Regional Wastewater Services Plan 2016 Annual Report

Prepared in accordance with
Ordinance 15384, Section 6, as amended, and King County Code 28.86.165

September 2017

King County

Department of Natural Resources and Parks
Wastewater Treatment Division

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Introduction

King County Ordinance 15384, Section 6, as amended, and King County Code 28.86.165 require the King County Executive to transmit a report to the Council in September each year to cover the previous year's implementation of the Regional Wastewater Services Plan (RWSP). The RWSP outlines programs and projects through 2030 to increase wastewater system capacity and function; gives guidance on recovering and recycling beneficial resources from the wastewater treatment process; and provides direction on protecting and monitoring water quality and meeting permit conditions.

Specifically, the Ordinance, as amended, and the King County Code require the report to:

- Summarize activities for the major components of the RWSP, including associated capital projects that were underway.
- Include a status of the odor prevention program and a summary of odor complaints.
- Summarize the results for the water quality monitoring program.
- Include information on the plan's elements, such as reclaimed water, biosolids, and energy.
- Provide an update of anticipated RWSP program costs through the year 2030.

This report addresses each requirement under a corresponding heading. This is the seventeenth RWSP annual report that the Wastewater Treatment Division (WTD) of the Department of Natural Resources and Parks has prepared.[1]

Executive Summary

The RWSP 2016 Annual Report summarizes the progress made during 2016 in implementing the plan's major programs and projects.

Highlights are as follows:

- Progress was made on capital projects associated with the Conveyance System Improvement Plan and the Long-term Combined Sewer Overflow (CSO) Plan.
- West Point, South, and Brightwater treatment plants produced 122,194 wet tons of Loop® biosolids, all of which were recycled and used as a fertilizer and soil amendment for forestry and agricultural applications or to make compost.

[1]Previous RWSP annual reports are available at http://www.kingcounty.gov/environment/wtd/Construction/planning/rwsp/Library/AnnualReport.aspx.

- Carbon sequestered from the use of Loop in agriculture, forestry, and composting totaled 41,092 MtCo2e (metric tons of carbon dioxide equivalents—the standard measure of carbon storage). This amount is equivalent of taking 8,000 cars off the road.
- The South, West Point, and Brightwater treatment plants continued to use digester gas to produce heat, electricity, and natural gas.
- WTD distributed about 83 million gallons (MG) of reclaimed water to off-site uses. In addition, 711 MG of filtered effluent was produced and used for on-site process water and irrigation at South, West Point, and Brightwater treatment plants.
- South, West Point, Vashon, and Carnation treatment plants received Platinum Peak Performance Awards from the National Association of Clean Water Agencies. Platinum-level awards are given for five or more consecutive years of compliance with effluent limits established by National Pollutant Discharge Elimination System (NPDES) permits.

RWSP Major Components

This section summarizes activities in 2016 for the following RWSP major components:

- Conveyance System Improvement Program
- Infiltration and Inflow Control Program
- CSO Control Program

Conveyance System Improvement Program

In accordance with RWSP policies, the Conveyance System Improvement (CSI) Program works to provide capacity in areas of the separated conveyance system in order to meet the RWSP 20-year peak flow design standard. This standard was adopted by the King County Council to serve as an objective measure for designing and building conveyance facilities intended to meet NPDES permit requirements that there be no overflows from the separated system. A 20-year peak flow consists of both storm flow (infiltration and inflow) and base flow (wastewater from homes and businesses) and has a 5 percent chance of occurring in any year.

In 2016, work continued on the CSI Program Update. RWSP policies call for regular program updates to verify, modify, or identify new conveyance system needs. WTD is working with the Engineering and Planning Subcommittee of the Metropolitan Water Pollution Abatement Advisory Committee (MWPAAC) and individual sewer agencies on the update which is expected to be complete in 2017.

More information on the CSI Program update is available at http://www.kingcounty.gov/environment/wastewater/CSI/ProgramUpdate.aspx.

Five CSI projects were underway in 2016:

- Sunset and Heathfield Pump Stations and Force Main Upgrade Project: http://www.kingcounty.gov/depts/dnrp/wtd/capital-projects/active/sunset-heathfield.aspx.
- North Creek Interceptor Project: http://www.kingcounty.gov/depts/dnrp/wtd/capital-projects/active/north-creek-interceptor.aspx.
- North Mercer Island and Enatai Sewer Upgrade Project: http://www.kingcounty.gov/depts/dnrp/wtd/capital-projects/active/north-mercer-island-enatai-sewer-upgrade.aspx.
- Lake Hills and Northwest Lake Sammamish Sewer Upgrade Project: http://www.kingcounty.gov/depts/dnrp/wtd/capital-projects/active/lake-hills-nw-lake-sammamish.aspx.
- Kent Auburn Conveyance System Improvements Project (Phase B): http://www.kingcounty.gov/depts/dnrp/wtd/capital-projects/active/kent-auburn.aspx.

Infiltration and Inflow Control Program

The County's Infiltration and Inflow (I/I) Control Program was created in 1999 as part of the RWSP to reduce the amount of I/I that enters the regional wastewater system, as I/I affects the capacity needs of sewer pipes and treatment plants. I/I is excess water that flows into sewer pipes from groundwater and stormwater. Groundwater (infiltration) seeps into sewer pipes through holes, cracks, joint failures, and faulty connections. Stormwater (inflow) rapidly flows into sewers via roof drain downspouts, foundation drains, storm drain cross-connections, and through holes in manhole covers.

Activities in 2016 focused on exploring and evaluating I/I reduction concepts identified by the MWPAAC I/I Task Force in 2015. WTD staff worked with MWPAAC's Engineering and Planning Subcommittee to develop a consultant scope of work. A Request for Proposal for professional services for evaluation of I/I reduction concepts was advertised in August 2016, and a notice to proceed was issued in December 2016.

More information on the I/I Control Program is available at http://www.kingcounty.gov/environment/wastewater/II.aspx.

Combined Sewer Overflow (CSO) Control Program

Work continued in 2016 to implement the County's CSO Control Program. RWSP policies and the 2013 consent decree, which the County entered into with the U.S. Department of Justice, the U.S. Environmental Protection Agency (EPA), and the Washington State Department of Ecology (Ecology), require control of all CSO locations by 2030. Control means that each location meets the Washington State standard of no more than one untreated discharge per year on a 20-year moving average.

More information on the CSO Program is available at http://kingcounty.gov/services/environment/wastewater/cso.aspx.

Six CSO projects and a water quality assessment and monitoring study were under way in 2016:

- Murray CSO Control Project (achieved substantial completion in 2016): http://www.kingcounty.gov/environment/wtd/Construction/Seattle/MurrayCSOStorage.aspx.
- Rainier Valley Wet Weather Storage Project: http://www.kingcounty.gov/depts/dnrp/wtd/capital-projects/active/rainier-valley-wet-weather-storage.aspx.
- Georgetown Wet Weather Treatment Station Project: http://www.kingcounty.gov/depts/dnrp/wtd/capital-projects/active/georgetown.aspx.
- West Duwamish CSO Control Project: http://www.kingcounty.gov/depts/dnrp/wtd/capital-projects/active/west-duwamish-cso-control.aspx.
- Joint City of Seattle and King County Ship Canal Water Quality Project: http://www.seattle.gov/util/EnvironmentConservation/Projects/ShipCanalWaterQuality/index.htm.
- Chelan CSO Control Project: http://www.kingcounty.gov/depts/dnrp/wtd/capital-projects/active/chelan-cso-control.aspx.
- Water Quality Assessment and Monitoring Study: http://www.kingcounty.gov/services/environment/wastewater/cso/projects/water-quality-study.aspx.

In 2016, work was underway to prepare the 2018 CSO Long-term Control Plan. This effort is looking at what has changed since the last time the plan was updated in 2012. It will reflect environmental, social, and financial goals to meet current needs. Updates to the CSO Long-term Control Plan are required as part of the NPDES permit renewal process for the West Point Treatment Plant.

More information on the 2018 CSO Long-term Control Plan is available at http://kingcounty.gov/services/environment/wastewater/cso/projects/system-plan.aspx.

Odor Prevention and Control Program

RWSP policies provide direction on implementing an odor prevention and control program that goes beyond traditional odor control for the County's wastewater treatment plants and associated conveyance facilities.

WTD received and investigated 45 odor complaints in 2016 (Table 1). When investigating an odor complaint, the source of the odor is not always identifiable. For example, some complaints were from areas where there are no WTD facilities.

Of the 45 complaints received, 24 were determined to be attributable to WTD facilities. No odor complaints were attributed to the Brightwater, West Point, and Carnation treatment plants. Complaints attributable to WTD facilities were resolved through replacing carbon in odor control facilities, sealing manhole covers, or cleaning or repairing air ducts.

Table 1. Odor Complaints in 2016

Location	Complaints Received	Complaints Attributed to WTD Facilities
West Point Treatment Plant	0	0
Conveyance facilities in the West Point service area	15	11
South Treatment Plant	3	1
Brightwater Treatment Plant	3	0
Conveyance facilities in the East Service Area (serving South and Brightwater Treatment Plant service areas)	22	11
Vashon Treatment Plant/Pump Station	2	1
Carnation Treatment Plant	0	0
Total	**45**	**24**

More information on the Odor Prevention and Control Program is available at http://www.kingcounty.gov/environment/wtd/Response/OdorControl/GoodNeighbor.aspx

Water Quality Monitoring

To protect public health and King County's significant investment in water quality improvements, the County regularly monitors treatment plant effluent, marine water, fresh water, and sediments. The parameters used to assess a water body's health

under Washington State Water Quality Standards are fecal coliform bacteria, dissolved oxygen, temperature, pH, nutrients, turbidity, and a variety of chemical compounds. Monitoring results for the previous year are presented as environmental indicators on the County's Department of Natural Resources and Parks KingStat website at http://your.kingcounty.gov/dnrp/measures/.

Key findings in 2016 included the following:

- Waters in most urban streams are frequently warmer, have more fecal coliform bacteria, and less dissolved oxygen than Washington State standards allow.
- The health of streams, as measured by the diversity and abundance of the invertebrate community that lives on the stream bottom, is generally better in streams that have less urban development.
- Five beaches monitored on Lake Washington had incidents of high bacteria and did not meet standards for swimming beaches. During the sampling season, 15 beaches throughout the County were resampled because of exceedances of the standards. Marina Beach was closed for two weeks early in the season.
- Lake Washington had algal blooms with cyanotoxins above the state recreational guidance value at Arrowhead Point and Luther Burbank Park. Four small lakes-Cottage, Hicklin, Marcel, and Wilderness-also had toxic algal blooms. Two other drainages, Mallard Lake and Joe's Creek, had cyanotoxins above state guidance values.
- Unusually warm Pacific Ocean waters entered inland Puget Sound marine waters in late 2014, and continued to cause anomalously high water temperatures in the Puget Sound Central Basin throughout the water column in 2016. Temperatures were generally 0.5-1 degree Celsius above normal for most of the year.
- For marine waters, large rainfall events during the 2016 wet season caused fresher than normal surface waters between January and March. Conversely, surface salinities were high during the warm and dry summer.
- Based on the Marine Water Quality Index, most offshore monitoring stations (85.7 percent), including those at the County's treatment plant marine outfalls, were at a low level of concern in 2016. Stations in Quartermaster Harbor and Elliott Bay were at a moderate level of concern in 2016 due to low dissolved oxygen.
- No exceedances of fecal coliform bacteria standards occurred at the County's treatment plant marine outfalls.
- No marine subtidal or beach sediment data were collected in 2016. Ambient subtidal sediment data will be collected in 2017 from Elliott Bay and the mainstem of Puget Sound's Central Basin.

Data and reports are available on the Water and Land Resources Division's Science and Technical Support Section website at http://www.kingcounty.gov/depts/dnrp/wlr/sections-programs/science-section/doing-science.aspx.

RWSP Plan Elements

This section summarizes activities in 2016 for the following RWSP plan elements:

- Biosolids Recycling Program
- Energy Efficiency and Recovery Program
- Reclaimed Water Program
- Permit Compliance

Biosolids Recycling Program

Biosolids are the nutrient-rich organic material produced by treating wastewater solids. After being processed and treated, biosolids are used beneficially as a fertilizer and soil amendment. RWSP biosolids policies encourage the County to continue to produce and market Class B biosolids and to evaluate alternative technologies to produce the highest quality marketable biosolids, including Class A biosolids.[2,3]

In 2016, a total of 122,194 wet tons of Loop® biosolids were produced at the West Point, South, and Brightwater treatment plants, all of which were recycled and used beneficially as a soil amendment for forestry and agricultural applications or were used to make compost.

Carbon sequestered from the use of Loop in agriculture, forestry, and composting totaled 41,092 MtCo2e (metric tons of carbon dioxide equivalents—the standard measure of carbon storage) after subtracting diesel emissions for transport and land application. This amount is equivalent of taking 8,000 cars off the road.

More information on the Biosolids Recycling Program is available at http://www.kingcounty.gov/environment/wastewater/Biosolids.aspx.

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[2]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.

[3]Class A biosolids refer to biosolids that have been treated to reduce pathogens to below detectable levels. Biosolids that meet this designation can be used without site access or crop harvest restrictions and are exempt from site-specific permits. Federal regulations require Class A level of quality for biosolids that are sold or given away in a bag or other container or that are applied to lawns or home gardens.

Energy Efficiency and Recovery Program

RWSP policies call for the County to use digester gas, an energy-rich methane gas naturally produced as a byproduct of solids treatment, for energy and other purposes when it is cost-effective to do so. In addition, the County's Strategic Climate Action Plan (SCAP) includes goals to implement energy efficiencies and increase renewable energy production.

In 2016, 33 million kilowatt-hours (kWh) of electricity were produced at South (18 million kWh) and West Point (17 million kWh) treatment plants. South Treatment Plant sold 173,000 therms of scrubbed natural gas to Puget Sound Energy.

In accordance with the SCAP, WTD's Energy Program prepared a *2017–2021 Energy Reduction Plan.* The plan outlines WTD's proposed approach for helping the County meet its energy reduction targets. The SCAP's energy reduction targets include reducing normalized energy use in County-owned facilities by at least five percent by 2020 and 10 percent by 2025, as compared to a baseline year of 2014. The projected energy efficiency gains from currently planned capital projects and operations and maintenance efforts show that WTD is on track to meet these targets.

More information on the Energy Efficiency and Recovery Program is available at http://www.kingcounty.gov/services/environment/wastewater/resource-recovery/Energy.aspx.

Reclaimed Water Program

The RWSP encourages the County to explore ways to increase the use of reclaimed water from its wastewater treatment plants. In 2016, about 83 million gallons (MG) of reclaimed water was distributed to off-site uses. In addition, 711 MG of filtered effluent was produced and used at the treatment plants for on-site process water and irrigation. Information on reclaimed water production and use by treatment plants in 2016 is summarized below.

- The South Treatment Plant produced and used about 71 MG of filtered effluent for process water at the plant. About 6.3 MG of Class A reclaimed water was distributed and used offsite by reclaimed water customers. The reclaimed water was used for irrigation of the Starfire Sports Complex, a wetland plants nursery, City Soil Community Farm Project, City of Tukwila landscaping irrigation, and for city public works uses such as street sweeping and sewer flushing.
- The West Point Treatment Plant produced and used about 170 MG of filtered effluent for process water and landscape irrigation at the plant.
- The Brightwater Treatment Plant produced and used about 470 MG of filtered

effluent for process water at the plant. In addition, about 43 MG of Class A reclaimed water was distributed to the Brightwater Education and Community Center, the Influent, North Creek, York, and Hollywood pump stations, Willows Run Golf Course, 60 Acres Park, and to the King County's Water and Land Division for mitigation plantings from the York reclaimed water fill station. The water was used for irrigation, toilets/urinals, and public art.

All of the effluent produced at the Carnation Treatment Plant is Class A reclaimed water quality, and about 33.5 MG of reclaimed water was used to beneficially enhance a wetland in the County's Chinook Bend Natural Area. More information on the Reclaimed Water Program is available at http://www.kingcounty.gov/services/environment/wastewater/resource-recovery/recycled-water.aspx.

Permit Compliance

On average, the County's wastewater treatment plants processed about 179 MG of wastewater each day. In 2016, four of the County's treatment plants—South, West Point, Vashon, and Carnation—operated without a violation of their NPDES permit effluent limits, and each of these plants received a Platinum Peak Performance Award from the National Association of Clean Water Agencies. Platinum-level awards are given for five or more consecutive years of compliance with effluent limits established by NPDES permits.

More information on WTD's NPDES permits is available at http://www.kingcounty.gov/depts/dnrp/wtd/system/npdes.aspx.

RWSP Cost Estimates

The RWSP reporting policies call for an update of anticipated RWSP program costs through the year 2030. In accordance with Section 110, Proviso P1 in Budget Ordinance 17941 and Motion 14384, WTD began work in 2015 to review and make recommendations regarding the processes the division uses to establish and update planning-level cost estimates for capital projects. Because this work continued through 2016, an update of 2016 RWSP cost estimates was not prepared. The results of this work will be applied in 2017 and 2018 to update planning-level cost estimates associated with program updates that are underway (CSI Program Update and 2018 CSO Long-term Control Plan).

Conclusion

WTD continues to implement programs and projects in accordance with the RWSP. In 2016, five CSI project and six CSO control projects were underway. Work progressed on preparing the CSI Program Update and the 2018 CSO Long-term Control Plan. WTD continued to recycle and beneficially use wastewater treatment products. These efforts also help to meet the County's SCAP energy reduction and greenhouse gas emissions reduction targets.