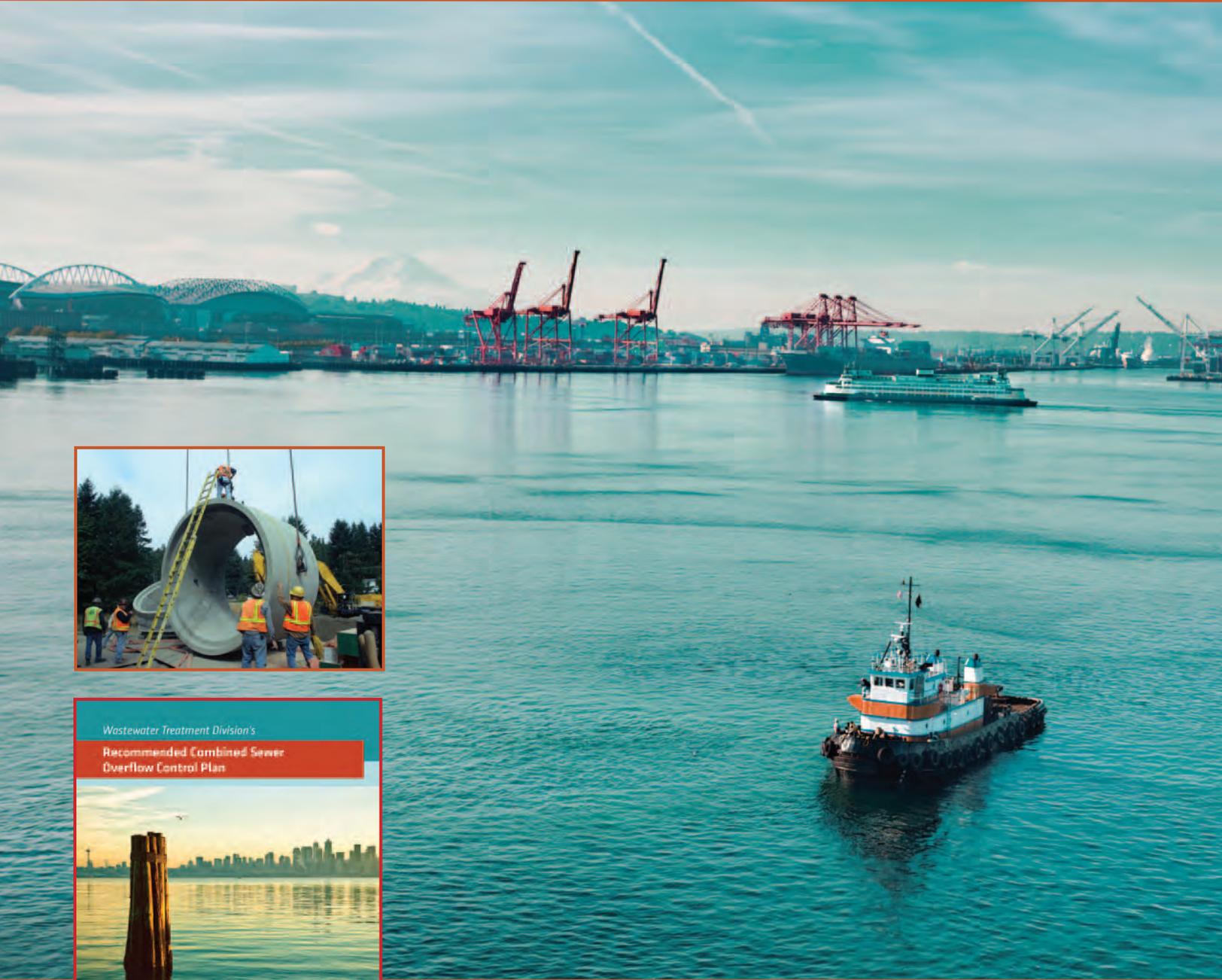


King County Executive's

Recommended Combined Sewer Overflow Control Plan



Wastewater Treatment Division's
Recommended Combined Sewer
Overflow Control Plan

King County
Department of Natural Resources and Parks
Wastewater Treatment Division

October 2011

The cover of the report features a photograph of a sunset over a body of water. In the foreground, a wooden post stands in the water. In the background, a city skyline is visible across the water. The text on the cover includes the title, the King County logo, and the date.

June 2012



King County

Department of Natural Resources and Parks
Wastewater Treatment Division

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King County Executive's

Recommended Combined Sewer Overflow Control Plan



King County

Department of Natural Resources and Parks
Wastewater Treatment Division

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A Community-Based Plan to Improve Our Waterways



King County Executive Dow Constantine is submitting his recommended combined sewer overflow (CSO) control plan to the King County Council and the Regional Water Quality Committee (RWQC) for review and approval.

The Executive's plan, summarized in the following pages, reflects community values, concerns, and preferences expressed throughout the process to update the County's CSO control plan. Completing the plan will benefit the community by reducing the threat to public health from contact with pathogens and from eating contaminated fish, and it will protect the environment by reducing the chemical threat to juvenile salmon and by contributing to cleanup of the Lower Duwamish Waterway.

The plan carries forward the nine CSO control projects presented in the October 2011 Wastewater Treatment Division (WTD) Recommended CSO Control Plan. Completion of the projects will meet federal and state regulations by controlling all King County CSO locations to no more than one overflow per year on average at each location. The schedule calls for completing the projects by 2030, which continues the County's earlier commitments to regulators and the community. These final projects in our CSO Control Program are some of the most complex and expensive, estimated to cost a total of \$711 million (in 2010 dollars).

The recommended projects emerged from a three-year-long comprehensive review of the CSO Control Program. During the review, WTD evaluated new conditions, opportunities, and community input since the last major CSO plan update in 1999 and then developed a number of alternative projects to determine which ones were the most cost-effective and efficient.

The projects reflect community priorities heard during the public review process:

- Changing the order of projects so that completion of CSO control projects in the Duwamish River coincides with the cleanup schedules of the Lower Duwamish Waterway and East Waterway Superfund sites. The CSO projects along the Lower Duwamish Waterway will be completed sooner than recommended in the 1999 plan, which prioritized control of CSOs in the Lake Washington Ship Canal first.
- Conducting more detailed evaluation of the use of green stormwater infrastructure on four projects to complement traditional CSO control techniques.
- Collaborating with the City of Seattle on projects when it is cost-effective to do so.

In addition, the Executive is recommending completion of a water quality assessment/environmental benefit study early in the plan schedule to inform the County as it carries out actions to improve water quality and prepare for the next CSO plan update. The recommendation for this study emerged through conversations with stakeholders and the public asking that CSO control be evaluated more fully along with other programs that improve the quality of our waterways.

This document describes CSOs and presents more detail on the recommended plan and the water quality assessment/environmental benefit study. It also tells how the CSO control projects may affect neighborhoods and increase monthly wastewater bills. The Executive invites the community to continue the conversation as the King County Council and RWQC review the plan.

You'll find more detail on how CSO control projects were developed and evaluated at www.kingcounty.gov/csoreview.

Making the Best Investment in Water Quality

Historical CSO control—a necessity and a benefit

King County owns and operates a regional wastewater system that serves 1.5 million people in a 420-square-mile area. About 15 percent of the County’s wastewater service area has combined sewers that carry both wastewater and stormwater in the same pipes.

The vast majority of flows from combined sewers go to wastewater treatment plants for treatment. During heavy storms, however, untreated combined flows that exceed the capacity of sewers and treatment plants discharge through outfall pipes to Puget Sound, the Duwamish River, the Lake Washington Ship Canal, and Lake Washington. These combined sewer overflows (CSOs) serve as a safety valve in preventing sewer backups into homes and streets. Metro, King County’s predecessor, built most of the CSO outfalls while developing the regional wastewater system.

CSOs are untreated wastewater and stormwater that discharge directly from CSO outfall pipes into water bodies in Seattle during heavy rainstorms when sewers are full.

CSOs do contain more harmful chemicals and pathogens than stormwater alone. Controlling CSOs protects public health and the environment in a number of ways:

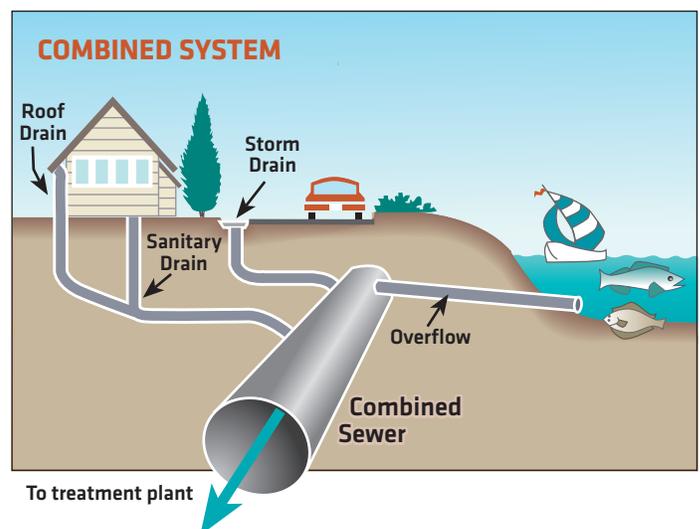
- Reduces the threat to people from contact with pathogens and consumption of contaminated fish.
- Reduces the threat to salmon of exposure to chemicals at their most vulnerable life stage.
- Helps protect Puget Sound and meet cleanup goals for the Duwamish River.

Decades of investment in CSO control

CSO control is required by Washington state and federal law. “Control” means reducing the number of untreated overflows from each location to the Washington state standard of once per year on average. King County and the City of Seattle have made commitments to the Washington State Department of Ecology (Ecology) and to the public to meet this standard at all their CSO locations.

Through independent and joint efforts over the years, King County and Seattle have reduced the annual volume of untreated wastewater discharged to waterways from around 30 billion gallons to less than 1 billion gallons since the regional wastewater system began operating in the 1960s. The County alone has invested \$389 million to reduce its CSO volumes from 2.3 billion gallons when the CSO Control Program began in the early 1980s to approximately 0.8 billion gallons today. We are investing another \$117 million on projects that are now under way near Puget Sound beaches.

Of the 38 county-owned CSO locations, 14 still need control projects. About half of the 90 Seattle-owned CSO locations also need control projects. These uncontrolled sites are clustered in the Duwamish River/Elliott Bay, Lake Washington Ship Canal/Montlake Cut, and Lake Washington areas.



The contribution of additional CSO control to regional water quality

Our previous investments in CSO control have significantly reduced CSO volumes and pollutant loads into our waterways, but we as a region need to continue to do more to improve water quality.

The Puget Sound Partnership (PSP)—a coalition of citizens, governments, tribes, scientists, and businesses working to restore and protect Puget Sound—has identified five “pressures” on the Puget Sound ecosystem. These pressures are land development, shoreline alteration, stormwater runoff from the built environment, wastewater management, and loss of floodplain function.

Stormwater runoff is a major contributor to degradation of the quality of Puget Sound and other water bodies in our region. Stormwater enters water bodies through surface runoff, CSO outfall pipes, and separate stormwater outfall pipes. This stormwater carries pollutants from places such as yards and streets, and even from the air. The U.S. Environmental Protection Agency (EPA), PSP, Ecology, and other entities recognize that reducing CSOs is one of many needed actions and that integration of CSO control, stormwater management, and other water quality projects is a sound approach to improving local waters.

There are many voices and opinions on the best ways to improve water quality in our region. During the public review process, we heard much support for the recommended CSO control plan and also heard questions about the actual or measurable water quality benefits that would result from this significant investment.

Taking a comprehensive view

Scientific knowledge and regulations continually evolve as we implement our long-term CSO Control Program. Periodic studies are valuable to ensure we meet our goals for water quality. The Executive recommends investing in a comprehensive review of water quality on the watershed and sub-watershed levels. This water quality assessment/environmental benefit study would be completed concurrently with the first projects in the plan.

The study will provide critical information to the region. It will analyze and integrate the findings of existing studies and will collect new information, as needed. Study findings will lead to identification of integrated and sequenced actions that King County can undertake to meet current water quality standards, improve public health and biological outcomes, and provide the greatest benefit to watersheds where CSO discharges occur.

An independent science panel will assess the findings and potential actions identified in the study. A stakeholder process will make recommendations to the King County Executive. The recommendations will inform the next scheduled update of the long-term CSO control plan. The results of the study will not alter King County’s legal obligation to control its remaining uncontrolled CSOs. Any future updates or amendments to the County’s long-term CSO control plan would be subject to EPA and Ecology approval.

A water quality assessment/ environmental benefit study...

...will focus on areas where uncontrolled CSOs occur in order to identify the following:

- The most pressing public health and environmental protection problems.
- Innovative solutions for the highest priority problems.
- Critical wastewater, stormwater, environmental, and other capital projects, and operation and maintenance work.
- Options for the best outcomes and solutions for competing water quality priorities and CSO control planning.

A stakeholder process will make recommendations for King County’s CSO control plan based on the study’s findings.

Recommended CSO Control Projects

CSO control approaches in our toolbox

WTD considered five CSO control methods in developing, comparing, and recommending project alternatives.

Whether we use storage, CSO treatment, or any other approach, the facilities would operate only when the region experiences a heavy rainstorm.



Storage. Build underground tanks, tunnels, or pipes to store flows during heavy storms until capacity becomes available in the downstream conveyance and treatment system.



CSO treatment. Build plants to treat flows that are too large to store. CSO treatment settles and removes solids, sends the solids to regional plants for treatment, and disinfects and discharges the treated effluent at the location of the outfall.



Conveyance. Build new pipelines or increase the size of existing pipelines to transfer flows directly to the regional conveyance system or to facilities that control CSOs from multiple locations.



Sewer separation. Build new pipes or use existing pipes that carry stormwater only.



Green stormwater infrastructure (GSI). Build rain gardens, green roofs, or other systems to reduce stormwater runoff into combined sewers. In addition to identifying GSI opportunities in public rights-of-way, King County is participating in Seattle's Residential RainWise Program to encourage GSI on residential properties.

The King County Executive is recommending nine projects to control overflows that occur at 14 CSO locations in the regional wastewater system:

- Two projects would construct CSO treatment facilities in industrial areas near the Duwamish River and Elliott Bay.
- Seven projects would control CSOs by building underground tanks or pipes to store the flows until a storm subsides:
 - > Four storage projects would be built in the Lake Washington Ship Canal/Montlake Cut area, and three in the Duwamish River/Elliott Bay area.
 - > King County and the City of Seattle will continue to work to collaborate on three of the seven projects.
 - > Four of the seven projects would include further analysis of green stormwater infrastructure (GSI) as potential components to help reduce the required size of storage projects.

WTD continues to develop and evaluate information on alternatives not recommended at this time.

The city is still developing its CSO control plan. Although it has agreed in concept on the recommended joint projects, the city cannot fully commit to the projects until it has completed an environmental review and the mayor and city council have adopted the city's CSO control plan in 2014.

King County is committed to working with Seattle on joint projects when such collaboration would benefit the community and wastewater ratepayers. We will continue to recommend the joint projects in this plan with the knowledge that county-only alternatives are available, if necessary, as described in the October 2011 WTD Recommended CSO Control Plan.

11th Ave NW

Cost: \$23.7 M

Construct a 0.6-mile-long pipeline to convey excess flows to West Point plant via new Ballard Siphon. Up to 5 acres of Residential RainWise Program and 60 acres of green streets and alleys.



University

Cost: \$45.2 M

Construct an up to 5.23-MG underground storage tank to control county and city CSOs. Up to 28 acres of Residential Rainwise Program and 261 acres of green streets and alleys.



Montlake

Cost: \$95.4 M

Construct an up to 7.87-MG underground storage tank on the south side of the Montlake Cut to control county and city CSOs. Up to 17 acres of Residential RainWise Program green streets and alleys.



3rd Ave W

Cost: \$51 M

Construct a 7.23-MG underground storage tank on north side of Ship Canal to control county and city CSOs.



Hanford #2 - Lander St - King St - Kingdome

Cost: \$270.8 M

Construct a 151-mgd CSO treatment plant between the King Street and Hanford Street Regulator Stations and modify an existing pipeline to divert flows to the new plant.



Chelan Ave

Cost: \$51.7 M

Construct a 3.85-MG underground storage tank and modify an existing pipeline.



W Michigan - Terminal 115

Cost: \$14.8 M

Construct a pipeline and an up to 0.32-MG underground storage pipe near the Terminal 115 Overflow Structure. Up to 3 acres of Residential Rainwise Program and 45 acres of green streets and alleys.



Hanford #1

Cost: \$19.2 M

Construct a 0.34-MG underground storage tank and conveyance improvements to make use of available capacity in an existing tunnel.



Brandon St - S Michigan

Cost: \$139.7 M

Construct a 66-mgd CSO treatment plant between the Brandon Street and South Michigan Street Regulator Stations and a pipeline to convey flows from the Brandon Street Regulator Station to the new plant.



- King County CSO Project
- King County–City of Seattle Joint CSO Project

- CSO Treatment Plant/Facility
- Wastewater Treatment Plant

Abbreviations
 MG = million gallons
 mgd = million gallons/day



How CSO Control Could Affect Wastewater Rates

The estimated cost of the CSO control projects

Controlling King County’s remaining 14 CSO locations is estimated to cost wastewater ratepayers an additional \$711 million in 2010 dollars. Looking at actual dollars to be spent over the next 18 years with inflation included, the \$711 million expense will total \$1.05 billion by 2030. The water quality assessment/environmental benefit study will cost up to \$5 million.

This significant financial investment will help protect public health and the environment, will contribute to cleanup of the Lower Duwamish Waterway, and is necessary for meeting our commitments to regulators.

The region’s investment in CSO control will create as many as 4,000 jobs for our local economy during project design and construction.

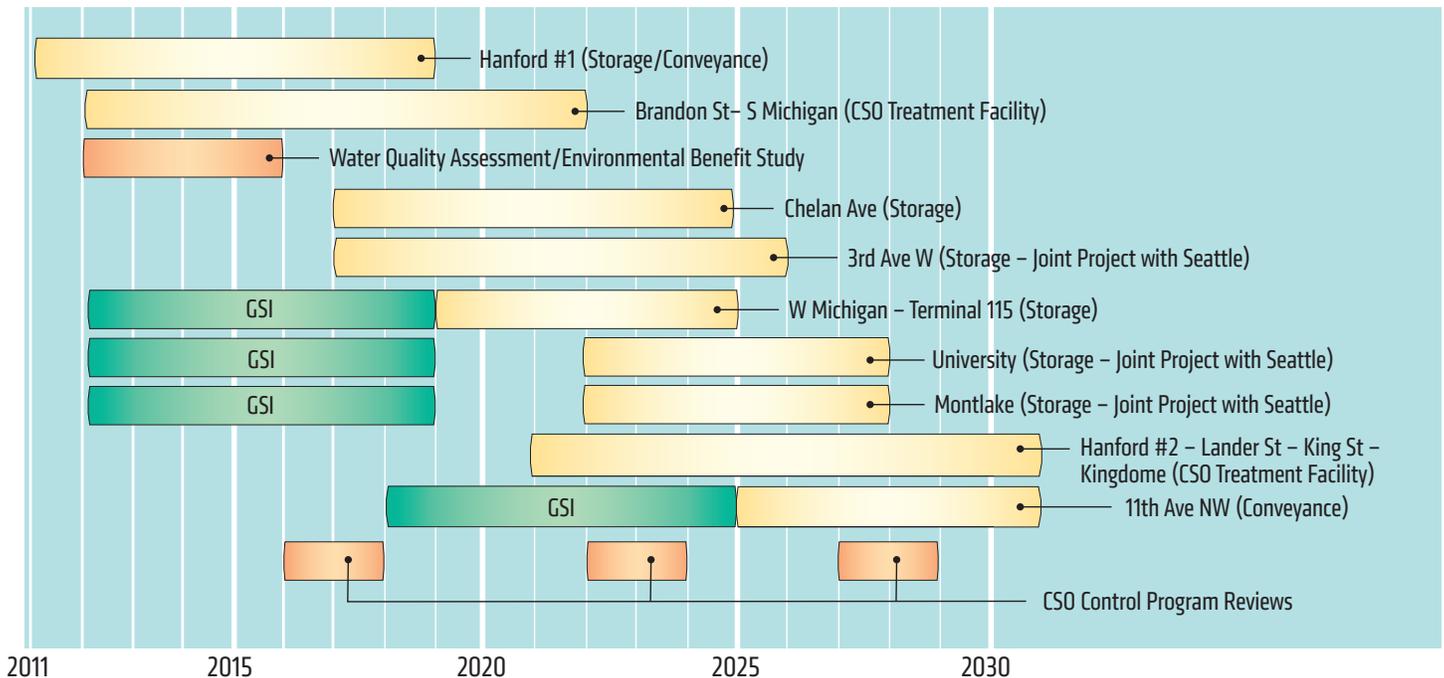
A staggered schedule to reduce impacts on wastewater rates

The schedule for completing the projects spreads the projects throughout the timeframe to help make implementation easier and reduce impacts on rates. The results of the water quality assessment/environmental benefit study, completed early in the timeframe, will provide guidance for projects that follow.

Two projects will start two years later than indicated in the October 2011 WTD Recommended CSO Control Plan so that they can benefit from study recommendations. These changes will not affect the overall timeframe for completing all projects by 2030.

King County estimated the cost of each recommended CSO control project using conceptual design information. The estimates are planning-level only, for use in developing long-range capital schedules and budgets. The accuracy of planning-level estimates is -50 to +100 percent. The accuracy will increase as we gain more site-specific information during project design, and a project budget will be set.

Schedule to Complete CSO Control Plan by 2030



Note: All project timelines include planning, design, and construction phases.

Controlling costs: a top priority

While developing and evaluating project alternatives, WTD identified cost controls and ways to support the economic health of the region. Here are a few cost-control measures we're recommending or are already applying:

- Making the most use of existing wastewater facilities whenever possible.
- Combining areas to build two CSO treatment facilities, rather than the four recommended in earlier plans.
- Using advanced CSO treatment technologies, which require less land than older technologies.
- Collaborating on projects and programs with the City of Seattle.
- Consolidating control of two or more CSO locations into single projects.
- Evaluating use of GSI to help reduce the size of storage structures.

What ratepayers could be paying each month for CSO control

Using planning-level cost estimates for the nine recommended CSO control projects, WTD analyzed how the projects could affect monthly wholesale wastewater rates between 2015 and 2030.

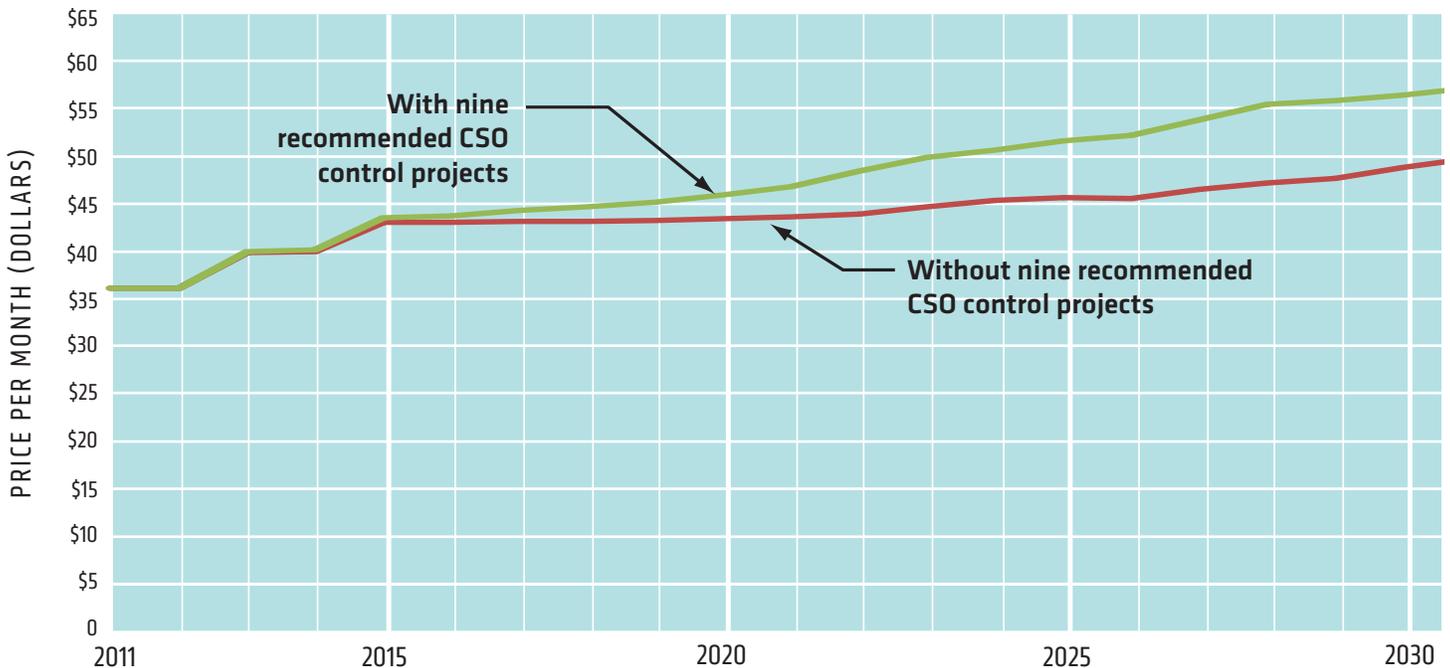
King County charges a wholesale wastewater rate to cities and local wastewater districts who send flows from homes and businesses to the regional system. The cities and districts then add their own fees to the wholesale rate before billing their customers.

As shown in the table and graph below, monthly wastewater bills could increase by an estimated \$7.61 by 2030 (with inflation). This investment will help the community enjoy the benefits of cleaner water, safer recreational areas, and quality seafood.

Estimated Additions to Monthly Wastewater Rates Between 2015 and 2030 from Recommended CSO Control Projects (with inflation)

2015	2020	2025	2030
\$0.47	\$2.50	\$5.92	\$7.61

Estimated Monthly Wastewater Rates Between 2015 and 2030 With and Without Recommended CSO Control Projects (with inflation)



How Projects Could Affect Neighborhoods

The typical CSO control project takes 8 to 10 years to complete—from planning through construction. The Executive’s recommended CSO control plan will engage the community in the process and minimize potential impacts to neighborhoods in these ways:

- Holding public meetings and conducting environmental review (State Environmental Policy Act review).
- Reviewing siting issues and constraints early in the planning process.
- Consolidating county projects and collaborating on projects with the City of Seattle, which means building fewer facilities in fewer neighborhoods.
- Coordinating construction with other local project schedules.
- Configuring projects to reduce the amount of land needed.

What we would build

WTD works with communities to design facilities that reflect neighborhood values. Structures on one project may look very different from structures on another.

Storage tanks, pipes, tunnels, and many other facilities will be built below ground. Local codes and standards may require that some structures associated with these facilities be located aboveground. Underground facilities may have other aboveground components, such as access hatches, lighting, air vents, and odor control stacks.

The two recommended CSO treatment facilities will require more aboveground structures and land area than storage projects. Both treatment facilities will be located in industrial areas near the Duwamish River and Elliott Bay. Each facility will require expanding existing outfall pipes or constructing new ones in the Duwamish River or some other location.

There will be many opportunities to be involved as each recommended project is designed and built.

Engaging the Community at Every Step of the Way

System Planning

The County is now in the system planning phase. This phase involves identifying projects and preparing conceptual-level features and costs. The public has been, and will continue to be, instrumental in framing these concepts.

Project Planning

Once a CSO control project gets approved for project development, WTD works with the community to provide information about the need for the project and to identify its likely impacts.

Project Design

During design, the project team develops engineering elements of the project and may conduct technical investigations in the project area. WTD welcomes comments on architecture, color, and landscaping and any help in identifying reasonable solutions for short-term construction impacts. The team will notify residents in advance of any work in their neighborhood.

Project Construction

Construction of CSO control projects lasts from three to four years. Neighbors may experience temporary inconveniences such as noise, increased truck traffic, and traffic delays. We listen to concerns and work with the community to reduce construction impacts where possible.

Facility Operation

WTD crews regularly access storage tanks, pipes, and tunnels for maintenance and repairs. During and after storms, crews may take wastewater samples, monitor facility function, make emergency repairs, clean up, or do other work to prepare for the next storm.

Where we would build

CSO control structures must be located near areas where CSOs occur to minimize the size of facilities and ensure the most efficient movement of flows to treatment.

We've identified general areas for each project to help us prepare planning-level project cost estimates. Finding the best site begins during the early design stages of each project. Engineering teams use information on CSO flows, location of the existing conveyance system, and surface and subsurface features to identify potential sites to discuss with community members. The sites may include a range of property types, including private and publicly owned property, street rights-of-way, and open space.

Wastewater staff inspecting construction of a CSO storage tunnel.



Access hatches for maintenance of a storage tank, and maintenance crews cleaning underground storage tanks through access hatches.



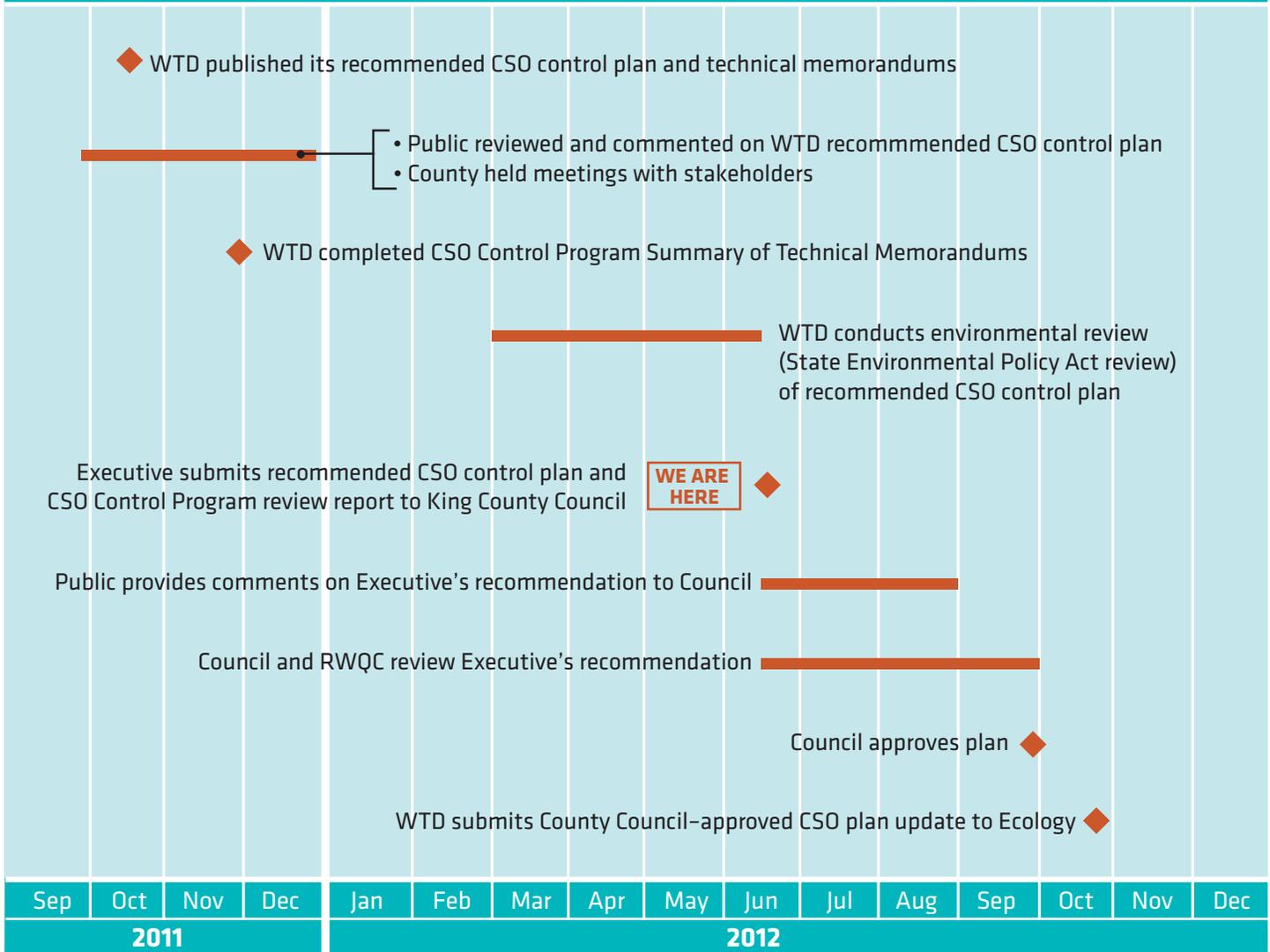
Aboveground structures and landscaping at Denny Way Regulator Station in Myrtle Edwards Park.

Recommended Timeline for Completing the Plan

The Executive is requesting King County Council approval of his recommended CSO control plan by the end of September 2012 so that WTD can submit the approved plan to Ecology and EPA for final approval.

The community will have opportunities for testimony at Council, Regional Water Quality Committee, or other committee public hearings on the plan. You can view a schedule of public hearings at this site: <http://mkcclegisearch.kingcounty.gov/Calendar.aspx>.

Recommended CSO Control Plan Timeline



Note: The timing for any activities undertaken by the King County Council will depend on the Council's schedule.

Information about this project is available in English, Spanish, Korean, Chinese, and Vietnamese. Please contact Dana West at 206-684-1097 or TTY Relay: 711.

Se encuentra disponible información sobre este proyecto en español. Favor de comunicarse con Dana West al 206-684-1097 o TTY (para personas con problemas de audición): 711.

Tin tức về dự án này có sẵn bằng tiếng Việt. Xin liên lạc Dana West tại số Đ.T. 206-684-1097 hoặc 711 dành cho người điếc.

이 프로젝트에 관한 자료는 한국어로도 갖춰져 있습니다. Dana West(데이나 웨스트)씨에게 206-684-1097번 또는 TTY: 711번으로 연락하면 구할 수 있습니다.

此項目的資訊有中文版本，請聯絡Dana West獲得，電話：206-684-1097，有聽力障礙人士請撥打711



Alternative formats available - 206-684-1280 TTY Relay: 711



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