
Executive Summary

King County Ordinance 15384 and King County Code 28.86.165 require that the King County Executive submit a yearly report to the King County Council on implementation of the Regional Wastewater Services Plan (RWSP). The RWSP outlines a number of important projects, programs, and policies for the county's Wastewater Treatment Division (WTD) to implement through 2030.

The following text summarizes the 2008 RWSP annual report.

Providing Needed Capacity in the Regional System

The RWSP calls for the construction of a new regional treatment plant and conveyance system by the year 2010 or as soon thereafter as possible to provide additional capacity for projected population growth in the northern portion of King County's wastewater service area. This system, called the Brightwater Treatment System, is currently under construction. It will consist of a treatment plant in Snohomish County just north of the City of Woodinville and approximately 14 miles of pipelines constructed in underground tunnels in north King County.

RWSP policies further direct WTD to use the 20-year peak flow storm as the design standard for its separated conveyance system to avoid sanitary overflows and ensure there is sufficient capacity in the regional conveyance system to accommodate projected population growth.

Brightwater Treatment System

WTD made substantial progress on the Brightwater project in 2008. A significant amount of construction was completed in 2008. The system is expected to be operating in fall 2011.

Brightwater Treatment Plant Site

Construction of the Brightwater Treatment Plant continued in 2008. Completed activities include (1) site excavation and earthwork for the tank and gallery foundations, (2) the concrete foundation bottom slabs needed for the grit, headworks, primary clarifiers, aeration basins, and galleries, and (3) the foundations for the digesters and Energy and Solids Building. Work was initiated on the walls for the grit, headworks, primary clarifiers, aeration basins, and galleries. Underground utilities, piping for processes, and conduit for electrical and instrumentation control wiring were installed. Installation of rebar and concrete work for the digesters and Energy and Solids Building also began.

Brightwater Conveyance System

Excavation of the East Tunnel, which consists of about 14,050 feet of 16.6-foot internal-diameter tunnel between the North Creek Portal in Bothell to the Brightwater Treatment Plant, was completed in November.

Progress on the Central Tunnel has been slower than anticipated because of underground conditions. Approximately 56 percent (6,502 feet) of the eastbound portion of the Central Tunnel, which extends from the North Kenmore Portal to the North Creek Portal in Bothell, was completed by the end of December. The tunnel boring machine (TBM) for the westbound portion, which extends from the North Kenmore Portal to the Ballinger Way Portal in Shoreline, was launched in March 2008 and approximately 26 percent (5,136 feet) of the tunneling was completed by the end of the year.

The TBM for the West Tunnel, which extends from the Point Wells Portal in unincorporated Snohomish County and heads east to the Ballinger Way Portal in Shoreline, was launched in September. Approximately 14 percent (2,900 feet) of the tunneling was completed by the end of the year.

Construction of the marine outfall began in spring and was completed in December.

Conveyance System Improvements

The Conveyance System Improvement Program Update, completed in 2007, identifies projects to meet projected capacity needs through 2050. During the update process, King County worked closely with the Metropolitan Water Pollution Abatement Advisory Committee (MWPAAC) and with individual local sewer agencies.¹ The update recommended that checks and balances be performed, including periodic systematic flow monitoring, field verification, and regular program updates, to update flow projections and avoid overbuilding the system. It also recommended evaluation of demand management methods, such as infiltration and inflow (I/I) reduction, to meet identified conveyance needs.²

WTD completed construction of the Hidden Lake Pump Station and Sewer Improvement project and the Juanita Bay Pump Station Replacement project during the year. The force main for the Bellevue Pump Station Upgrade project was also completed, and construction of the project's pump station began. Construction also started on the North Creek Interceptor project. Design activities continued on the Kent/Auburn Conveyance Systems Improvements and the Black Diamond Infrastructure Upgrade projects.

I/I—clean stormwater and groundwater that enters local sewer systems—takes up capacity in the King County regional conveyance and treatment systems and, along with population growth and other factors, drives the need to build additional capacity. The RWSP calls for improvements to

¹ 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 utilities that operate sewer systems in King County.

² In March 2008, the King County Council approved recommendations made in the update as amendments to RWSP conveyance policies via adoption of Ordinance 16033.

reduce levels of I/I into local collection systems. The Executive's Recommended Regional Infiltration and Inflow Control Program, approved in May 2006 by the King County Council through adoption of Motion 12292, directs the county to work with local agencies to implement two to three initial projects to test the effectiveness of I/I reduction. It is hoped that the projects will help determine whether and under what conditions it is possible to cost-effectively remove enough I/I from the collection system to delay, reduce, or eliminate some otherwise needed regional conveyance system improvement projects.

Activities in 2008 included completing alternatives analysis within the four candidate project areas located in the Cities of Bellevue, Issaquah, and Renton, and in the Skyway Water and Sewer District. In consultation with MWPAAC and the host agencies, two projects were selected as the initial I/I reduction projects for final design and construction—a combined Bellevue and Issaquah project and a Skyway project.

Creating Resources from Wastewater

WTD continues to find beneficial uses for byproducts from wastewater treatment—biosolids and digester gas from the solids treatment process and reclaimed water from the liquids treatment process.

Biosolids Recycling

Highlights of Biosolids Program activities and achievements during the year are as follows:

- Approximately 116,000 wet tons of biosolids were produced in 2008, all of which was recycled as fertilizer and soil amendment for forestry and agricultural applications and to make compost.
- WTD is participating in a research project to quantify the carbon sequestration benefits of using biosolids and other organic residuals as a soil amendment for land application; the project was launched in 2008.
- Predesign was completed on the West Point Treatment Plant Digestion System Improvements project. This project will enhance the reliability of the plant's solids digestion system and reduce the risk of digester upsets under current and future solids loading conditions.
- Planning efforts were initiated to upgrade influent screens at West Point to comply with new amendments to the Washington State rule for biosolids management. The new screens will reduce the amount of non-organic debris in the biosolids. Predesign is expected to begin in summer 2009.
- WTD made progress in its transition from its existing environmental management system (EMS) for biosolids toward gaining certification through the International Organization for Standardization (ISO 14001) for an EMS for WTD's solids operations, including biosolids. The ISO 14001 standard is applicable to more of WTD's operations than other EMS certifications and fits into the division's vision of "Creating Resources from

Wastewater.” In 2008, WTD developed a manual that outlines how the division will meet the requirements for ISO 14001 certification for all of WTD.

- WTD issued a request for information (RFI) in July to learn about market options available for supplementing, strengthening, or diversifying its existing biosolids program. The goal of the RFI process is to provide the county with information on options for biosolids management in the next decade that are reliable, cost-effective, publicly acceptable, and provide multiple environmental benefits. Twelve responses to the RFI were received in September; evaluation of the responses will be completed in early 2009.

Reclaimed Water

WTD continues to produce and use reclaimed water at the West Point and South plants. In addition, reclaimed water from South plant is used off-site in the City of Tukwila. The county and the City of Tukwila renewed a sale and distribution agreement for reclaimed water, under which the city will continue to act as a reclaimed water purveyor in its service area. The city uses reclaimed water from South plant for irrigation of Fort Dent Park (including newly constructed soccer fields where the Seattle Sounders Football Club practices) and city public works uses such as street sweeping and sewer flushing. In addition, the Tukwila City Council approved an agreement in July to extend the reclaimed water distribution line from South plant to Foster Golf Links.

In keeping with RWSP policy, new treatment plants are incorporating production and distribution of reclaimed water into their designs. The Carnation Treatment Plant, which uses membrane bioreactor technology (MBR) and is designed to treat all the wastewater to Class A reclaimed water standards, began operating in May 2008.³ The plant has a dual discharge system: an outfall that discharges to the Snoqualmie River and another outfall that discharges to a wetland in the Chinook Bend Natural Area. Discharge to the wetland serves as the primary discharge location. In August 2008, the Carnation Treatment Plant earned the WateReuse Association’s Small Project of the Year Award in recognition of the facility’s innovative use of reclaimed water to enhance wetlands and preserve local habitat.⁴

Work continued in 2008 on the Brightwater Reclaimed Water System. Construction of the South Segment of the system is expected to be substantially complete in 2009. WTD continued to work with local jurisdictions, water purveyors, and other interested entities to identify and confirm potential markets and demand for reclaimed water in the South Segment area, which includes the Sammamish Valley. WTD also continued to work with water purveyors in this area to determine their interest in serving as reclaimed water purveyors in their service areas.

³ “Class A” is the highest quality reclaimed water and is allowed for all permitted uses of reclaimed water, which include non-potable uses such as irrigation, groundwater recharge, wetland enhancement, streamflow augmentation, and street cleaning

⁴ The WateReuse Association is a nonprofit organization whose mission is to advance the beneficial and efficient use of water resources through education, sound science, and technology using reclamation, recycling, reuse, and desalination for the benefit of its members, the public, and the environment. More information on the association is available on the Web at <http://www.watereuse.org/>.

WTD continued to participate in reclaimed water study efforts. The turf grass irrigation study, initiated in 2007, was completed in 2008. An ornamental plant and food crop irrigation study was initiated in 2008. These studies were undertaken in partnership with University of Washington researchers to develop local, independent, best-available science about the public health and environmental impacts of using reclaimed water.

In July 2008, WTD began a planning process to develop a Reclaimed Water Comprehensive Plan to determine if, how, when, where, and by what funding mechanisms over the next 30 years the county's existing reclaimed water program should expand. WTD is working with a broad range of interested parties and individuals on this multiyear planning effort.

Energy Generation from Digester Gas

Digester gas—energy-rich methane gas produced during solids treatment—is used at the West Point and South plants to produce power and heat for plant processes and buildings. In addition, the remainder of the gas at South plant, about 2.1 million therms, which is enough to serve more than 2,500 homes, was “scrubbed” and sold to Puget Sound Energy.

WTD is carrying out a Waste-to-Energy project at the West Point plant to install a new cogeneration facility so that digester gas can again be used to generate electricity at the plant. The previous power cogeneration engines, installed in 1984, were removed from the plant site in 2008 after reaching the end of their useful life. Final design efforts on this project began in September and are expected to be complete in spring 2009.

Some of the digester gas that will be produced at the Brightwater Treatment Plant will be used to fuel a boiler that generates heat for the digestion process and for buildings. In addition, plans are under way to develop an Energy Technology Demonstration Facility at the plant site for research of potential technologies for producing alternative forms of energy from digester gas. Final design of the facility was under way in 2008 and is expected to be complete in May 2009.

Protecting Water Quality and Complying with Regulations

RWSP reporting policies require a summary in the annual reports of WTD's water quality management programs and its compliance with the Endangered Species Act and other agency regulations and agreements. WTD manages several programs to protect and preserve water quality, including wastewater treatment, combined sewer overflow control, sediment management, and source control.

The policies also require the inclusion of a report on the results of the water quality monitoring program, which measures water and sediment quality near WTD outfalls and facilities and compares the results with measurements in other areas in the same water bodies. The 2008 report, included as an appendix to the RWSP 2008 Annual Report, indicates that the quality of marine and fresh waters in King County is fair to good.

Treatment Plants

Effluent from King County's treatment plants must meet National Pollutant Discharge Elimination System (NPDES) permit requirements and Washington State Water Quality Standards. The quality of treated effluent from its four secondary plants remained high in 2008. NPDES permit limitations were met for all the plants, including the new Carnation Treatment Plant. Both the South and West Point Treatment Plants earned the National Association of Clean Water Agencies Gold Peak Performance Award for achieving 100 percent compliance with their NPDES permits for an entire calendar year. These two plants also received the Platinum Peak Performance Award for multiple years of consecutive gold performance.

CSO Control and Sediment Management

King County's combined sewer overflow (CSO) facilities are regulated through West Point's NPDES permit. WTD also submits a report to the Washington State Department of Ecology (Ecology) each year on annual CSO volumes and frequencies and on progress made to control its CSOs.⁵

Almost 20 years of data demonstrate progress toward the control goal. As of May 2008, about 16 of King County's 38 CSOs are controlled. Two other CSOs—part of the Mercer/Elliott West CSO control system that came online in 2005—are expected to achieve control after startup adjustments and modifications are made to the system.⁶ Control status of county CSO locations will be confirmed in the hydraulic model recalibration that is scheduled to be ready in 2010. The remaining 20 uncontrolled CSOs will meet state standards as projects listed in the RWSP are completed between 2013 and 2030.

Four of the RWSP CSO control projects are under way. Predesign on these projects, collectively called the Puget Sound Beach projects, was under way in 2008. Construction is expected to begin in late 2013. Another CSO at the Ballard Regulator Station, scheduled in the RWSP to be controlled in 2029, will be brought under control in 2012 through the Ballard Siphon Replacement project. Other accomplishments of the CSO Control Program in 2008 include making progress on a pilot program to assess CSO treatment technologies for future CSO control projects. Project development, jar testing, and technology identification was completed, and pilot-scale testing at the West Point plant of two technologies began in late 2008. WTD also submitted the 2008 CSO plan update to Ecology as part of West Point's NPDES permit renewal application.

To meet RWSP policies, WTD is carrying out a sediment management plan developed in the late 1990s to remediate contaminated sediment near CSO outfalls. Most of the contamination is from the first half of the twentieth century. Since completion of the sediment management plan, King County has been partnering with other agencies on sediment management in the Duwamish

⁵ "Control" is defined as meeting the Washington State standard of an average of no more than one untreated discharge per year per outfall.

⁶ The two CSOs are the Denny Way and Dexter Avenue Regulator Stations.

Waterway under two federal Superfund projects: the Harbor Island and the Lower Duwamish Waterway projects.⁷

Work on projects identified in the sediment management plan is under way. King County completed dredging and capping of the area near the former Denny Way CSO in February 2008 and in April, began a 10-year program to monitor sediment quality at the site. After completion of five years of monitoring, the county will evaluate alternatives for cleaning up nearby areas.

The draft remedial investigation for the Lower Duwamish Waterway Superfund site was completed in 2008 and is expected to be finalized in 2009. The feasibility study, which will identify cleanup alternatives, will be completed in 2009.

Source Control

King County operates two source control programs: the King County Industrial Waste Program (KCIW) and the Local Hazardous Waste Management Program (LHWMP). Both programs work to control pollutants at their source, thereby keeping them out of the wastewater system and, in turn, out of surface waters and the environment.

In 2008, 133 permits and 319 industrial waste discharge approvals were in effect, 435 inspections were conducted, and 112 Notices of Violation were issued. KCIW inspected 97 dental offices in 2008 as part of its nationally prominent program to reduce mercury discharges to sewers. KCIW continued to participate in source control efforts in the Lower Duwamish Waterway, including sampling and analysis of industrial waste discharges and rainfall for contaminants such as phthalates, and continued to work on the East Waterway source control project as part of Harbor Island Superfund project.

In 2008, the LHWMP collected 1,826 tons of household hazardous waste from more than 44,877 customers, some of which may otherwise have entered King County sewers. Also in 2008, LHWMP began a pilot project to determine whether it should provide collection for businesses that generate infrequent, small volumes of hazardous waste. By the end of the year, 278 businesses had brought in 31.2 tons of waste.

Endangered Species Act Compliance

WTD continues to consult with the National Marine Fisheries Service and the U.S. Fish and Wildlife Service (“Services”), as required under Section 7 of the Endangered Species Act (ESA), on projects that require a federal permit or receive federal funding. WTD’s past efforts to develop programmatic agreements with the Services (habitat conservation plan, programmatic biological assessments) and its funding of a position at National Marine Fisheries Service to review projects have helped make the Section 7 consultations more predictable and efficient.

⁷ Superfund is the common name for the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA).

In 2008, WTD ESA compliance activities included completing a technical memorandum on the impact of reclaimed water on ESA-listed species.

Being a Good Neighbor

In all its projects, WTD strives to minimize adverse effects of its facilities on the surrounding community through facility design features, construction best practices, and responsiveness to community input. RWSP policies direct WTD to employ stringent odor control at existing and new facilities.

Odor Control

The RWSP includes policies to guide King County in achieving its goal of preventing and controlling nuisance odor occurrences at all wastewater treatment plants and associated conveyance facilities. The policies also call for implementation of an odor prevention program that goes beyond traditional odor control.

The policies require retrofitting existing treatment and conveyance facilities. Retrofitting work done so far includes the following:

- At the West Point plant, efforts focused on evaluating odor control improvements that were completed in 2007. The evaluation found that the odor intensity from these areas was reduced by 79 percent (target reduction was 81 percent) and that odor frequency was reduced by 81 percent (target reduction was 90 percent). Operational activities were implemented to improve these results. WTD will evaluate the effects of these activities in 2009 and 2010.
- At South plant, efforts focused on evaluating odor control improvements that were completed in 2007. Preliminary modeling results indicate that the intensity of maximum odor impact was reduced by 91 percent (target reduction was 99 percent) and that the frequency of impacts was reduced by 76 percent (target reduction was 96 percent). Operational activities to help improve these results were implemented in 2008. Additional improvements are planned for South plant to help meet the odor reduction targets.
- Thirteen projects have been identified to improve odor control in the county conveyance system. Two projects were completed in 2008: installation of carbon bed odor scrubbers and chemical injection systems at the Hidden Lake and Juanita Bay Pump Stations.

RWSP policy directs the county to construct odor control systems for new regional treatment plants that meet the “best in the country for new facilities” level, as described in Attachment A to Ordinance 14712. Brightwater’s odor control system was designed to ensure there are no detectable odors at the property line for the treatment plant. Concrete work on the odor facilities began in 2008 and is expected to be complete by the end of 2009.

Public Involvement

In accordance with RWSP public involvement policies, 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 ensure its facilities are good neighbors. Public involvement activities associated with the capital projects discussed in the RWSP 2008 Annual Report include community meetings, informational booths, up-to-date Web sites, 24-hour construction hotlines, newsletters, bulletins, and press releases.

Tracking Costs

The 2008 cost estimate for implementing RWSP projects and programs through 2030 is approximately \$3.35 billion, an increase of about \$24 million, or 0.69 percent, from the 2007 RWSP cost estimate. The majority of this difference is attributed to unanticipated construction delays, refinements in project scope, inflation, and unpredictability in the construction bid market.

Nearly one-fourth of the 2008 RWSP cost estimate represents planning-level costs. Planning-level cost estimates are based on generic facility concepts. 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.^{8,9} By the time a project enters the construction phase, estimates typically narrow to a range of -10 to +15 percent.

⁸ Project Management Institute's *A Guide to the Project Management Body of Knowledge*, third edition, 2004.

⁹ Order-of-magnitude estimates are made without detailed engineering data. They are often referred to as "ball park" estimates.