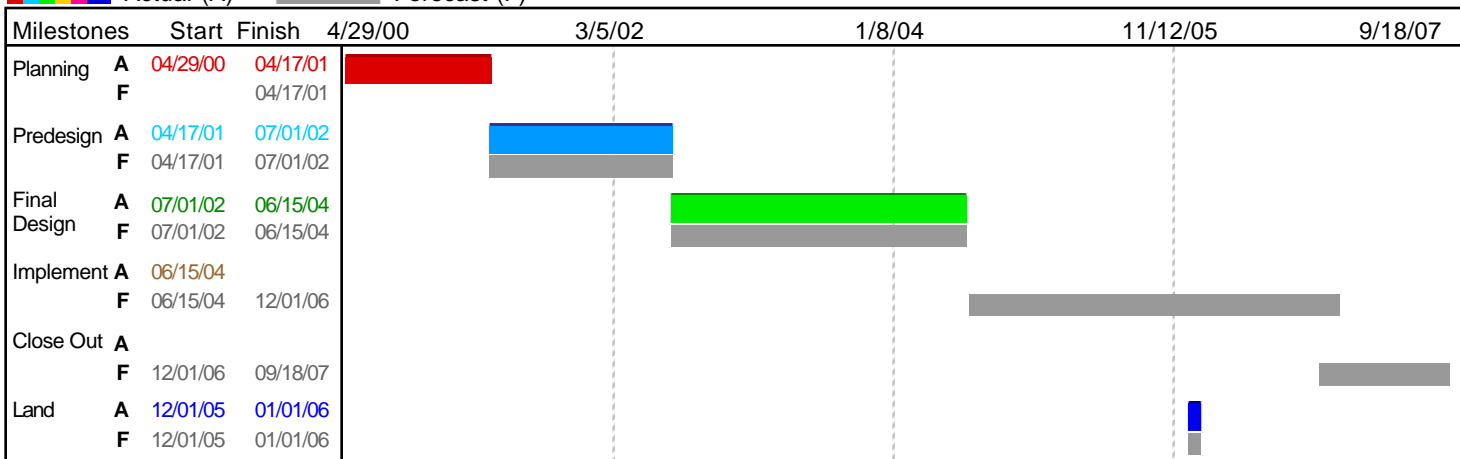


**King County**

Department of Natural Resources and Parks  
Wastewater Treatment Division

## Milestone Schedule

Actual (A) Forecast (F)



## Schedule Adjustments

No change.

## Cost Summary

Expenses	2006 Actual Expenditure and Plan			Lifetime Actual Expenditure and Budget		
	IBIS YTD Dec-06	Adopted Plan	Updated Plan	IBIS LTD Dec-06	Lifetime Budget	Updated Budget
CONSTRUCTION	1,812,368	2,520,894	1,882,444	4,475,952	4,376,672	5,020,566
Construction Contracts	1,791,724	2,520,894	1,882,444	4,454,007	4,376,466	5,019,266
Other Capital Charges	20,644	0	0	21,944	206	1,300
NON-CONSTRUCTION	577,250	458,553	515,553	2,925,206	2,723,095	2,901,338
Engineering	106,720	240,999	240,999	1,620,484	1,793,713	1,754,764
Planning & Management Svcs.	10,247	0	0	27,953	1,399	17,707
Permitting & Other Agency Support	891	0	0	51,253	24,492	46,991
Right-of-Way	300	0	0	10,200	9,300	9,900
Misc. Services & Materials	13,174	0	0	36,529	16,011	23,355
Staff Labor	445,919	217,554	274,554	1,178,787	878,181	1,048,622
PROJECT RESERVE	0	213,617	30,769	0	708,674	102,077
Project Reserve	0	213,617	30,769	0	708,674	102,077
<b>Total \$</b>	2,389,618	3,193,064	2,428,766	7,401,158	7,808,441	8,023,982

## Cost/Budget Adjustments

No change.

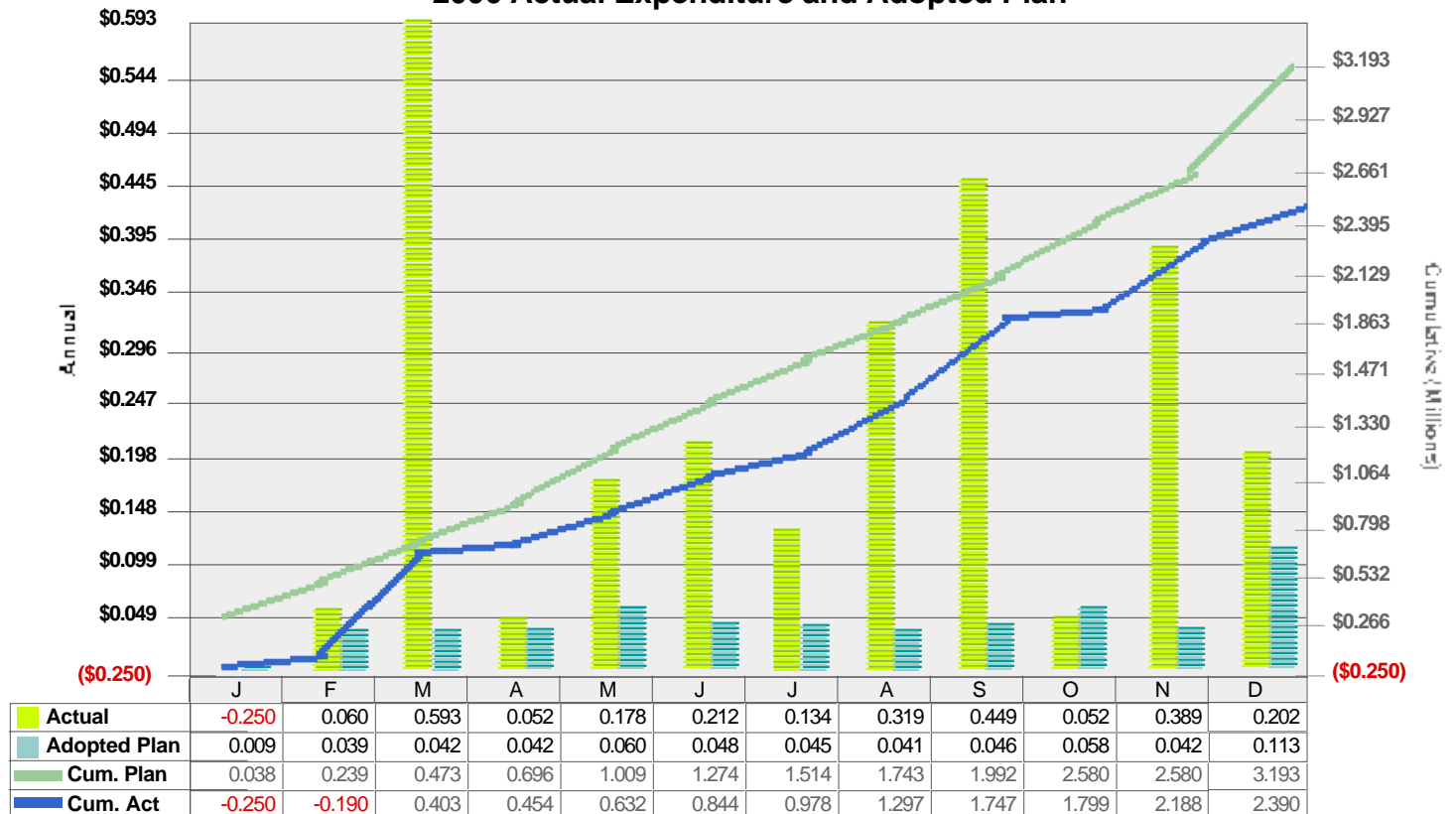


## Contract Status

Contract	Original Contract Amount	Phased Amends	Base Contract Amount	Change Amends or COs	Change Percentage	Nbr of Amends/CO's to Date	Current Contract Amount	Amount Paid	Thru Pmt No.	% Paid
Pacific Pump Station	\$3,792,143	\$0	\$3,792,143	\$548,652	14%	8	\$4,340,795	\$4,016,291	22	93%
Engineering Services for Pacific Pump Station	\$1,351,537	\$373,756	\$1,725,293	\$0	0%	2	\$1,725,293	\$1,623,951	68	94%

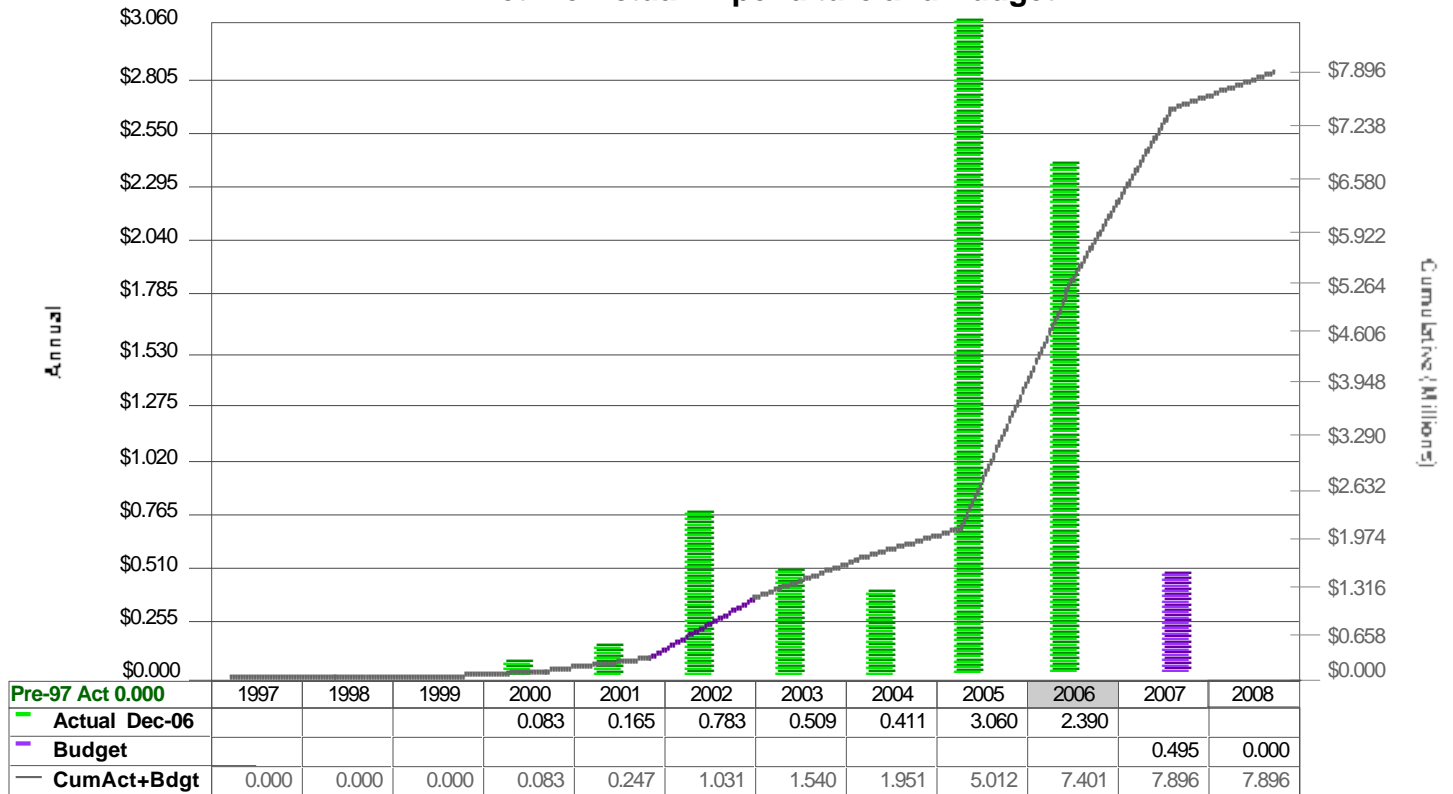
## Annual Cash Flow

### 2006 Actual Expenditure and Adopted Plan



## Lifetime Cash Flow

### Lifetime Actual Expenditure and Budget



# RWSP Project Report

## DECEMBER 2006

### 423297 RWSP Local System I/I Control



#### Project Description

The Executive's Regional Infiltration/Inflow Control Program was approved by County Council in May 2006. The first step is to implement 2 to 3 initial I/I reduction projects between 2007 and 2012. These projects will test the County's ability to cost-effectively reduce I/I within project basins to a point where planned more expensive conveyance system improvement projects will not be needed. In 2007, sewer system evaluation survey (SSES) work will be conducted on four potential project sites. SSES work includes CCTV inspection, smoke testing, manhole inspections and dye testing. Pre-design work on the four project sites will be initiated and completed between July 2007 and September 2008. At the end of pre-design work, the 2 to 3 most feasible projects will be selected for design and construction. The design phase will occur between October 2008 and September 2009. Construction will occur between February 2010 and October 2011. Post project flow monitoring and analysis will be conducted between November 2011 and August 2012. A final report of findings and recommendations for continued implementation of the Regional I/I Control Program will be presented to the King County Executive and King County Council in the 4th quarter of 2012.

#### Project Phase: 1 Planning

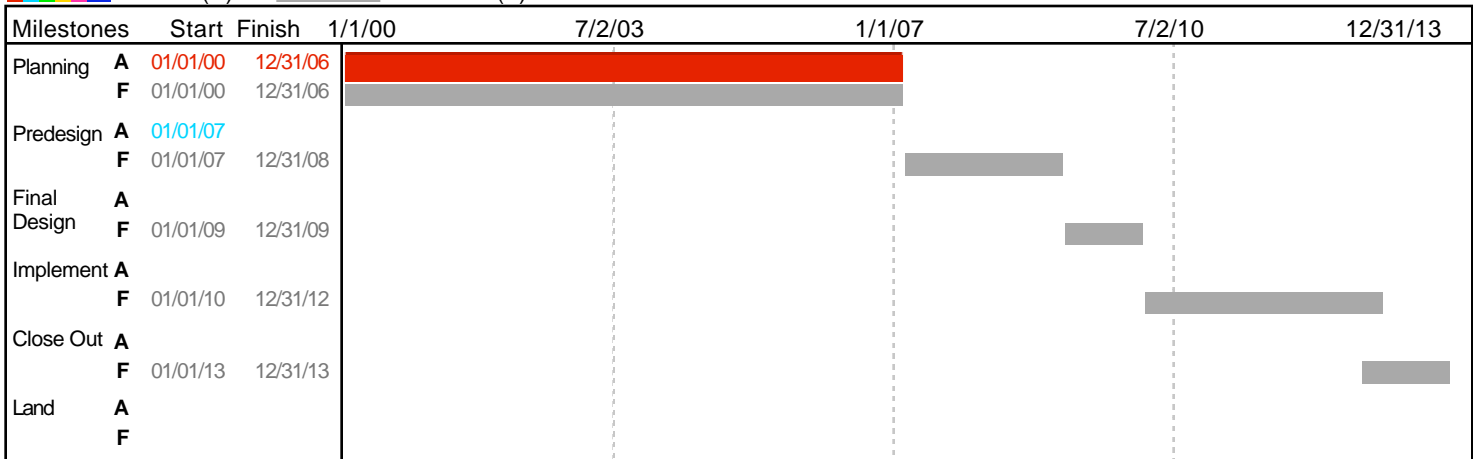


**King County**

Department of Natural Resources and Parks  
Wastewater Treatment Division

## Milestone Schedule


 Actual (A)      Forecast (F)



## Schedule Adjustments

None

## Cost Summary

Expenses	2006 Actual Expenditure and Plan			Lifetime Actual Expenditure and Budget		
	IBIS YTD Dec-06	Adopted Plan	Updated Plan	IBIS LTD Dec-06	Lifetime Budget	Updated Budget
CONSTRUCTION	974	0	0	5,455,999	5,452,305	38,754,179
Construction Contracts	0	0	0	5,419,822	5,417,102	38,718,976
Owner Furnished Equipment	974	0	0	27,046	26,073	26,073
Other Capital Charges	0	0	0	9,131	9,131	9,131
NON-CONSTRUCTION	596,126	1,738,536	1,404,916	33,195,837	39,634,207	46,046,836
Engineering	211,311	800,000	900,000	25,327,596	28,525,776	34,312,049
Planning & Management Svcs.	0	0	0	45,533	45,533	45,533
Permitting & Other Agency Support	0	0	0	1,865,036	1,865,036	1,865,036
Misc. Services & Materials	30,686	27,604	27,604	621,605	681,183	802,295
Staff Labor	354,129	910,932	477,312	5,336,067	8,516,679	9,021,923
CREDITS AND REVENUES	0	0	0	-2	0	0
Credits and Revenues	0	0	0	-2	0	0
<b>Total \$</b>	597,100	1,738,536	1,404,916	38,651,835	45,086,512	84,801,016

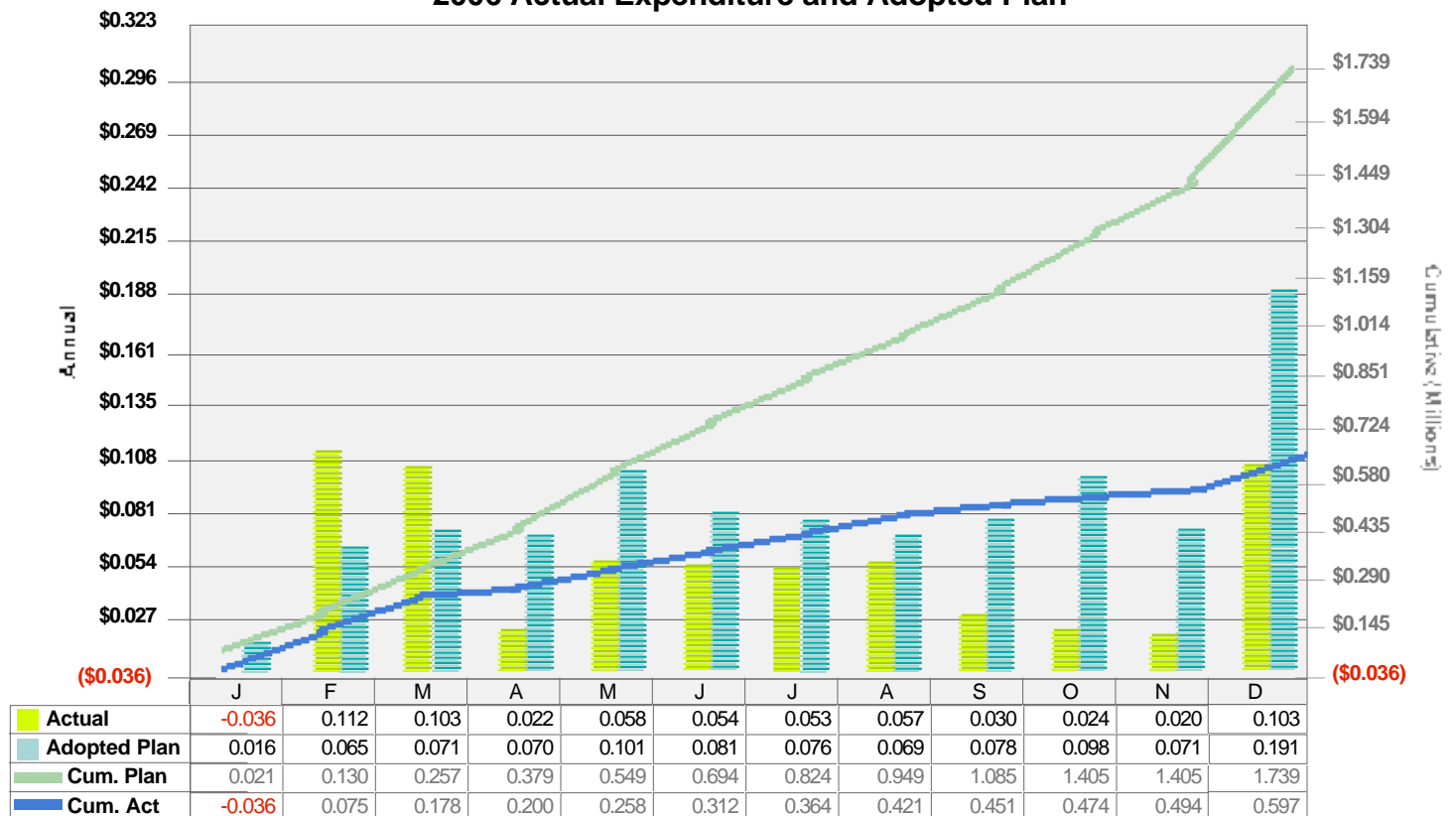
**Cost/Budget Adjustments** - Note: The costs of design and construction of the I/I initial reductions projects are capped at \$25 million. Although the cost summary reflects the budget for these projects; the projects are being funded from the Conveyance System Improvement program, as the purpose of the project is to carry out I/I control in lieu of investing in larger conveyance system improvements when it is cost-effective to do so. It is expected that the lifetime budget will be less than shown on this summary. In addition, the results of the I/I initial projects will be a factor in future I/I control expenditures. The RWSP 2006 cost estimate sheet shows an additional cost of \$4 million through 2012 to cover flow monitoring costs associated with the initial projects, ongoing modeling, analysis, reporting, and other costs in support of the I/I program.

## Contract Status

Contract	Original Contract Amount	Phased Amends	Base Contract Amount	Change Amends or COs	Change Percentage	Nbr of Amends/CO's to Date	Current Contract Amount	Amount Paid	Thru Pmt No.	% Paid
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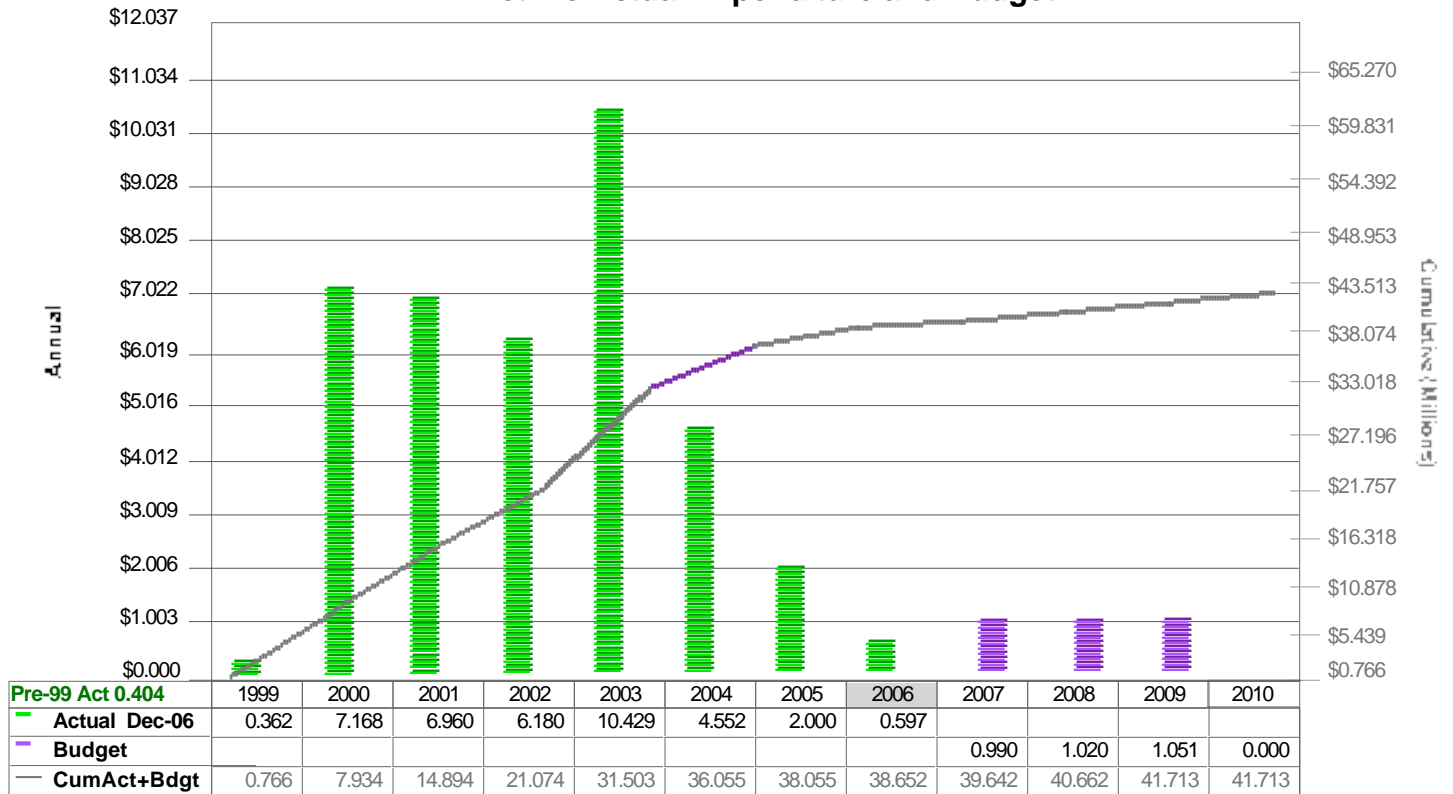
## Annual Cash Flow

### 2006 Actual Expenditure and Adopted Plan



## Lifetime Cash Flow

### Lifetime Actual Expenditure and Budget



# RWSP Project Report

## DECEMBER 2006

### 423368 Sediment Managment Plan



#### Project Description

Sediment Management Program addresses sediment contamination cleanups required under federal CERCLA and state MTCA regulations. The SMP objectives are to repair potential environmental damage in a timely, efficient and economical process, to prevent harm to public health, and to limit future liability.

#### Project Phase: 1 Planning

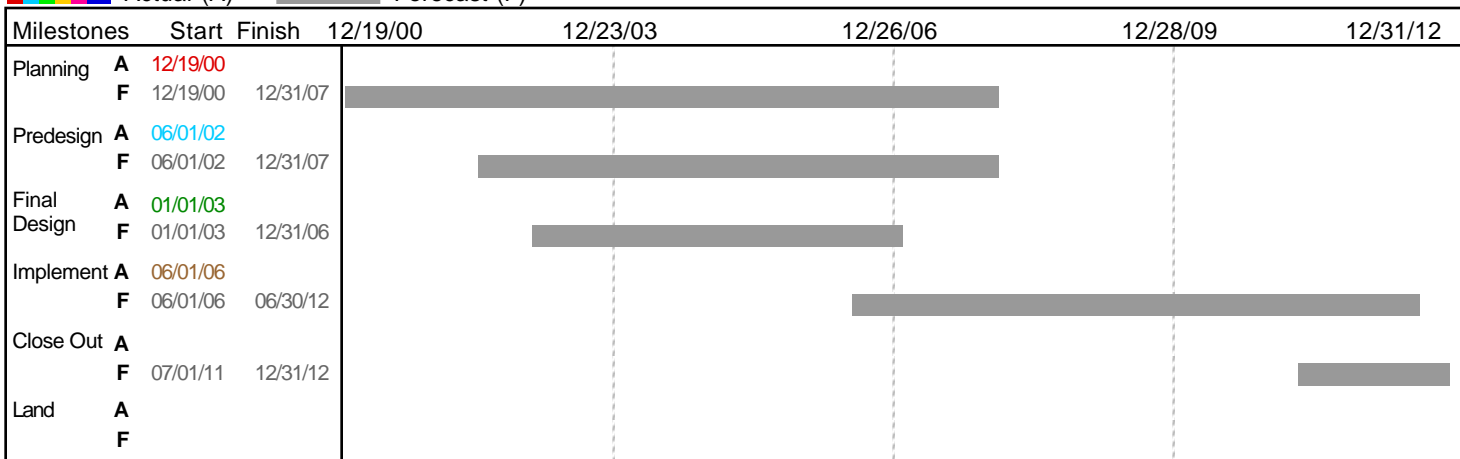


**King County**

Department of Natural Resources and Parks  
Wastewater Treatment Division

## Milestone Schedule

Actual (A) Forecast (F)



## Schedule Adjustments

- Portion of construction costs for start of Denny will be delayed into the 2007-8 dredging window as Ecology has not assigned a site manager.
- Portion of construction costs are for a share of Hanford/Lander costs that the Port of Seattle incurred during a navigation dredging in 2004-5. MOA signed with the Port and Seattle will likely move allocation process into 2007 so no construction money will be dispersed until at least 2007.

## Cost Summary

Expenses	2006 Actual Expenditure and Plan			Lifetime Actual Expenditure and Budget		
	IBIS YTD Dec-06	Adopted Plan	Updated Plan	IBIS LTD Dec-06	Lifetime Budget	Updated Budget
CONSTRUCTION	0	3,276,224	0	5,412	27,746,401	30,995,230
Construction Contracts	0	3,276,224	0	0	27,740,989	30,972,014
Owner Furnished Equipment	0	0	0	5,412	5,412	5,412
Other Capital Charges	0	0	0	0	0	17,805
NON-CONSTRUCTION	524,349	1,563,483	1,420,177	5,742,576	12,048,394	12,951,500
Engineering	176,315	927,000	815,109	1,371,811	4,116,593	4,460,353
Planning & Management Svcs.	0	0	0	360,702	347,063	360,702
Permitting & Other Agency Support	12	51,500	0	96,046	419,455	377,657
Misc. Services & Materials	63,132	62,830	31,415	1,652,734	1,823,802	1,775,002
Staff Labor	284,890	522,153	573,653	2,261,282	5,341,482	5,977,786
CREDITS AND REVENUES	-150,639	-1,228,891	0	-150,639	26,550	0
Credits and Revenues	-150,639	-1,228,891	0	-150,639	26,550	0
<b>Total \$</b>	373,711	3,610,817	1,420,177	5,597,349	39,821,345	43,946,731

## Cost/Budget Adjustments

- Construction costs projected in 2006 are delayed into 2007 for Denny
- Construction costs for Hanford/Lander are delayed into future years due to negotiations with Port of Seattle and City of Seattle to conduct joint work on East Waterway. Allocation process will determine cost shares and timing of payments.

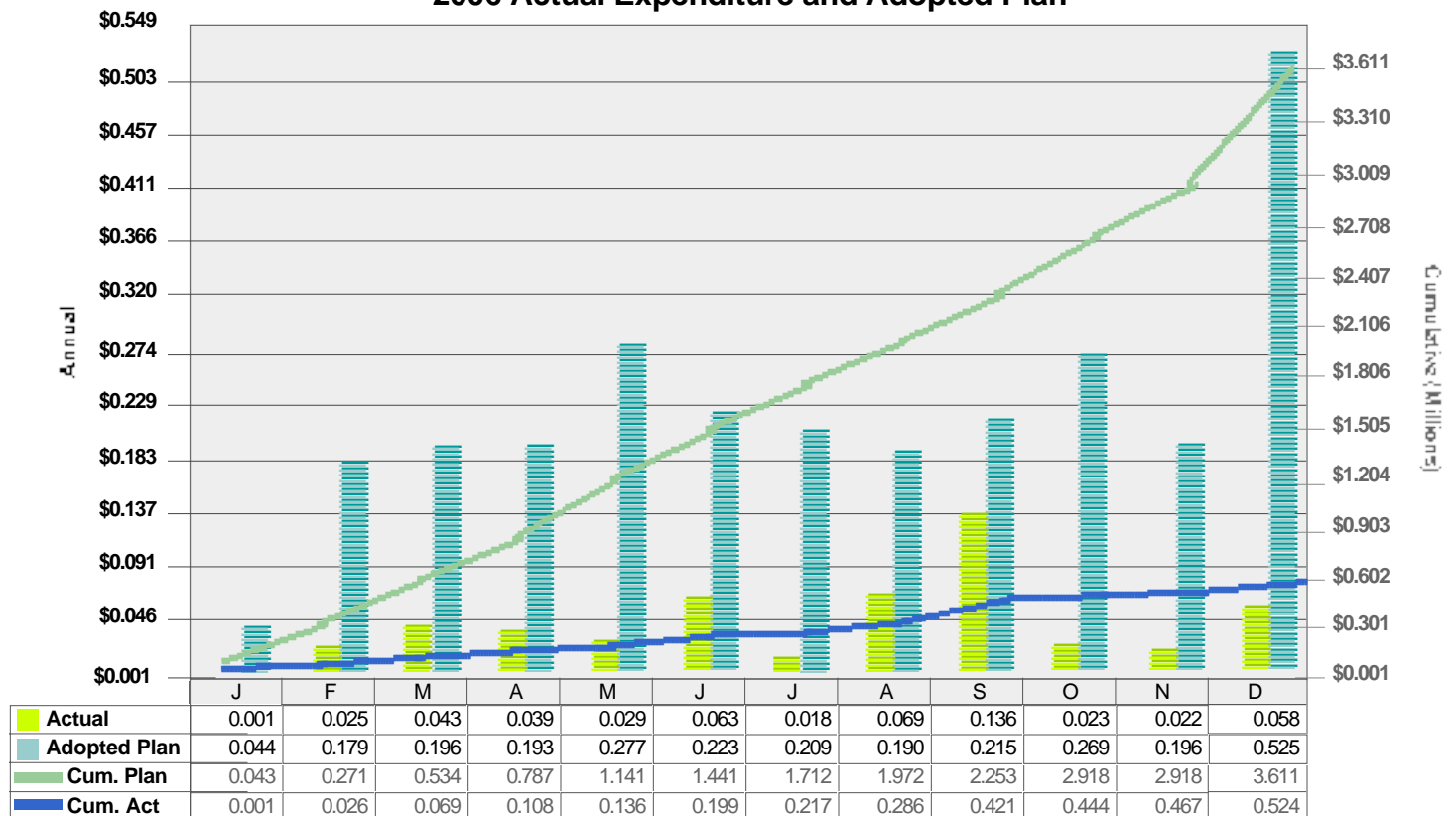


## Contract Status

Contract	Original Contract Amount	Phased Amends	Base Contract Amount	Change Amends or COs	Change Percentage	Nbr of Amends/CO's to Date	Current Contract Amount	Amount Paid	Thru Pmt No.	% Paid
Sediment Management	\$526,052	\$0	\$526,052	\$0	0%	1	\$526,052	\$378,622	46	72%
Phase 2/Discharge Modeling for Contaminated Sediment	\$266,664	\$0	\$266,664	\$0	0%		\$266,664	\$257,518	8	97%
Discharge Modeling for Contaminated Sediment	\$53,692	\$0	\$53,692	\$10,136	19%	1	\$63,828	\$63,383	12	99%

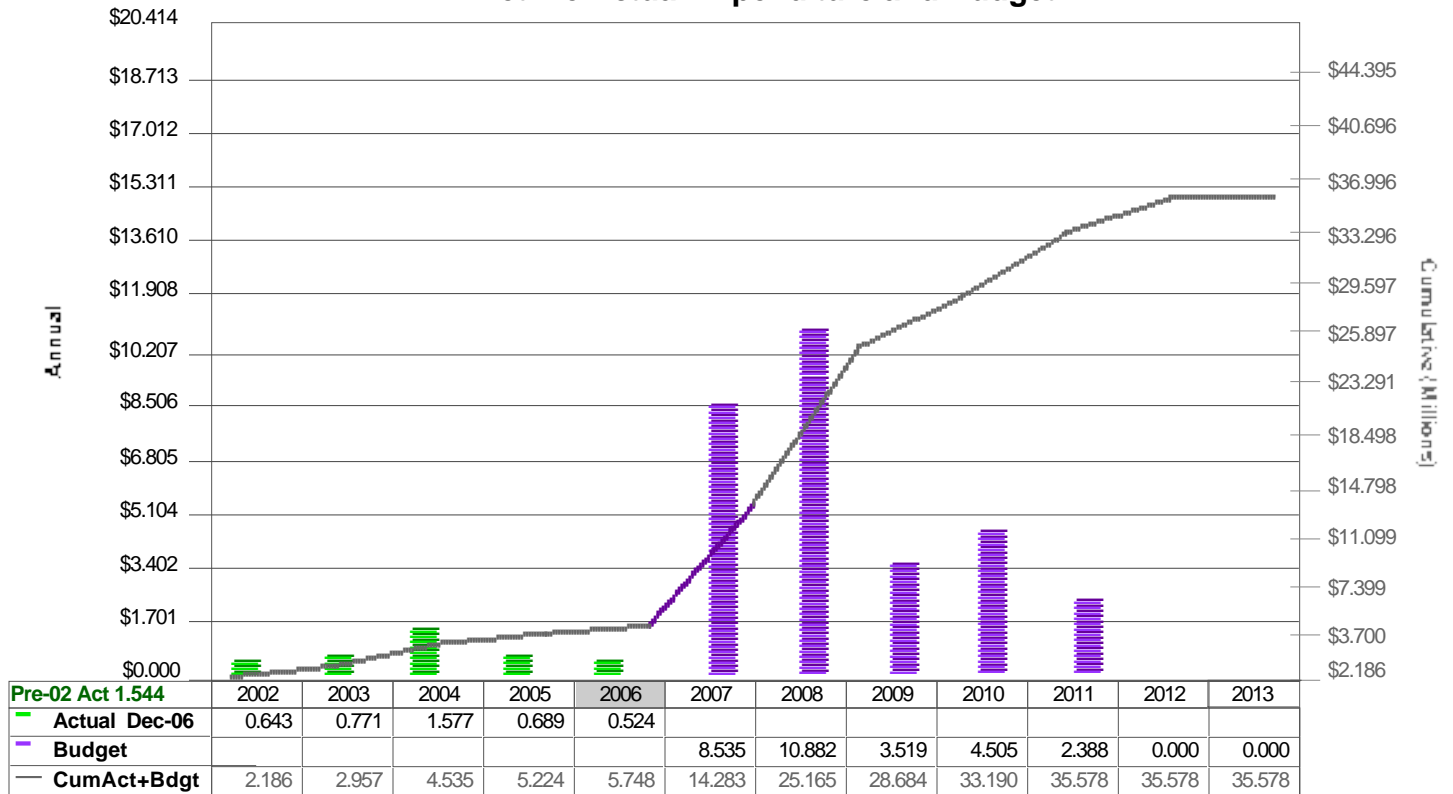
## Annual Cash Flow

### 2006 Actual Expenditure and Adopted Plan



## Lifetime Cash Flow

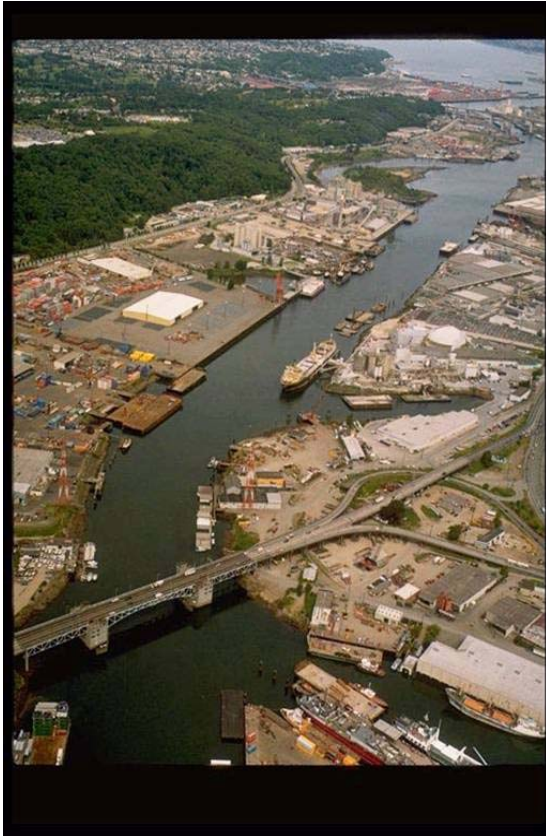
### Lifetime Actual Expenditure and Budget



# **RWSP Project Report**

## **DECEMBER 2006**

### **423589 Lower Duwamish Waterway Superfund**



#### **Project Description**

The project implements the County's shared responsibilities under a signed Administrative Order on Consent (AOC) to conduct a Remedial Investigation/Feasibility Study (RII/FS) for the Lower Duwamish Waterway Superfund Site, conduct source control along the waterway, and pay for EPA and Ecology oversight costs.

**Project Phase: 1 Planning**



**King County**

Department of Natural Resources and Parks  
Wastewater Treatment Division

Actual (A)      Forecast (F)

Milestones	Start	Finish	1/1/05	3/18/06	6/2/07	8/16/08	10/31/09
Planning	A	01/01/05	10/31/09				
	F	01/01/05	10/31/09				
Pre-design	A	10/31/09	10/31/09				
	F	10/31/09	10/31/09				
Final Design	A	10/31/09	10/31/09				
	F	10/31/09	10/31/09				
Implement	A	10/31/09	10/31/09				
	F	10/31/09	10/31/09				
Close Out	A	10/31/09	10/31/09				
	F	10/31/09	10/31/09				
Land	A						
	F						

none

Cost Summary	2006 Actual Expenditure and Plan			Lifetime Actual Expenditure and Budget		
	IBIS YTD Dec-06	Adopted Plan	Updated Plan	IBIS LTD Dec-06	Lifetime Budget	Updated Budget
Expenses						
NON-CONSTRUCTION	2,429,184	1,461,319	2,035,038	3,978,165	4,980,416	5,857,690
Engineering	483,045	946,556	1,426,538	494,360	3,006,824	2,738,946
Planning & Management Svcs.	364,942	0	0	365,930	0	988
Permitting & Other Agency Support	120	0	0	120	0	0
Misc. Services & Materials	907,767	0	0	1,978,282	0	1,070,515
Staff Labor	673,309	514,763	608,500	1,139,473	1,973,592	2,047,241
CREDITS AND REVENUES	-1,121,827	0	0	-1,121,827	0	0
Credits and Revenues	-1,121,827	0	0	-1,121,827	0	0
Total \$	1,307,356	1,461,319	2,035,038	2,856,338	4,980,416	5,857,690

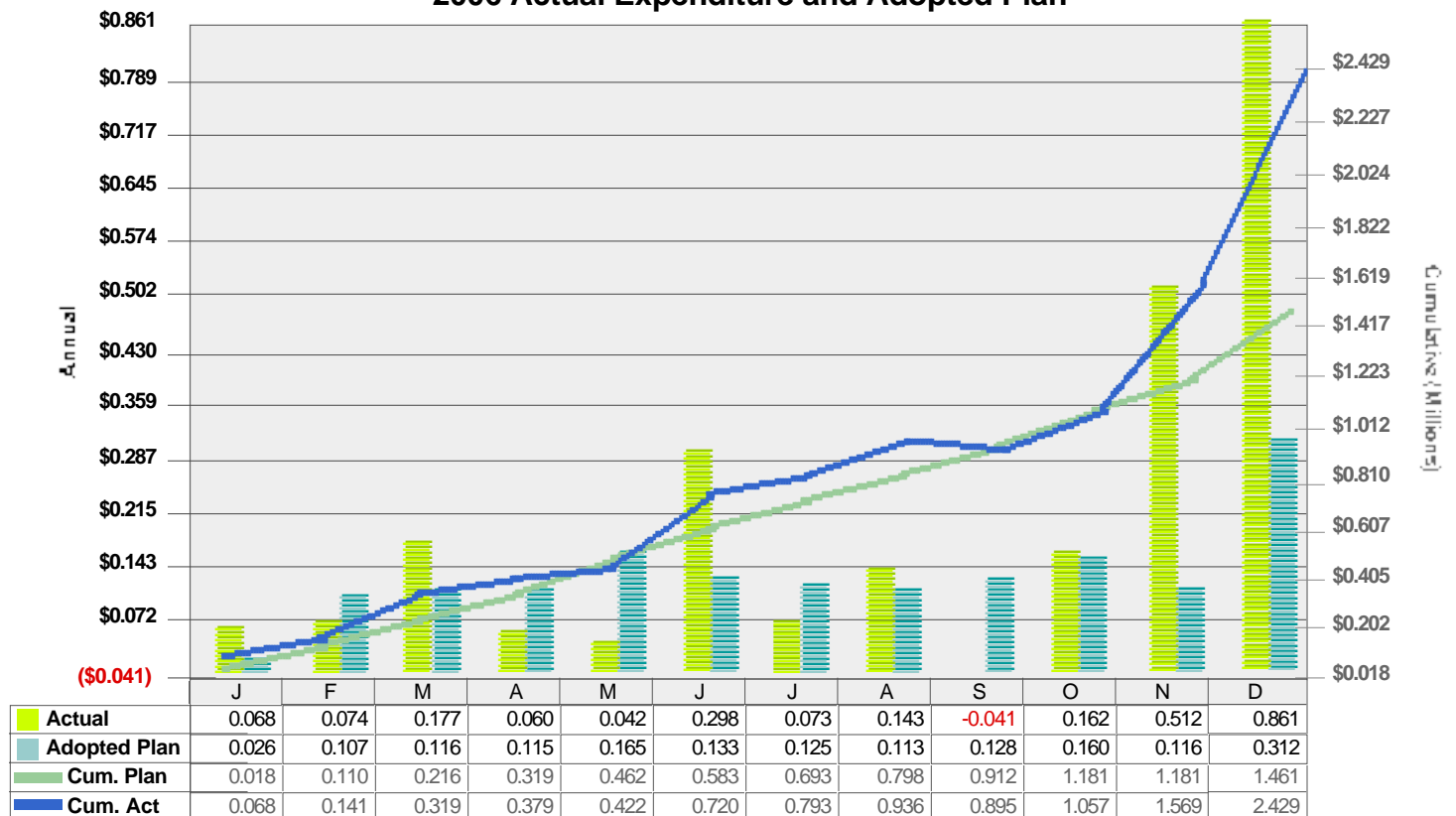
Total Project costs are projected to increase to \$5.8 million due to increased effort for all sampling conducted to date and expected increased costs in developing and gaining EPA approval of final deliverables.

## Contract Status

Contract	Original Contract Amount	Phased Amends	Base Contract Amount	Change Amends or COs	Change Percentage	Nbr of Amends/CO's to Date	Current Contract Amount	Amount Paid	Thru Pmt No.	% Paid
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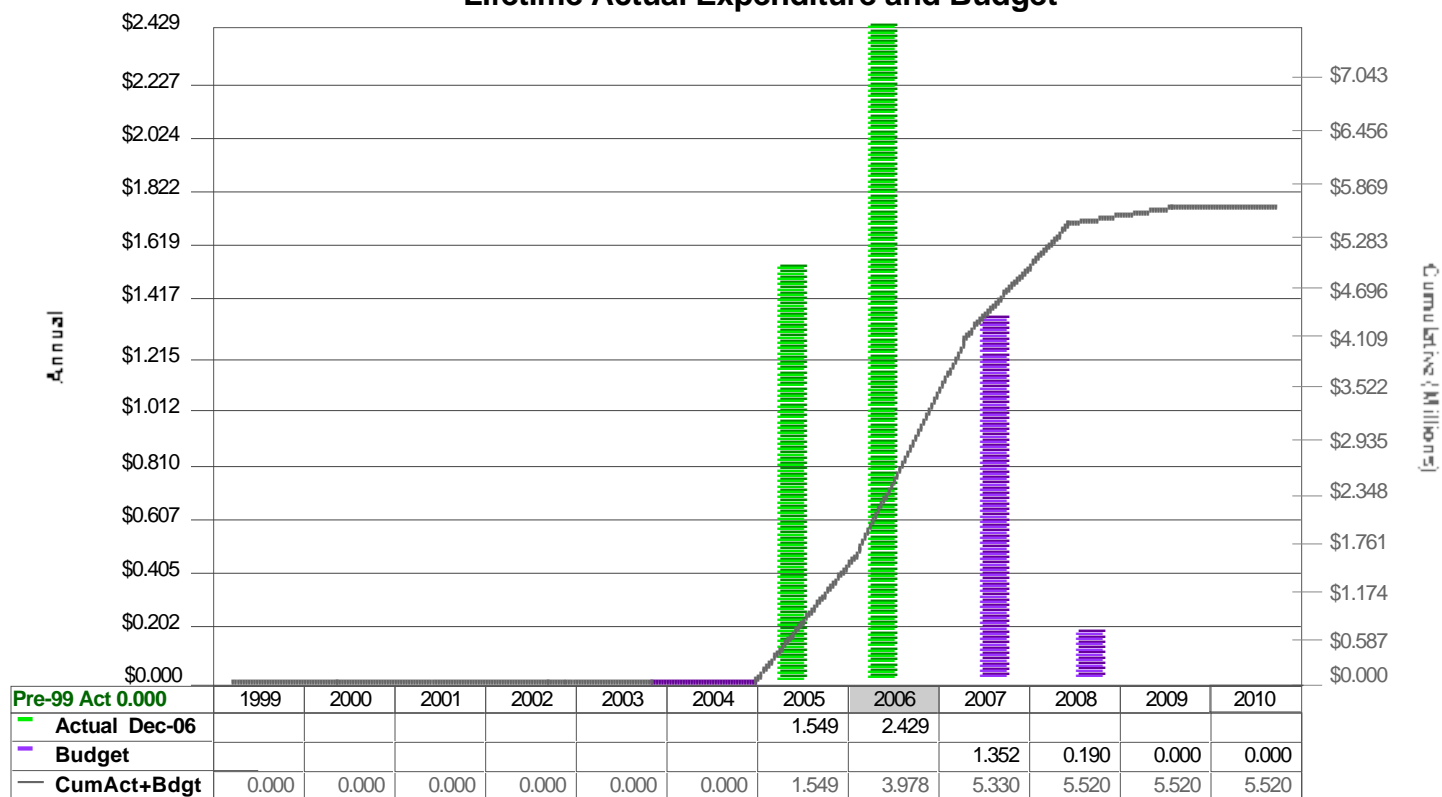
## Annual Cash Flow

### 2006 Actual Expenditure and Adopted Plan



## Lifetime Cash Flow

### Lifetime Actual Expenditure and Budget



# RWSP Project Report

## DECEMBER 2006

### 423593 WP Digestion Improvements



#### Project Description

Design and implement improvements to the West Point Treatment Plant solids digestion system to improve system reliability. Improvements will include modifications to the blending storage tank (Digester 6) to enable its use as an emergency active digester, modifications to solids conveyance systems to enable continuous digester feed and withdrawal and installation of new mixing system for Digesters 4 and 5.

**Project Phase: 1 Planning**








**King County**

Department of Natural Resources and Parks  
Wastewater Treatment Division

## Milestone Schedule

 Actual (A)
  Forecast (F)

Milestones	Start	Finish	1/2/05	5/26/06	10/17/07	3/9/09	7/31/10
Planning	A 01/02/05	06/19/06					
	F 06/19/06	06/19/06					
Predesign	A 06/19/06						
	F 06/19/06	03/31/07					
Final Design	A						
	F 03/31/07	07/24/07					
Implement	A						
	F 07/24/07	12/09/08					
Close Out	A						
	F 12/09/08	07/31/10					
Land	A						
	F						

## Schedule Adjustments

## Cost Summary

Expenses	2006 Actual Expenditure and Plan			Lifetime Actual Expenditure and Budget		
	IBIS YTD Dec-06	Adopted Plan	Updated Plan	IBIS LTD Dec-06	Lifetime Budget	Updated Budget
CONSTRUCTION	0	76,606	0	0	2,374,607	3,476,374
Construction Contracts	0	76,606	0	0	2,342,303	3,444,069
Other Capital Charges	0	0	0	0	32,304	32,304
NON-CONSTRUCTION	194,427	508,106	589,291	282,716	1,281,573	1,478,758
Engineering	69,659	270,375	434,211	69,659	629,678	906,268
Permitting & Other Agency Support	0	22,071	22,071	0	25,643	22,071
Misc. Services & Materials	9,844	11,330	14,399	16,015	46,020	50,676
Staff Labor	114,925	204,329	118,610	197,043	580,233	499,743
PROJECT RESERVE	0	0	0	0	747,480	1,187,403
Project Reserve	0	0	0	0	747,480	1,187,403
CREDITS AND REVENUES	0	0	0	0	22,613	0
Credits and Revenues	0	0	0	0	22,613	0
<b>Total \$</b>	194,427	584,712	589,291	282,716	4,426,273	6,142,534

## Cost/Budget Adjustments

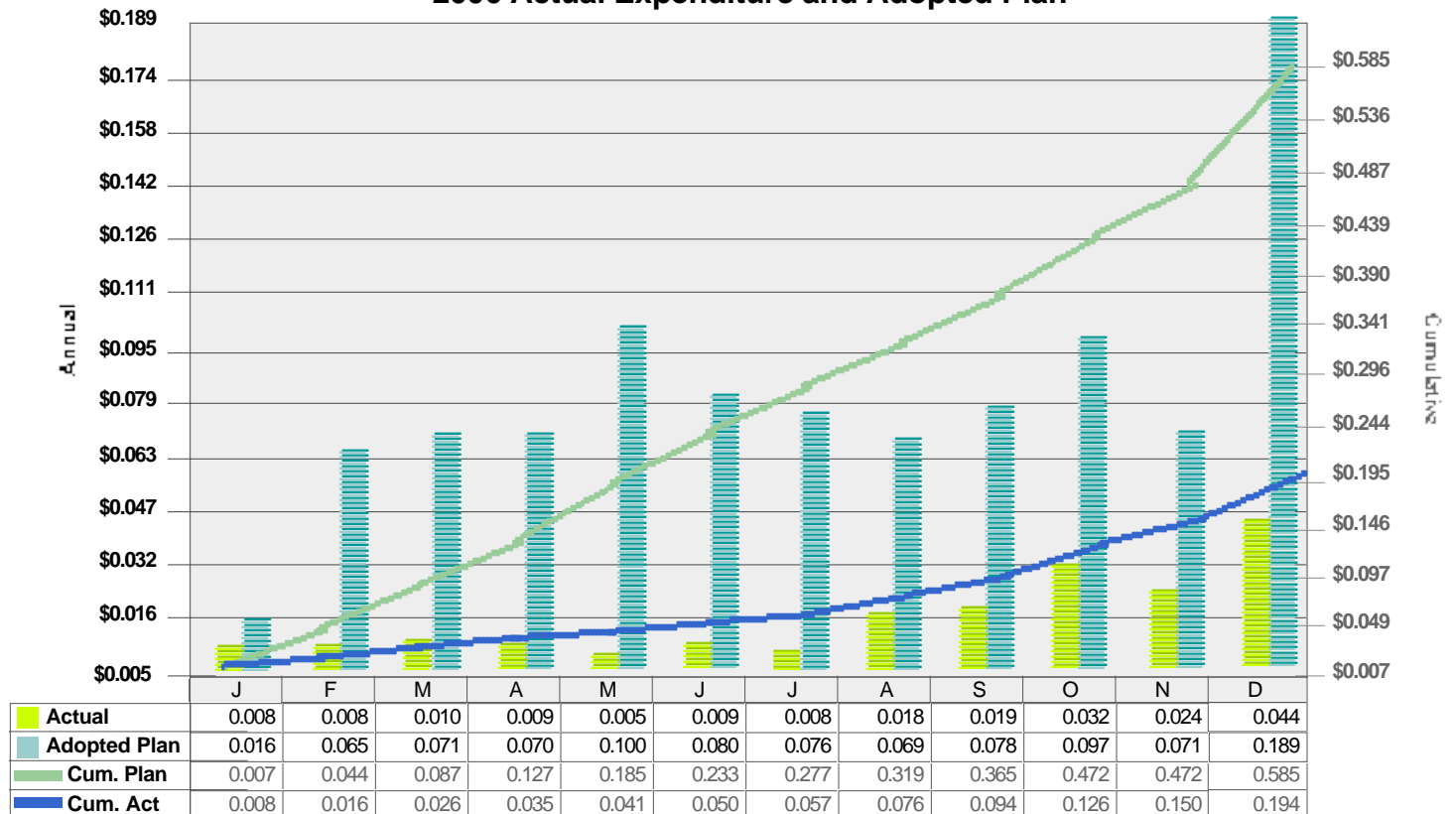


## Contract Status

Contract	Original Contract Amount	Phased Amends	Base Contract Amount	Change Amends or COs	Change Percentage	Nbr of Amends/CO's to Date	Current Contract Amount	Amount Paid	Thru Pmt No.	% Paid
West Point Treatment Plant Digestion System	\$382,148	\$0	\$382,148	\$0	0%		\$382,148	\$89,394	7	23%
E53025E										

## Annual Cash Flow

### 2006 Actual Expenditure and Adopted Plan



## Lifetime Cash Flow

### Lifetime Actual Expenditure and Budget

