

WASTEWATER TREATMENT CAPITAL IMPROVEMENT PROGRAM

Introduction to Program, Program Goals, and Key 2005-2010 Issues

The mission of the Wastewater Treatment Division (WTD) is to protect public health and the environment by conveying and treating the region's wastewater. Since 1958, when King County citizens voted to build a regional wastewater system to clean the polluted waters of Lake Washington and Puget Sound, we have helped to dramatically improve water quality while recycling and reusing natural resources.

The objectives of the capital program are to:

- ensure continued operation and reliability of existing wastewater conveyance and treatment assets;
- enhance regional water quality in compliance with federal, state and local regulations; and
- ensure sufficient capacity to meet the long-term needs of the regional service area.
- Attaining these objectives is the basis for the projects included in the 2005 CIP budget.

In June 2001, the King County Council passed the Wastewater Flexible Budgeting Ordinance (King County Code, Chapter 4.04) creating a budgeting process for the WTD CIP program. This comprehensive ordinance defines a process that provides accountability for the spending while allowing the division the flexibility needed to achieve its mission.

The 2005 WTD CIP proposed budget is the fourth budget submitted under the flexible budgeting ordinance. In accordance with the ordinance, the spending authority for most capital projects is appropriated at the fund level. Minor asset management projects are appropriated at the category level as described below. This allows WTD the flexibility to transfer funds among projects within the appropriation category, subject to reporting requirements, and to react to special circumstances as they occur. In each case, only year one of budget authority is appropriated. Additionally, the full term of multi-year construction contracts is appropriated in the first year of the contract. Inclusion of the full contract value in year one gives rise to fluctuations in appropriation requests over time. For example, a large multi-year contract will increase the appropriation in the first year relative to the subsequent years.

**Wastewater Treatment Division
2005 Proposed Appropriation**

	Proposed Appropriation
WTD Capital Projects	564,981,222
Minor Asset Management Categories	
Structure and Site Improvements	1,677,967
Mechanical Equipment	1,890,148
Odor and Corrosion	436,264
Pipeline Replacement	1,087,850
Process Replacement/Improvement	2,579,270
Electrical, Instrumentation and Control	1,517,077
Total	574,169,798

The WTD Capital Program makes a distinction between appropriation and expenditure. The appropriation amount for the indicated year includes the (1) expenditure for the proposed year plus (2) full contract terms (multi-year contracts are fully budgeted in the year awarded), minus (3) previously appropriated expenditures.

The planned expenditure for projects by functional categories include only the amount WTD project managers and program staff expect to spend in the indicated year. The WTD Capital Program financial plan is based on expenditure estimates.

The WTD CIP appropriation request for 2005 is \$574,169,798. The following table describes the requested appropriation in terms of the components discussed above:

Wastewater Treatment Division	
2005 Proposed Appropriation by Component	
	Proposed Appropriation
2005 Total Expenditure	262,679,433
plus: 2005-2010 construction contracts	87,459,255
plus: BW Conveyance Tunnel construction bids	306,141,703
minus: previous grant-backed appropriation	(380,000)
minus: previously appropriated 2005 expenditure	(81,730,596)
Total	574,169,798

Financial Resources and Policy Overview

In June 2004, the King County Council adopted a monthly wholesale sewer rate of \$25.60 and a capacity charge of \$34.05 for 2005. Cash flows generated by the rate and capacity charge are sufficient to fund the accompanying appropriation request while fully complying with WTD's financial policies.

The WTD CIP is funded primarily through proceeds from revenue bond sales, short-term borrowing, capacity charge revenues and transfers from the operating fund. The operating fund derives the majority of its revenue from monthly charges to sewer customers that are collected by WTD's component agencies. Transfers from the operating fund to the capital program are the result of additional cash generated to meet the financial policy requirement of maintaining a debt service coverage ratio of no less than 1.15 of all debt service payments. WTD uses these transfers to reduce the amount of borrowing necessary to finance the capital program.

The 2005 capacity charge is based on the new capacity charge methodology adopted by the King County Council in October 2001 in Ordinance 14129. The methodology provides an equitable basis for allocating the costs of the wastewater treatment system to the

customers that use it. Specifically, it enacts the RWSP policy of growth paying for growth by ensuring new customers bear their equitable share of the cost of building new capacity in the system.

Capital Project Budget Estimates

WTD uses a consistent and systematic approach across the division to develop initial project budgets and update existing budgets. The following section provides an overview of the project budgeting process, including assumptions for contingency and inflation. The initial project budget is almost always derived from a planning-level budget estimate. These estimates are prepared early in the life of the project and provide the expected capital construction or implementation costs. These estimates are based on: (1) the project scope as it is known at that time, (2) industry standard pricing and contingencies, (3) historical project comparisons, (4) in-house and/or consultant experience, and (5) benchmarking, estimating programs, and in-house construction cost models.

The capital implementation cost estimate is used to derive additional project costs, including planning, engineering, construction, right-of-way/land acquisition costs, staff labor and overhead costs. Using extensive historical information and management input, the parameters and standards used in allocating these additional costs vary according to such things as: (1) the size and complexity of a project, (2) whether engineering is performed by County staff or consultants, and (3) whether construction management is performed by County staff or consultants.

The result is an overall project budget including details on schedule, construction costs, engineering costs, staff costs, overhead costs and Right-of-Way/Land Acquisition costs. This budgeting model produces detailed cash flow information by year and project phase in addition to detailed staffing information by phase and cost center or year and cost center. WTD will continue to improve the model over time.

Program Contingency

Program contingency provides an element of flexibility in reacting to changing circumstances across the entire CIP program. For the WTD CIP program, contingency is defined as 7.5 percent of the appropriation-year cash flow or \$10,000,000, which ever is less. Program contingency is identified as a single project (423545) and can be found under Central Functions. In 2004, a contingency transfer request of \$4 million was approved under the provisions of King County Code (KCC) 4.04.280(E) to fund construction on the Pacific Pump Station capital project. Additional appropriation of \$5,682,703 has been requested in 2005 to bring the program contingency back to \$10,000,000.

Project Contingency Assumptions

Project contingency is added to a project to explicitly reflect the uncertainty about the future and as a buffer against the risk of under-funding a project. In WTD, CIP project contingency is calculated using standards recommended by the Association for Advancement of Cost Engineering (AACE) recommendations. The typical WTD CIP project goes through five phases; with each successive phase

representing more complete and detailed project information. The five phases include planning, pre-design, design, construction, and closeout.

In the calculation of project contingency, the percentage of total project cost is specified according to the current phase of the project. The following table shows the percentage associated with the current phase of the project.

Project Phase	Percent Contingency
Planning	30
Pre-design	30
Design	20
Construction	10
Close-out	0

The contingency is based on total project cost and entered in the close-out phase of the project. As the project moves through the phases, the contingency amount will decrease, reflecting the improvements in project definition and expected accuracy of the data.

Inflation Assumptions

The WTD CIP contains many multi-year projects in which price changes over time affect the cost of materials and services. There are many sources of inflation and prices do not always change at the same rate. For example, the cost of construction may increase relatively fast reflecting a strong local construction market. The WTD CIP assumes general prices change at 3 percent per year during the 2005-2010 periods. This does not reflect a projection of any single inflation index but reflects a reasonable aggregate rate of increase for the next 6 years, based on the historical activity of both construction and non-construction price indices. Indices tracked include the Consumer Price Index, Implicit Price Deflator, the ENR Construction Cost Index and the Turner Building Cost Index.

Project Prioritization

In 2003, WTD initiated a new process to prioritize its capital projects for funding. This process combined WTD's former approach with the approaches used by other large west coast wastewater utilities. The new process evaluates each capital project against specific criteria that reflects WTD's missions and goals. Each project receives a score based on this evaluation, and the result was a numeric ranking of projects from first to last. This ranking, combined with the project cost estimates and other information, helps WTD managers identify which projects would be funded in the annual budgets. The process assumes that each proposed capital project is part of an approved comprehensive plan or has a sound business case, as demonstrated in a detailed project review form.

The prioritization system groups capital projects in three project categories, each with a set of criteria based on the division's mission statement.

1. **Major Capital** - projects that provide new capacity to the wastewater systems or add additional capacity to the system. Five categories of criteria are proposed for projects in the Major Capital projects in this category: (1) Regional Capacity Needs, (2) Public Health, Safety, and Property, (3) Regulatory or Contractual Requirements, (4) Natural Resources Protection, and (5) Cost Savings.
2. **Asset Management** - projects that rehabilitate or improve existing facilities, upgrade technologies, and improve processes or systems. Asset management projects typically do not increase capacity. Five categories are used to score Asset Management projects: (1) Service Disruption and Impacts from Asset Failure, (2) Employee Safety, (3) Regulatory or Contractual Requirements, (4) Remaining Equipment Life/Asset Damage, and (5) Cost Savings.
3. **Planning** - projects that are more diverse in nature, such as planning work, studies, central administrative functions, and projects supporting the Water and Land Resources Division. Six categories are used to score Planning projects: (1) Regional Service Needs, (2) Public Health Protection, (3) Regulatory Compliance (4) Contractual Requirements or Mandates, (5) Natural Resources and Property Protection, and (6) Cost Savings.

The result of the ranking process is three lists of ranked projects, one for each category of project. Each category has its own budget allocation, so only like projects compete against each other for available for funding.

Project Categories

Capital projects carried out by WTD are grouped according to the major functions they serve in the wastewater system. There are thirteen functional categories in all. The spending authority for the first twelve of these categories is pooled at the fund level. For the thirteenth category, Minor Asset Management, the spending authority is defined at the level of the sub category.

1. South Treatment Plant
2. West Treatment Plant
3. Brightwater Treatment Plant
4. Vashon Treatment Plant
5. Conveyance Pipelines and Storage
6. Conveyance Pump Stations
7. Combined Sewer Overflow (CSO) Control
8. Infiltration and Inflow (I/I) Control
9. Biosolids Recycling
10. Water Reuse
11. Environmental Lab

- 12. Central Functions
- 13. Minor Asset Management

Project Subcategories

To help make it easier to track projects we have further grouped them into four primary subcategories: (1) asset management, (2) new facilities, (3) odor control, and (4) power management. Most wastewater capital projects fall under either asset management or new facilities, so the odor and power management categories were added to logically differentiate the projects. Other subcategories are used, as well, to describe projects specific to two project categories: combined sewer overflows and minor asset management. Descriptions of those subcategories are provided under the related project category.

New Facilities and Improvements

King County must provide the necessary wastewater capacity to serve the rapidly growing population in King County, south Snohomish County, and a small part of Pierce County. Forecasts predict that more than 1 million new people will be living and working in King County by 2030, generating an additional 54 million gallons of wastewater each day (mgd). The Washington State Growth Management Act requires the county to have infrastructure available to serve this growth, and the recent amendment to the Comprehensive Water Pollution Abatement Plan (the Regional Wastewater Services Plan) is the vehicle for meeting this requirement. The RWSP identifies wastewater capital projects to be constructed in the next 30 years, including the new 36-mgd Brightwater Treatment Plant, a marine outfall, several large conveyance pipes, and 22 CSO projects.

Odor Control

In December 2002, the WTD established odor control policies for its facilities. The King County Council adopted an ordinance (2003-0178) to require the following:

- establish odor control goals for all treatment plants and conveyance facilities;
- design and operate odor control facilities to meet the goals;
- investigate potential technologies and costs;
- recommend a policy to the Council for inclusion in the RWSP; and
- achieve significant reduction of South Plant odors below 1993 air model levels.

Many odor control projects are intended to control the odor caused by hydrogen sulfide gas, thus limiting corrosion as well as improving air quality around WTD facilities. Examples include conducting odor studies and constructing or upgrading odor control facilities. Hydrogen sulfide (H₂S) results from the natural decomposition of organic material in raw sewage, especially in enclosed areas like pipes and holding basins. This colorless gas has an unpleasant rotten egg odor; when combined with water in sewage pipes, it forms sulfuric acid, a compound that corrodes concrete pipes and degrades their structural integrity.

Power Management

There are two main types of power management projects. Projects of the first type implement Motion 11712, unanimously supported by the King County Council, to provide reliable power for safe and dependable wastewater treatment service.

The sewage backups and overflows that occurred during the widespread power outages caused by the Holiday Storm of 1996–97 and the Energy Crisis of 2000–2001 highlighted the need for onsite self-generation and standby generators at additional pump stations and treatment plants. Power supply is also made more reliable by upgrading existing equipment such as pump motors, switches, meters, and transformers.

The second type of projects conserves energy and provides quantifiable, long-term savings in energy costs. An example of this type of project is co-generation, where methane gas captured from the treatment process is used to power generators that would otherwise require electricity.

Asset Management

The Wastewater Treatment Division's Asset Management program strives to preserve asset value, system reliability, efficiency, and worker safety at lowest lifecycle costs. Preservation of wastewater assets is vital to our mission of protecting public health and environmental stewardship.

Infrastructure replacement and rehabilitation projects are funded as both stand-alone capital projects as well as under the Minor Asset Management program. WTD's Facilities Inspection group conducts comprehensive underground pipe assessments using both Closed Circuit TV (CCTV) as well as personnel access. Advanced methods of pipe rehabilitation are regularly implemented. Our engineering, operations and maintenance groups monitor condition status of mechanical, electrical and process assets within our system. Projects are now prioritized by their relative impacts on potential service disruptions/impacts, employee safety, regulatory or contractual requirements, estimated remaining asset useful life, and potential cost savings.

Work is now underway in WTD to develop business systems and practices to be able to more precisely predict the optimal point between increased operational maintenance costs and capital asset replacement. Other areas of improvement being addressed are increased use of life cycle cost analysis and proactive risk management.

Green Building Initiative

WTD is supporting the King County Green Building Initiative. In this pursuit, WTD has initiated or completed the following actions:

- WTD staff serves on the King County Green Team.
- WTD has established a Green Team.
- Future revisions to the WTD CIP project management system will help with tracking green building implementation.
- An On-Call Green Building Consultant Contract is available for use by AM and MC Project Managers to help them implement the green building initiative in their projects.
- Continued funding of the Environmental Building Newsletter to help project managers implement the green building initiative in their projects.
- Revision of the WTD specifications to include green building language.
- Projects incorporating Green elements include the Brightwater Treatment Plant and Conveyance, Juanita Pump Station, Carnation Treatment Plant, West Point Cogeneration, South Plant Cogeneration, Hidden Lake Pump Station, Pacific Pump Station, Sweyolocken Pump Station, Interbay Pump Station, and Soos Creek Pump Station.

Growth Management and Comprehensive Plan

Both King County and Washington State require sewer comprehensive plans for all entities that provide sewage collection and treatment. These plans must include specific information such as a capital facilities inventory, and must undergo a formal public review process. The Washington State Growth Management Act (GMA) further requires King County to forecast the amount of wastewater infrastructure necessary to serve growth within the urban growth boundary, and to have this infrastructure available when growth occurs.

The King County Council adopted the Regional Wastewater Services Plan (RWSP), a supplement to the King County Comprehensive Water and Pollution Abatement Plan, in November 1999. The RWSP is the policy basis for the capital improvements necessary to provide wastewater services to this region for the next 30 years.

The RWSP utilizes the same assumptions with regard to future population and employment levels in the Puget Sound region as does the GMA and the King County Comprehensive Plan. When originally presented to the Council for adoption, the RWSP included an up-to-date inventory of existing facilities, a level of service definition, and an identification of needs to support the regional vision adopted under the GMA and the King County Comprehensive Plan. The update of the RWSP is currently before the Regional Water Quality Committee for the King County Council review.

Council Adopted Changes

Council added the following project to the 2005 Wastewater CIP:

- *Denny Way CSO - \$500,000*

Council also reduced funding from the Wastewater CIP projects listed below:

- *Denny Way CSO – (\$500,000)*
- *Water Reuse Satellite Facility – (\$6,751,051)*

Council Provisos

P1 PROVIDED THAT:

Of this appropriation, \$500,000 may not be expended or encumbered on the Denny Way CSO project 423001 until the division submits to the council a mitigation plan to develop the surface area of the Denny Way CSO site on Elliott Avenue for public recreational benefit. The plan shall be developed in collaboration with the Seattle parks department and shall outline the cost and timeline of multiple recreational options

suitable to the site and with public benefit.

The plan must be filed no later than April 15, 2005, in the form of 16 copies with the clerk of the council, who will retain the original and will forward copies to the councilmembers and the lead staff of the natural resources and utilities committee or its successor.

P2 PROVIDED FURTHER THAT:

Of this appropriation, \$500,000 shall not be expended or encumbered until the wastewater treatment division hires a consultant to provide independent oversight and monitoring of the treatment plant, conveyance facilities and marine outfall elements of the Brightwater project.

(1) The consultant shall have the following minimum qualifications:

- a. Nationally recognized expertise on major public capital improvement projects with a constructed value of \$200 million or more;*
- b. Experience with wastewater treatment facilities of similar scope and scale to the Brightwater project;*
- c. Capacity and expertise to quickly and professionally review project scope, schedule and budget phase submittals;*
- d. Expertise in construction management and/or program management; and*
- e. Preference should be given to a consultant with a local office.*

(2) The work program for the consultant shall require the consultant at a minimum to provide to the executive, the council and the Brightwater project representatives the following:

a. An overview of the Brightwater project including an initial review of scope, schedule, budget and distribution of budget categories compared to other projects of similar scope and scale or industry standards. The overview shall identify any project elements that are inconsistent or out of balance with industry standards or other comparable projects and shall include recommendations, if any, for improvements to the Brightwater project;

b. A review of the scope, schedule and budget for all major Brightwater project phase submittals including the 30%, 60%, 90% and 100% design submittals;

c. Written reports on the status of all design phase submittals reviewed by the consultant;

d. Additional analysis or studies as may be requested by the wastewater treatment division or the council, including, but not limited to, monthly reports on the bidding and construction phases of the project; and

e. Quarterly presentations on the status of the Brightwater project to the budget and fiscal management committee or the regional water quality committee or their successor committees. The frequency of these presentations may be decreased to less than quarterly at the discretion of the chair of the budget and fiscal management committee or the chair of the regional water quality committee, respectively, or their successor committees.

(3) To the extent feasible, the consultant procurement process should be timed or phased to facilitate review of the Brightwater Treatment

Plan 60% design submittal, currently scheduled for January 2005.

The original and 16 copies of all oversight monitoring consultant reports must be filed with the clerk of the council, who will retain the original and will forward copies to each councilmember and to the lead staff for the budget and fiscal management committee and the lead staff of the regional water quality committee or their successors.

P3 PROVIDED FURTHER THAT:

Of this appropriation, \$500,000 shall not be expended or encumbered until the council approves by motion a report unifying Brightwater program reporting and cost monitoring formats and including a Brightwater program baseline budget. The report should be submitted by the executive to the council by January 24, 2005.

The proposed Brightwater project reporting requirements shall, at a minimum, include the following:

(1) A format for the Brightwater project monthly management reports in accordance with executive policies and procedures (CON 7-9-1 (AEP)) section 6.8.

(2) A format modeled after formats currently in use for existing large capital improvement projects such as the Harborview bond program and the courthouse seismic project (i.e. distribution list, executive summary, project descriptions, overall budget summary, critical issues, budget summary tables, schedule, current activities and a look ahead summary).

(3) A budget reporting format, appropriate to the scale of the Brightwater program, to be used as a consistent template for all Brightwater sub-projects and facilitate budget summary roll ups (example, Harborview bond program UW C-100 budget form 08/01/03).

(4) A proposed Brightwater program baseline budget based on the proposed budget reporting format and the October 2004 predesign estimate. The baseline budget approved by the council shall serve as a performance measurement planning tool for the Brightwater program.

The original and 16 copies of the report must be filed with the clerk of the council, who will retain the original and will forward copies to each councilmember and to the lead staff for the budget and fiscal management committee and the lead staff of the regional water quality committee or their successors.

CIP Program Accomplishments and Completion Lists

Construction Projects Completed in 2003

A20110 West Treatment Plant - Asset Mgmt
423351 WTP Community One Time Mitigation for Pcl/Smi

423413 WTP Drying Building Modifications

A20120 West Treatment Plant - New Facilities & Improvements

423537 WTP Raw Sewage Pump Engine

A20130 West Treatment Plant - Odor Control

423324 WTP Process Cleanings w/Odor Control

A20410 Conveyance Pipelines and Storage - Asset Mgmt

423082 Lake Hills Remediation Project

423569 63rd Ave. SW Pipeline Repairs/Corrosion

A20430 Conveyance Pipelines and Storage - Odor Control

423354 CP&S Juanita Bay FM Replacement

A20530 Conveyance Pump Station - Odor Control

423526 Hidden Lake PS & Siphon

A20540 Conveyance Pump Station - Power Mgmt

423155 Sunset/Heathfield PS - Emergency Generator

A20920 Water Reuse - New Facilities

423462 Mill Creek Habitat Restoration

A21100 Central Functions

423175 MMIS Implementation

423512 Issaquah Hatchery

423532 ESA Data Management

423576 WTD Division Wide Security

423531 Space Imaging And Land Classification

423522 Clark Settlement

423202 Mountains to Sound Greenway

Construction Projects to be Completed in 2004

A20010 South Treatment Plant - Asset Mgmt

423565 South Plant Aeration Manifold Replacement - Tanks 1, 2 & 3

423567 Structural Repairs to Earthquake Damaged Facilities

A20110 West Treatment Plant - Asset Mgmt

423305 WPTP - Stepping Power Factor Filter/Capacitor

423341 PLC Replacements

A20140 West Treatment Plant - Power Mgmt

423306 WPTP - Plant Electrical Power Management System

423314 WPTP - Uninterruptible Power Supply Monitoring System

A20410 Conveyance Pipelines and Storage - Asset Mgmt

423121 Madsen Creek Erosion & Sewer Stabilization

A20420 Conveyance Pipelines and Storage - New Facilities & Improvements

423107 Mill Creek Relief Sewer

423519 North Creek Storage Facility

A20530 Conveyance Pump Station - Odor Control

423469 Sveyolocken Discharge Odor Upgrade

423581 Pepcon Replacement Study

A20620 Combined Sewer Overflow - New Facilities & Improvements

423003 Ravenna Creek Pipeline

A20650 Combined Sewer Overflow Control - Remediation

423056 NOAA Misc. Outfall Sediment Remediation

A20700 Inflow & Infiltration

423297 RWSP Local Systems I/I Control

A21100 Central Functions

423550 Freshwater Assessment Program

Construction Projects to be Completed in 2005

A20020 South Treatment Plant - New Facilities & Improvement

423408 Fuel Cell Demonstration Project

423572 STP Dewatering Equipment Replacement

A20140 West Treatment Plant - Power Mgmt

423426 Power Reliability Improvements - EWRS

A20320 Vashon Treatment Plant - New Facilities & Improvements

423460 VTP Vashon Facility Improvement

A20410 Conveyance Pipelines and Storage - Asset Mgmt

2005-088 Densmore Stormwater System Improvement Project

A20430 Conveyance Pipelines and Storage - Odor Control

423468 ESI Chemical Injection

A20510 Conveyance Pump Station - Asset Mgmt

423303 Swayolocken PS - Pump Motors Drives

A20540 Conveyance Pump Station - Power Mgmt

423154 South Mercer PS - Emergency Generator

A20620 Combined Sewer Overflow - New Facilities & Improvements

423001 Denny Way/Lake Union CSO Control Project
423179 Henderson/MLK CSO