

# WASTEWATER TREATMENT DIVISION CAPITAL IMPROVEMENT PROGRAM

## Introduction to Program, Goals, and Highlights

The Wastewater Treatment Division's (WTD) Capital Improvement Program (CIP) budget request for 2008 is \$274 million. The total 2008-2013 proposed budget plan is approximately \$903 million.

The mission of the WTD is to protect public health and enhance the environment and create resources from wastewater. This includes treating and reclaiming the region's wastewater, recycling solids and generating energy. Since 1958, when King County citizens voted to build a regional wastewater system to clean the polluted waters of Lake Washington and Puget Sound, WTD has 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 2008 CIP budget.

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

In accordance with the flexible budgeting ordinance, the spending authority for most capital projects is appropriated at the fund level. The projects included in the six minor asset management categories are appropriated at the category level. 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 one year 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 one year can give 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  
2008 Proposed Appropriation**

	Proposed Appropriation
WTD Capital Projects	\$267,013,405
Minor Asset Management Categories	
Structure and Site Improvements	\$718,379
Mechanical Equipment	\$1,971,648
Odor and Corrosion	0
Pipeline Replacement	\$1,430,194
Process Replacement/Improvement	\$35,399
Electrical, Instrumentation and Control	\$2,354,873
Total	\$273,523,899

**Financial Planning and Policy Overview**

In June 2007, the Metropolitan King County Council adopted a monthly wholesale sewer rate of \$27.95 for 2008. A capacity charge of \$46.25 will also be in effect in 2008. Revenues generated by the rate and capacity charge are sufficient to fund the accompanying appropriation request while fully complying with WTD's financial policies. Appendix E provides the Financial Plan, adopted with the rate in June 2007.

The WTD CIP is funded primarily through proceeds from revenue or limited tax 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 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 capacity charge is based on the methodology the Metropolitan King County Council adopted 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 Regional Wastewater Services Plan (RWSP) policy of growth paying for growth by ensuring new customers pay 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. This 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.

### **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.

<u>Project Phase</u>	<u>Percent Contingency</u>
Planning	30
Pre-design	20
Design	15

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.

**Program Emergency Appropriation**

The 2008 Budget submittal requests \$15 million in appropriation for a new project to address unforeseen emergencies that threaten public health and safety. The WTD Emergency CIP Project will provide the necessary initial spending authority to immediately respond to emergency situations. This will improve transparency and accountability by centralizing and clearly identifying the charges incurred under emergency conditions before the more formal processes of project creation and authorization are complete. Typical examples are unforeseen facility and/or conveyance system events that threaten public health and safety. In the past two years, WTD has incurred two conveyance failures caused by severe weather conditions at a cost of \$4 to \$10 million. If approved, this request provides WTD with appropriation specifically designated to allow emergency capital improvement work to proceed.

**Inflation Assumptions**

Inflation is a market-driven increase in the level of prices over time that results in the future decrease in purchasing power of today’s dollars. 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 materials and commodities have increased at a greater rate and shown more volatility during the last several years than general inflation. This reflects a strong local construction market, and national and international economic conditions. For the coming year, forecasters predict some continued moderation in 2008 from the significant increases in materials prices experienced in 2004 and 2005.

WTD assumes general prices increase at 3 percent per year during the 2008-2013 budget period. 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.

It should be noted that while a standard increase of 3 percent per year is being used in estimating costs for its wastewater projects, the activity in project components such as materials, labor, equipment, supplies, and contractor markups may require an increase in inflation assumptions in subsequent budgets.

**Project Prioritization Methodology**

In 2003, King County’s Wastewater Treatment Division 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. In summary, the new process evaluates each capital project against specific criteria that reflect WTD's mission and goals. Each project receives a score based on this evaluation, and the result is a numeric ranking of projects from 1 to N. This ranking, combined with the project cost estimates and other information, helps WTD managers identify which projects to request for funding in the budget. 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.

To augment the prioritization process, WTD has compiled a set of guidelines for the consistent calculation of life-cycle costs and application of economic analyses to capital projects and alternatives. These analyses are an important element in defining projects from the Brightwater Treatment Plant to the combined sewer overflow (CSO) program update.

In addition, a major initiative encompassing a systematic and structured view of capital project decisions including economic analysis of project alternatives is under way in the asset management section. Business Case Evaluation (BCE) is a bottom up look at the capital project process that is providing the opportunity to work through a comprehensive framework that will form the basis of the program's capital decision making. Currently, case studies have been developed from which the lessons learned are being used to design and develop the form in which this process will be applied.

## **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. 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. Local Treatment Facilities
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

## **2008 Significant Project Highlights**

### **Brightwater Treatment Plant and Conveyance Systems: \$117,988,737**

Construction work at the treatment plant site related to the 40 acre North Mitigation Area has been substantially completed with the exception of some planting work which will continue through 2007. Work under the Site Prep contract has also been substantially completed as of the second quarter of 2007. This work entailed construction of erosion and sedimentation controls, an effluent drop structure and site filling and grading. Notice to proceed was given on the Earthwork/Brightwater Operation Center contract in April and is currently underway. This work will be completed in late 2007. Notice to Proceed on the treatment plant Liquid Stream contract was given in July. Request for bids on the Solids and Odor Control Facilities were advertised in late July. Bid opening is scheduled for the end of October, 2007.

Conveyance construction continues through 2007 with work underway on the East Central and West Tunnel Portals. Notice to Proceed on the Effluent Pumping Station was given in July. Notice to proceed on the Marine Outfall is expected in October, 2007. All components of conveyance construction are currently on schedule and no significant concerns exist at the present time.

### **Bellevue Pump Station/Forcemain Upgrade: \$10,462,397**

The existing Bellevue Pump Station is 30 years old. This project will replace the pumps, controls, electrical system, process piping, HVAC unit, and generator. Further developments will add chemical storage, an updated odor control system and the construction of 5,700 feet of

new force main extending from the Pump Station to the East Side Interceptor (ESI). The forcemain construction has begun and is scheduled for completion in June 2008 with pump station construction scheduled to start in February 2008.

**Ballard Siphon Repair Project: \$2,727,659**

The Ballard Siphon consists of two wood stave siphon barrels that rest in the flocky material on the bottom of the Washington Ship Canal. Final design is scheduled for completion in the third quarter 2008 with construction scheduled to begin in first quarter 2009. This project includes two major components: 1) Slip-lining the existing wood stave siphon barrels; and, 2) Tunneling an 84-inch diameter pipe below the canal.

This project was originally designated as an emergency project on the basis of preliminary sonar readings of the pipe coupled with the extreme exposure and sensitivity of its location.

Subsequent analysis and inspections have identified the anomalies in the sonar image as not immediately threatening. Accordingly, the assessment of risk of imminent failure in the first 140-feet (roughly 2.5% of the total pipe length) has been significantly reduced based on more complete information. However, risks and uncertainties associated with rest of the siphon and the consequences of pipeline failure remain high:

- Up to 60 million gallons per day of untreated sewage flowing into the canal
- Potential impacts to migratory path for endangered salmon
- Complexities of performing emergency construction work in a major commercial waterway
- Redistribution of contaminated sediments on the canal floor due to leaks, pipe collapse or construction

In addition to risk reduction there are collateral benefits to proceeding with this project. These include the elimination of CSO events at the Ballard RS, reduction of overflows at 11th Avenue RS and scope reductions in other planned CSO projects. For these, reasons, the project is continuing forward as a high priority on the program.

**Interbay Pump Station Upgrade Project: \$11,722,404**

This project increases the station's pumping capacity to 133 million gallons per day as required by agreements with the Washington State Department of Ecology (WDOE), replaces obsolete mechanical and electrical equipment, and upgrades emergency power generation capacity. The project also provides odor control at the pump station site and the force main discharge structure site. The project is scheduled to complete predesign and initiate final design by the end of 2007, which will continue through 2008.

**Southwest Interceptor Project: \$35,351,351**

Portions of the existing conveyance system in the Kent and Auburn planning zones do not have capacity for projected 2010 peak flows. This project will fund the design and construction of approximately 5 miles of new sewer in Kent, Auburn, Pacific and Algona ranging from 18 inch diameter to 54 inch diameter to increase system capacity. Final design is scheduled for completion in the fourth quarter of 2008. Advertisement of construction bids is also scheduled for the fourth quarter of 2008 after final design.

The following table displays major projects in the 2008 Executive Proposed Budget.

<b>Significant Projects</b>		<b>2008 Executive</b>	<b>Proposed Plan</b>	<b>Continuation</b>
<b>Wastewater Treatment Capital Improvement Plan</b>		<b>Proposed Budget</b>	<b>2008-2013</b>	<b>of Existing Project</b>
423484	Brightwater Treatment Plant	\$54,941,972	\$91,990,511	X
423575	Brightwater Conveyance	\$63,046,765	\$117,802,974	X
423521	Bellevue Pump Station/Forcemain	\$10,462,397	\$10,569,619	X
423602	Ballard Siphon Repair	\$2,727,659	\$3,258,109	X
423135	Interbay Pump Station Upgrade	\$11,722,404	\$19,801,734	X
423582	Southwest Interceptor	\$35,351,351	\$41,133,633	X

### **Project Subcategories**

To help make it easier to track, projects are further grouped 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 control and power management categories were added to logically differentiate the projects. Other subcategories are used 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.

#### **Asset Management**

King County has many responsibilities as a regional wastewater service provider. It must protect the health and safety of the public and the environment, dependably collect and treat wastewater from 34 local sewer agencies, meet the terms of National Pollutant Discharge Elimination System (NPDES) permits, and protect the investment in its existing wastewater system. To fulfill these responsibilities and ensure the system has the flexibility to meet future demands, the County must maintain and periodically update its wastewater assets. In general, the asset management projects reported in this subcategory are part of the Facilities Inspection Program, which through routine inspections and refurbishment extends and optimizes the “useful life” of WTD assets, including facilities, structures, and pipelines. Accordingly, these projects vary widely in scope, ranging from replacing pavement to replacing the roofs on digesters.

#### **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. WTD forecasts predict that between 2000 and 2030 more than 1,000,000 new people will be living and working in WTD’s service area, generating an additional 63 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 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 through 2030, including the new 36-mgd Brightwater Treatment Plant, a marine outfall, several large conveyance pipes, and 21 CSO projects.

### **Odor Control**

On July 14, 2003, the Metropolitan King County Council adopted Ordinance 14712, which established odor control policies for the Wastewater Treatment Division plants and conveyance facilities. Pursuant to adoption of the ordinance, WTD has:

- Designed the first phase odor control improvements for the South Treatment Plant and the West Point Treatment Plant with construction completion anticipated in 2007 and 2006 respectively
- Tested new biological scrubbers for odor control
- Completed 90% Brightwater treatment plant and conveyance systems to meet ordinance-required control levels
- Maintained the WTD Odor Control Design Standard
- Included odor control in all major conveyance facilities upgrades

New odor control projects planned for 2007 include the design of replacement of the county's two Phoenix® odor control systems with superior bioscrubbers eliminating on-going media replacement costs and substantially decreasing maintenance requirements.

The Phoenix® odor control scrubbers use a thin layer of carbon media to convert hydrogen sulfide to elemental sulfur that must be water washed off the carbon surface. Automated washing cycles clean the sulfur from the carbon restoring much of the carbon's ability to remove additional hydrogen sulfide.

### **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 project conserves energy and provides 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 provide electrical power that otherwise would have to be purchased.

### **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 an internal 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 asset management and major capital 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, Swaylocken 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.

## **CIP Program Accomplishments and Completion Lists**

### Projects Completed in 2006

A20020 South Treatment Plant – New Facilities & Improvement

423571 Digestion Enhancement /Full-Scale Operation Testing

A20040 South Treatment Plant – Power Mgmt

423548 STP Cogen

A20110 West Treatment Plant - Asset Mgmt

423341 PLC Replacements

423417 Grit System Improvements

423461 WPTP Clarifier Painting/Coating Phase 2

A20420 Conveyance Pipelines and Storage - New Facilities & Improvements

423507 Bear Creek Interceptor Extension

A20430 Conveyance Pipelines and Storage – Odor Control

423539 Fremont Siphon Odor Control

423527 EBI Odor Study

A20510 Conveyance Pump Station – Asset Mgmt

423601 Barton Force Main Repair

A20920 Water Reuse – New Facilities

423533 Normative Flow

A21100 Central Functions

423550 Freshwater Assessment Program

## Projects to be Completed in 2007

A20040 South Treatment Plant - Power Mgmt

423408 Fuel Cell Demonstration Project

A20120 West Treatment Plant – New Facilities & Improvements

423584 West Point Odor Improvements

A20320 Local Treatment Facilities – New Facilities & Improvements

423460 Vashon Treatment Facility Improvements

423611 Chinook Wetlands Enhancement

A20410 Conveyance Pipelines and Storage – Asset Mgmt

423578 Bellevue Interceptor Pipe Replacement

423588 Densmore Stormwater System Improvement Project

423612 North Mercer Island Interceptor Repair

A20420 Conveyance Pipelines and Storage - New Facilities & Improvements

423121 Madsen Creek Erosion & Sewer Stabilization

423494 Fairwood Interceptor (Formerly Madsen Creek)

A20510 Conveyance Pump Station - Asset Mgmt

423562 Mathews Park Pump Station Upgrade

A20520 Conveyance Pump Station – New Facilities & Improvements

423518 Pacific Pump Station

A20530 Conveyance Pump Station – Odor Control

423455 University Regulator Station Odor Control

423598 Swayolocken Forcemain Odor Control Carbon Polisher

A20620 Combined Sewer Overflow - New Facilities & Improvements

423489 Carkeek Overflow Reduction

423587 Dechlorination Systems at CSO Facilities (Alki and Carkeek)

A21100 Central Functions

423311 WTD Financial System Replacement Project

## Projects to be Completed in 2008

A20020 South Treatment Plant - New Facilities & Improvement

423585 South Plant Odor Improvements

A20120 West Treatment Plant - New Facilities & Improvements

423579 Space Planning Year 1 Phase 1

A20320 Local Treatment Facilities - New Facilities & Improvements

423557 Carnation Treatment Plant

A20430 Conveyance Pipelines and Storage - Odor Control

423468 ESI Chemical Injection

A20520 Conveyance Pump Station – New Facilities & Improvements

423365 Hidden Lake PS/Boeing Creek Trunk

423406 Juanita Bay PS – Modification

A20530 Conveyance Pump Station - Odor Control

423580 King Street Regulator Odor Control

A20650 Combined Sewer Overflow Control - Remediation

423589 Lower Duwamish Waterway Superfund

A20820 Biosolids – New Facilities & Improvement

423604 West Side Biosolids Storage

A21100 Central Functions

423458 HCP/Programmatic Biological Assessment (PBA)

### ***Council Adopted Budget Changes:***

*A20100 – West Point Treatment Plan - (\$1,200,000): Moved from 2008 to 2009.*

*A20400 – Conveyance Pipes and Storage - (\$8,086,640): Moved from 2008 to 2009.*

*A20600 – Combined Sewer Overflow - \$750,000*

*A21100 – Central Functions – (\$15,000,000): Proposed contingency budget removed*