

Wastewater Treatment Division's

Recommended Combined Sewer Overflow Control Plan



King County

Department of Natural Resources and Parks
Wastewater Treatment Division

October 2011

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



Dear Community Members:

Controlling combined sewer overflows (CSOs) is an important part of our clean-water agency's mission to protect public health and improve water quality. These untreated overflows of wastewater and stormwater that enter our regional waterways can harm people and fish. We've been making steady progress in CSO control over the past 30 years.

Recently, King County's Wastewater Treatment Division worked with leaders and community members to develop a recommended update to our CSO control plan. We invite you to continue the discussion and help shape the proposal that King County Executive Dow Constantine will forward to the King County Council next spring.

Our recommended plan calls for controlling all King County CSO locations to an average of no more than one overflow per year at each location. To meet this goal, we propose constructing nine projects in the Lake Washington Ship Canal area and in industrial areas near the Duwamish River. We're recommending that the projects in the Duwamish River area be finished first to support ongoing regional efforts to clean up the river. In addition, we're recommending that the projects incorporate green stormwater infrastructure where possible and that we meet the schedule recommended in previous plan updates to complete all projects by 2030.

No matter how we slice it, 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). If the plan is completed by 2030, the projects would add more to your monthly wastewater bill over time, reaching \$7.61 at the end in 2030 (\$2.06 in 2010 dollars). We're working hard to control costs by collaborating with the City of Seattle on three of the projects, analyzing ways to manage stormwater before it enters combined sewers, and considering other cost-control measures.

In this document, you'll learn more about the project sequencing and the alternatives we considered before developing our recommendation, alternative schedules for completing the recommended projects, how the projects could affect neighborhoods, and their estimated impact on monthly rates. Our website provides a lot of detail on the technologies and alternatives we reviewed and shows maps of proposed project areas: www.kingcounty.gov/csocontrol. You can also go to selected King County and Seattle libraries to read the information on the Web or in print.

Please let us know your thoughts and opinions about our recommended plan. Have we missed anything? Do you prefer other alternatives that were not recommended? Do you have a preference on which projects should start first or when all projects should be completed? What other information would you like to have?

You can use the comment card at the end of this document, use our website comment link, or call Dana West, Communications Specialist, at 206-684-1097 or TTY Relay: 711. Comments received by Dec. 31, 2011, will be used to help shape Executive Constantine's recommendation to the County Council.

We look forward to hearing from you.

Yours in clean water,

Pam Elardo, P.E., Division Director
Wastewater Treatment Division

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CSO Control—a Necessity and a Benefit

Our regional wastewater system

King County owns and operates a regional wastewater system that serves 1.5 million people in a 420-square-mile area. The area includes most of urban King County and south Snohomish County and a small portion of Pierce County (see map on next page).

The wastewater system is the largest in the Puget Sound region. It includes over 350 miles of large pipelines that collect wastewater from smaller pipelines owned and operated by 34 local sewer utilities. These large pipelines carry the wastewater to three regional treatment plants—West Point Treatment Plant in the city of Seattle, South Treatment Plant in the city of Renton, and Brightwater Treatment Plant in south Snohomish County—that treat and disinfect the wastewater before discharging it to Puget Sound.

King County’s wastewater service area is divided into three areas, one for each of the three regional plants. Wastewater from areas that lie mostly east and south of Lake Washington goes to South Treatment Plant; flows from areas west and north of Lake Washington go to West Point Treatment Plant; and flows from the Redmond, Woodinville, Bothell, and Mill Creek areas go to Brightwater Treatment Plant.

Our system also includes two small treatment plants on Vashon Island and in the city of Carnation that serve the local communities.

CSOs: a legacy from the past

Up through the early 20th century, most cities, including Seattle, constructed “combined sewers” to collect both wastewater and stormwater in the same pipes. These combined sewers carried their untreated contents directly to water bodies.

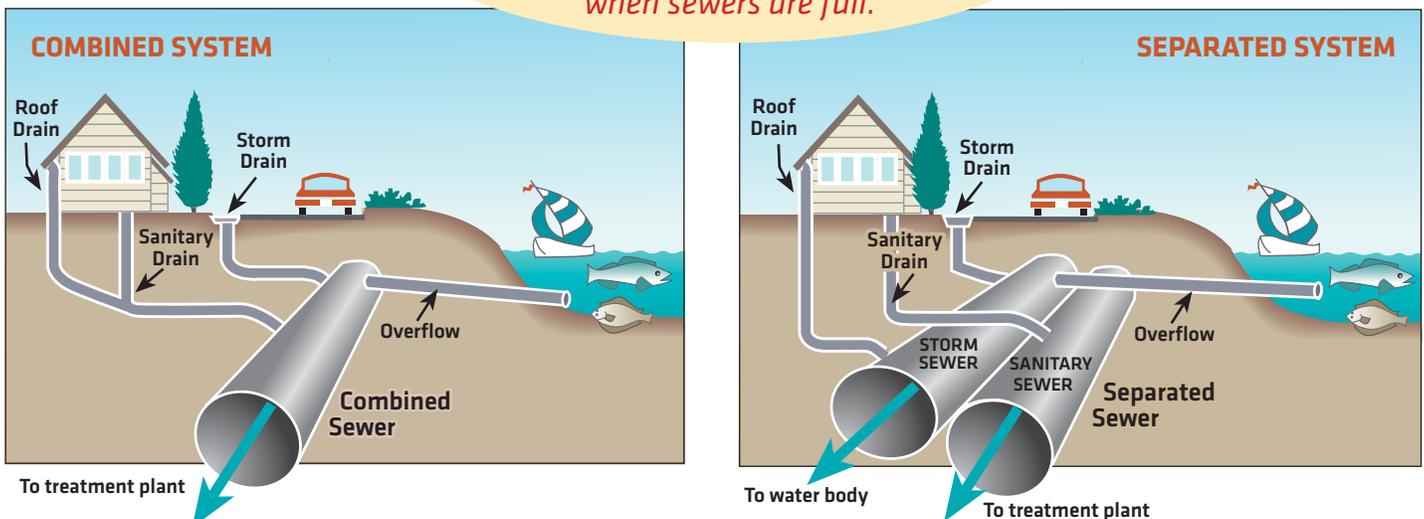
Today, flows from combined sewers go to wastewater treatment plants. Untreated overflows happen only during heavy storms when flows exceed the capacity of sewers and treatment plants. These combined sewer overflows (CSOs) serve as a safety valve in preventing sewer backups into homes and streets.

Around 15 percent of King County’s service area has combined sewers. The rest of the service area is served by separated sewers that carry wastewater and stormwater in different pipes. King County owns 38 and the City of Seattle owns 90 CSO locations in the city limits. The outfall pipes at these locations discharge wastewater diluted with stormwater to Puget Sound, the Duwamish River, the Lake Washington Ship Canal, and Lake Washington during large storms.

On average over the long term, about 350 CSOs occur from King County locations each year. Average annual volumes can be as low as zero at one location to over 200 million gallons at another.

The total average annual volume discharged from all locations is about 800 million gallons.

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.



Why We Need to Control CSOs



University Regulator CSO on Lake Washington Ship Canal.

Warning sign placed at CSO locations.



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

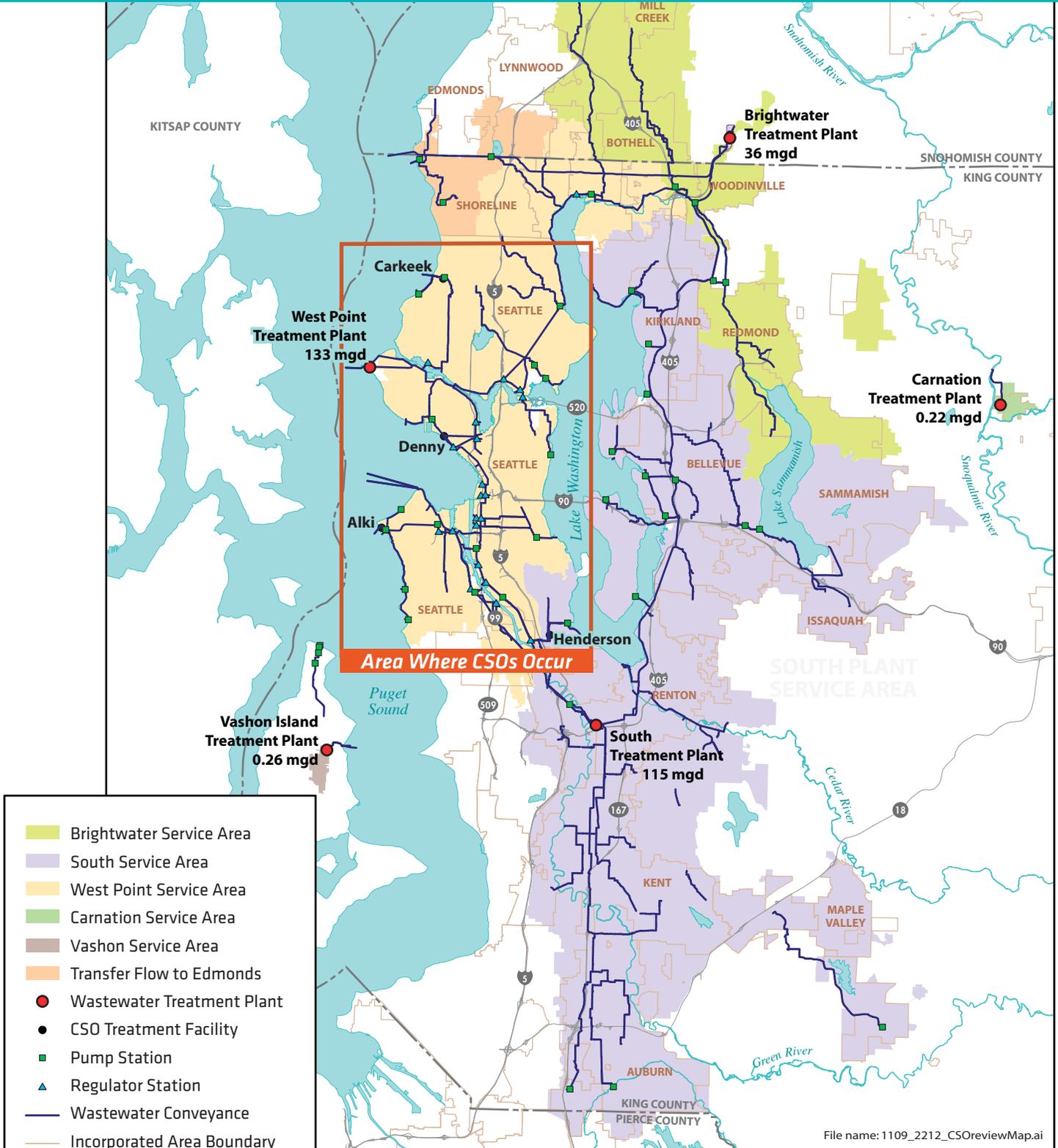
- It reduces the threat to people from contact with pathogens and consumption of contaminated fish.
- It reduces the threat to salmon of exposure to chemicals at their most vulnerable life stage.
- It helps protect Puget Sound and meet cleanup goals for the Duwamish Waterway.

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 has made a commitment to the Washington State Department of Ecology (Ecology) and to the public to control all our CSO locations to meet this standard. The City of Seattle has made a similar commitment for CSO control. Both agencies are well on their way to meeting this commitment.

You can find out when King County and Seattle CSO locations are overflowing at <http://www.kingcounty.gov/environment/wastewater/CSOstatus.aspx>.

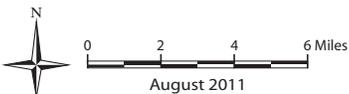
King County Wastewater Service Areas



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- Brightwater Service Area
- South Service Area
- West Point Service Area
- Carnation Service Area
- Vashon Service Area
- Transfer Flow to Edmonds
- Wastewater Treatment Plant
- CSO Treatment Facility
- Pump Station
- Regulator Station
- Wastewater Conveyance
- Incorporated Area Boundary

Note: mgd = million gallons/day



The information included on this map has been compiled from a variety of sources and is subject to change without notice. King County makes no representations or warranties, express or implied, as to accuracy, completeness, timeliness, or rights to the use of such information. King County shall not be liable for any general, special, indirect, incidental, or consequential damages including, but not limited to, lost revenues or lost profits resulting from the use or misuse of the information contained on this map. Any sale of this map or information on this map is prohibited except by written permission of King County.

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Decades of Investment in CSO Control

Steady progress in controlling CSOs

Through independent and combined efforts over the years, King County and the City of Seattle have reduced the volume of CSOs from around 30 billion gallons to less than 2 billion gallons each year since the regional wastewater system began operating in the 1960s (see graph below). So far, King County alone has invested \$389 million to reduce its CSO volumes from 2.3 billion gallons in the 1980s to about 1 billion gallons today. We are investing another \$117 million on projects that are now under way.

Only 14 of the county CSO locations and about half of the city's 90 locations still require control. Uncontrolled sites are clustered in the Duwamish River/Elliott Bay, Lake Washington Ship Canal/Montlake Cut, and Lake Washington areas (see map on next page).

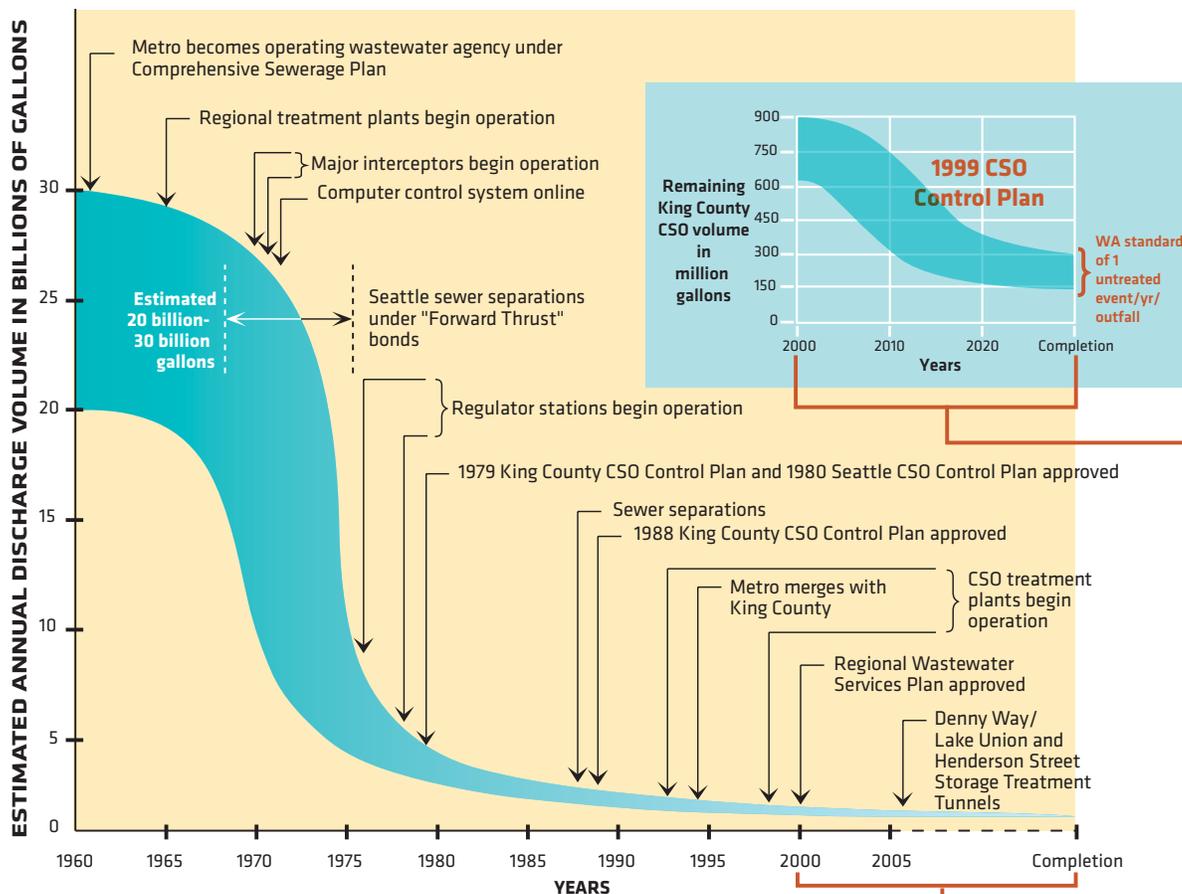
Learn more about the City of Seattle's CSO control plan at [http://www.seattle.gov/util/Services/Drainage & Sewer/keep water safe & clean/cso/csoreductionprojects/](http://www.seattle.gov/util/Services/Drainage_&_Sewer/keep_water_safe_&_clean/cso/csoreductionprojects/).

Regular CSO control plan updates

King County and the City of Seattle regularly update their CSO control plans. The County updates its plan about every five years. We completed a major update in 1999 as part of integrating CSO control with the Regional Wastewater Services Plan (RWSP).

Before each update, the County's Wastewater Treatment Division (WTD) reviews its entire CSO Control Program against conditions that have changed since the last update—conditions such as population and flow, scientific developments, regulations, new technologies, land costs, and public priorities. The updates must be approved by the King County Council.

WTD began this current review in 2009. The recommended CSO control plan update described in the following pages is the outcome of this review. It proposes projects, based on new information since 1999, to control all 14 remaining uncontrolled CSO locations. After public review and comment on this plan update, the King County Executive will send a recommendation to the County Council for their approval.



Almost two-thirds of King County CSOs are controlled.

Planning Areas for King County and City of Seattle CSO Control Projects



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|----------------------------------------|-----------------------------------------------|---------------------------------------|
| King Co. Uncontrolled CSO | City of Seattle CSO | King Co. CSO Treatment Plant/Facility |
| King Co. Controlled CSO | King Co. Uncontrolled CSO Area | King Co. Wastewater Treatment Plant |
| King Co. CSO Control Project Under Way | City of Seattle Primary Uncontrolled CSO Area | Incorporated Area |



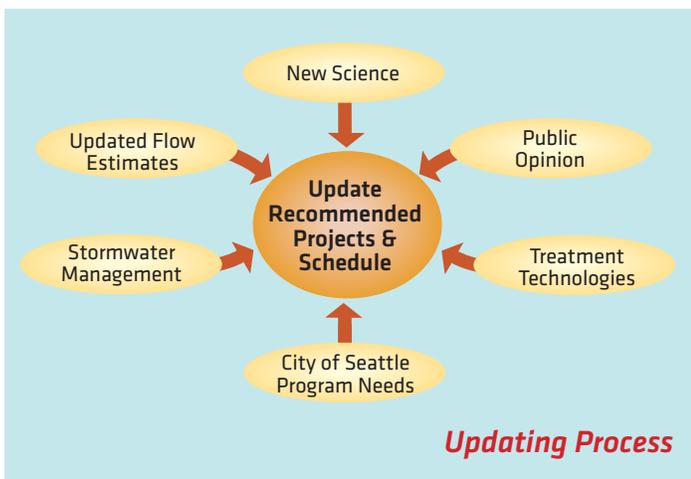
A Rigorous, Transparent Process to Identify and Compare Alternatives

During the three-year CSO Control Program review process, WTD evaluated the projects and schedules recommended in the 1999 CSO control plan for addressing the 14 remaining uncontrolled CSO locations. The evaluation considered regional priorities and new technologies, conditions, and scientific studies since 1999. We then used this information to develop and compare a number of modified and new project alternatives to achieve full CSO control in King County's system.

The CSO control plan updating process

From the very start of CSO Control Program review, WTD has sought opinions and suggestions through meetings, workshops, and interviews with environmental and community groups, tribes, agencies, and the public.

We've learned through our public outreach that controlling CSOs is important and should be done as cost-effectively as possible. Every decision made in comparing alternatives has considered how to control costs.



Our process considered other things that we understand is important to our region:

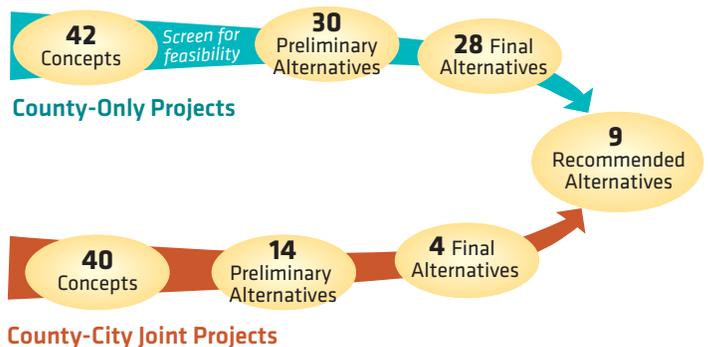
- Meeting our commitment to regulators and the public to achieve CSO control.
- Implementing projects in the Duwamish River area first.
- Collaborating with the City of Seattle on CSO control projects where possible.
- Using advanced CSO treatment technologies to produce cleaner water.
- Continuing to work with our partners to improve sediment quality in the region.
- Using green stormwater infrastructure (GSI) where possible to manage stormwater before it enters combined sewers.

We also reviewed and participated in scientific studies of the areas where CSOs discharge, measured CSO flows and updated computerized models to estimate how much flow we need to control, and researched and tested new CSO treatment technologies.

Both county-only and joint county-city alternatives

WTD identified 82 project concepts: 42 King county-only and 40 joint county-city concepts. We narrowed the concepts to 44 preliminary project alternatives and then to the 32 final project alternatives shown on Pages 8 and 9.

Parallel Paths for Developing Alternatives



Comparing alternatives with the triple bottom line

Our comparison of project alternatives used a tool called “the triple-bottom line.” Many agencies and corporations are using this tool. It brings social and environmental considerations into what was previously only the financial “bottom line” to help differentiate between alternatives and find the most sustainable ones:

- Environmental measures compare alternatives for things like energy use, carbon emissions, water consumption, and low-impact development opportunities.
- Social measures compare alternatives for things like how well they fit into the character of a neighborhood, traffic and parking impacts, job creation, and environmental justice.

The Triple Bottom Line— financial, social, and environmental



What do you think?

The next two pages describe the 32 final alternatives we considered. While we’re recommending 9 of the alternatives, all 32 alternatives remain open for your review.

*Find out more about the
project alternatives at our website:
www.kingcounty.gov/csoreview.*

*Please let us know what you think.
Did we miss anything?
Are we recommending the
best alternatives?*

CSO control approaches in our toolbox

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

To match methods with locations that need CSO control, we looked at factors such as City of Seattle CSO control needs, CSO volume, location, land availability and uses, technical feasibility and reliability, potential construction and environmental impacts, and costs.

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 wastewater 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.

Alternatives Evaluated for the CSO Control Plan

This table presents the 32 final project alternatives for controlling King County’s 14 remaining uncontrolled CSO locations. **The nine alternatives shown in bold type are the ones that WTD is recommending.** Three of the nine recommended projects are joint county-city projects, and four will likely include GSI.

CSO LOCATION	CSO CONTROL METHOD	SIZE	ESTIMATED COST TO KING COUNTY (2010\$ X 1 MILLION)
Elliott Bay and East Duwamish Waterway Area			
King St	Storage tank.	2.63 MG	\$38.70
Kingdome	CSO treatment facility.	48 mgd	\$108.20
Hanford #2	CSO treatment facility.	68 mgd	\$118.10
Lander St	CSO treatment facility.	23 mgd	\$75.70
Consolidated project options	CSO treatment facility for King St and Kingdome.	56 mgd	Allocation to CSOs:* \$37.77 (King St) \$96.33 (Kingdome)
	CSO treatment facility for Hanford #2 and Lander St.	94 mgd	Allocation to CSOs: \$101.62 (Hanford #2) \$58.08 (Lander St)
	CSO treatment facility for Hanford #2, Lander St, and Kingdome. New conveyance to facility.	139 mgd	Allocation to CSOs: \$100.05 (Hanford #2) \$53.27 (Lander St) \$114.92 (Kingdome)
	CSO treatment facility for Hanford #2, Lander St, Kingdome, and King St. New conveyance to facility.	151 mgd	Allocation to CSOs: \$94.70 (Hanford #2) \$50.58 (Lander St) \$103.77 (Kingdome) \$39.95 (King St)
	CSO treatment facility for Hanford #2, Lander St, Kingdome, and King St. Route flows through existing conveyance (interceptor) to facility.	151 mgd	Allocation to CSOs: \$94.30 (Hanford #2) \$51.96 (Lander St)** \$93.70 (Kingdome) \$30.82 (King St)
West Duwamish River Area			
Chelan Ave	Storage tank near Chelan Ave Regulator Station.	3.85 MG	\$51.70
	Two deep storage tanks at West Seattle Pump Station site.	3.85 MG	\$54.30
	Transfer to Alki Tunnel and CSO Treatment Plant (upgrade 63rd Ave Pump Station and Alki plant).		\$86.10
Terminal 115	Storage pipe.	0.05 MG	\$2.90
W Michigan	Storage pipe.	0.27 MG	\$710***
Consolidated project options	Storage pipe to control W Michigan and Terminal 115. GSI would likely be included.	0.32 MG	Allocation to CSOs: \$13.51 (W Michigan) \$1.29 (Terminal 115)

CSO LOCATION	CSO CONTROL METHOD	SIZE	ESTIMATED COST TO KING COUNTY (2010\$ X 1 MILLION)
East Lower Duwamish River Area			
Hanford #1	One storage tank to control Hanford #1 and Bayview N.	1.79 MG	\$50.50
	Two storage tanks to control Hanford #1 and Bayview N.	1.02 MG 0.77 MG	\$39.60
	Conveyance improvements to send more flow to Bayview Tunnel with reduced storage volume at Hanford #1.	0.34 MG	\$19.20
Brandon St	CSO treatment facility.	24 mgd	\$65.30
	Brandon area sewer separation.		\$71.70
S Michigan	CSO treatment facility.	40 mgd	\$95.70
Consolidated project options	CSO treatment facility to control S Michigan and Brandon St. New conveyance to facility.	66 mgd	Allocation to CSOs: \$85.85 (S Michigan) \$53.85 (Brandon St)
	CSO treatment facility to control S Michigan and Brandon St. Route flows through existing conveyance (interceptor) to facility.	66 mgd	Allocation to CSOs: \$85.91 (S Michigan) \$62.39 (Brandon St)
Ship Canal/Montlake Cut Area			
11th Ave NW	Storage tank.	1.85 MG	\$31.50
	Conveyance to Ballard Siphon (3,200 feet of 18-inch-diameter pipe); elimination of CSO discharge point. GSI would likely be included.		\$23.70
3rd Ave W	Storage tank on south side of Ship Canal.	4.18 MG	\$56.40
	Joint county-city storage tank project on north side of Ship Canal.	7.23 MG	\$50.96
Montlake	Storage tank on south side of Ship Canal.	6.6 MG	\$102.80
	Joint county-city storage tank project on south side of Ship Canal. GSI would likely be included.	7.87 MG	\$95.35
University	Storage tank.	2.94 MG	\$54.50
	Joint county-city storage tank project. GSI would likely be included.	5.23 MG	\$45.24
Consolidated project options	Joint county-city storage and conveyance tunnel under Ship Canal to control 11th Ave NW, 3rd Ave W, Montlake, and University county CSOs and seven city CSOs.	21.4 MG	Allocations to CSOs: \$42.80 (11th Ave NW) \$42.93 (3rd Ave W)** \$86.85 (Montlake) \$64.55 (University)

Bold = recommended alternative.

GSI = green stormwater infrastructure.

MG = million gallons.

mgd = million gallons per day.

*The portion of the total cost of consolidated alternatives attributed to each CSO location that the project would control is presented for comparison with costs of unconsolidated projects.

** Alternatives were evaluated as the sum of the consolidated project components compared to the sum of the next best alternatives.

*** Lower operation and maintenance costs and less disruption led to recommending the consolidated alternative.

A Snapshot of Recommended CSO Control Projects

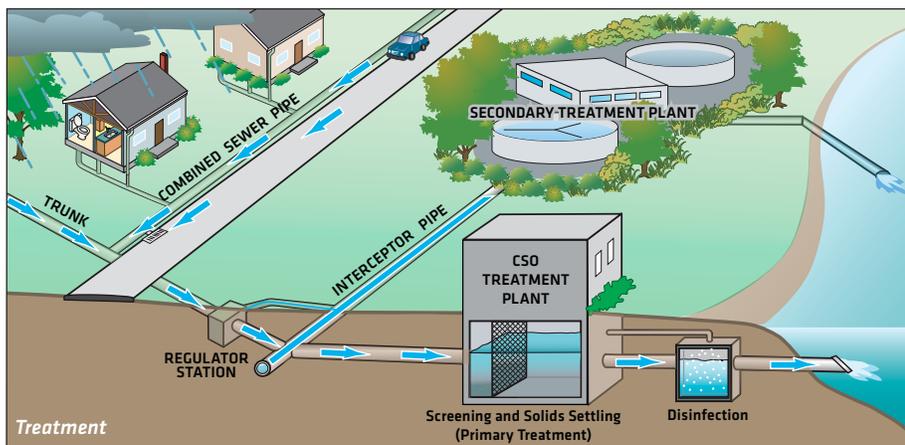
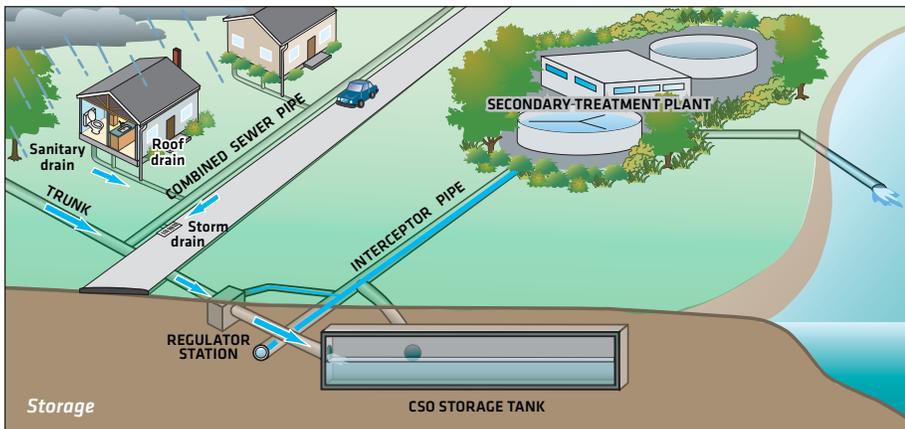
As a result of our CSO Control Program review and public input to date, WTD is recommending nine projects to control overflows that occur at 14 CSO locations in the regional wastewater system. Four projects would be built in the Lake Washington Ship Canal/Montlake Cut area and five in the Duwamish River/Elliott Bay area. King County and the City of Seattle are proposing to collaborate on three of the projects.

These nine projects are recommended because they ranked well in the triple bottom line analysis. They offer more opportunities for social and environmental benefits with fewer impacts to neighborhoods and at lower overall cost than other alternatives considered.

We continue to develop and evaluate information on alternatives not recommended at this time. One such alternative—a joint project with the City of Seattle—would build a large storage tunnel to control all CSOs in the Lake Washington Ship Canal/Montlake Cut area.

Total estimated cost to county ratepayers for the nine recommended projects in this plan is \$711 million (in 2010 dollars).

We estimated the cost of each CSO control alternative using conceptual design information. The estimates are planning-level estimates 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 improve as we gain more site-specific information during project design.



The recommended projects would achieve CSO control through storage, CSO treatment, and GSI:

- Seven projects would control CSOs by building underground tanks or pipes to store the flows until a storm subsides. Four of these storage projects would also include analysis of whether GSI could help reduce the required size of the storage structures.
- Two projects would construct CSO treatment facilities. GSI is not recommended for these projects. Our analysis found that GSI would not reduce the size of the facilities.

The interactive online version of this map at www.kingcounty.gov/csocontrol lets you click on locations to find out more about each recommended project.



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.

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 a 0.32-MG underground storage pipe near the Terminal 115 Overflow Structure.

University

Cost: \$45.2 M

Construct a 5.23-MG underground storage tank to control county and city CSOs.

Montlake

Cost: \$95.4 M

Construct a 7.87-MG underground storage tank on the south side of the Montlake Cut to control county and city CSOs.

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.

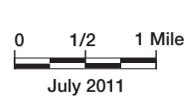
Brandon St - S Michigan

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



July 2011

When Projects Would Be Completed

Evaluating project sequences

WTD looked at a number of variations in sequences for implementing the nine recommended CSO control projects. Each of the variations emphasized one or two of the goals that we've heard is important to the region.

The evaluation determined that all sequences would protect public health, maintain a steady level of effort and spending, avoid conflicts with other regional projects, and have a similar impact on monthly wastewater rates. The key differences were whether to complete the joint projects by 2025 to meet the City of Seattle's preferred schedule, whether to recommend a joint project to build a tunnel in the Lake Washington Ship Canal/Montlake Cut area, whether to include enough time to verify if GSI would work, and whether to emphasize the regional effort to clean up the Duwamish River.

Is this the best project sequence? When should we complete the CSO control plan—2030, 3035, or 2040? You can find all the sequences we evaluated at www.kingcounty.gov/cscontrol.

Recommended project sequence

Our recommended project sequence implements projects in the Duwamish River/Elliott Bay area first and, for four of the projects, implements GSI before building other facilities. We're recommending this sequence for two reasons:

- It underscores the importance of our commitment to help clean up the Duwamish River.
- It allows us to identify early in a project how GSI may reduce the required size of storage structures.

WTD will continue to work with the City of Seattle to ensure that project implementation meets the goals and timelines set forth in our respective CSO control plans.

Evaluating schedules for rate impacts

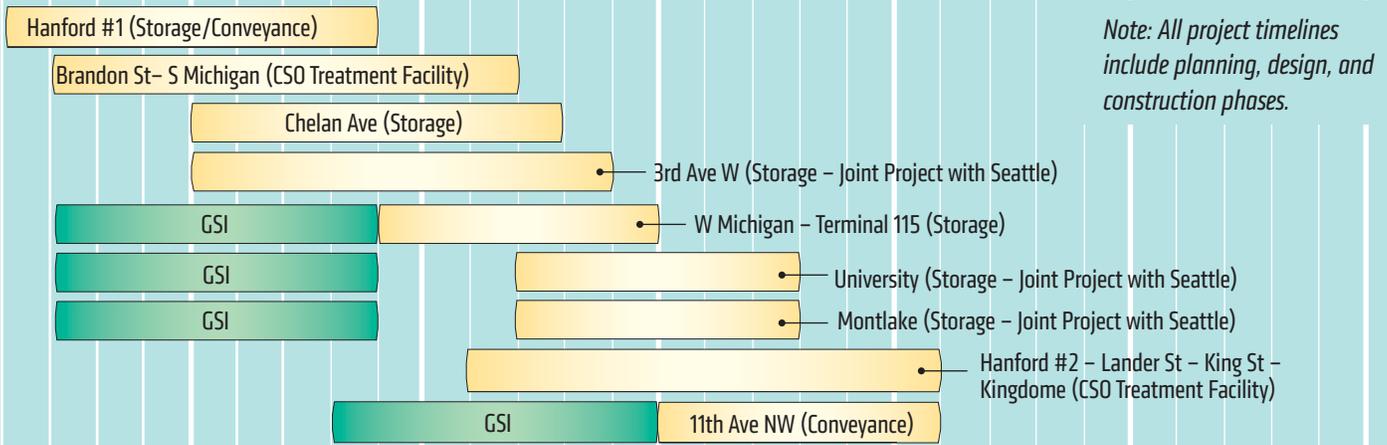
WTD is recommending that we achieve CSO control at all our locations by 2030, as recommended in previous CSO control plan updates. However, we did evaluate three different schedules for implementing our recommended project sequence to see how they could affect monthly wastewater rates. Each schedule that we evaluated has a different end date for completing the CSO control plan—2030, 2035, or 2040. All three schedules spread the projects throughout the timeframes to help make implementation easier and reduce impacts on rates.

(See "How CSO Control Could Affect Wastewater Rates" on the pages that follow.)

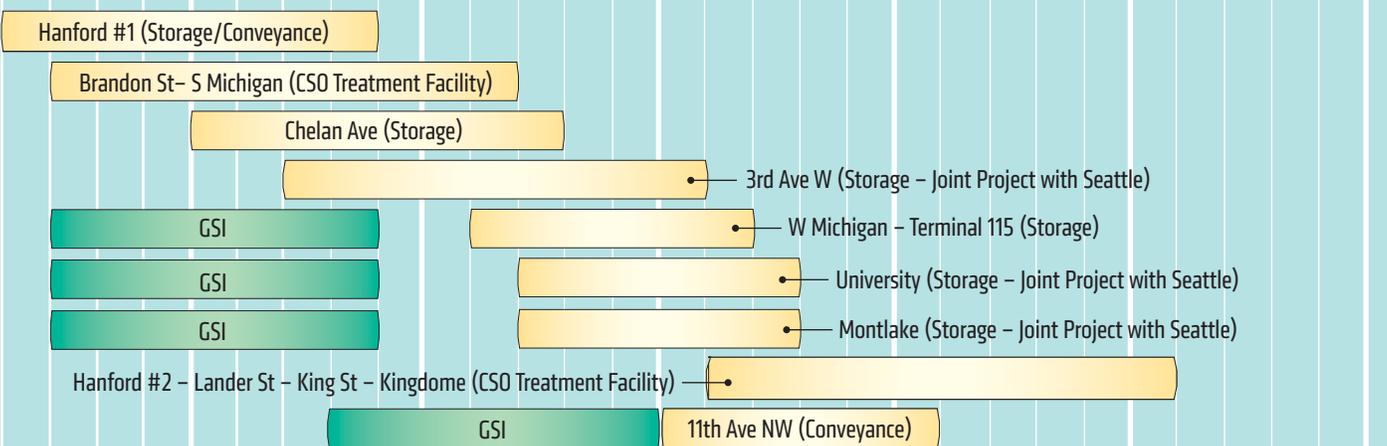


Installing the Boeing Creek storage pipeline.

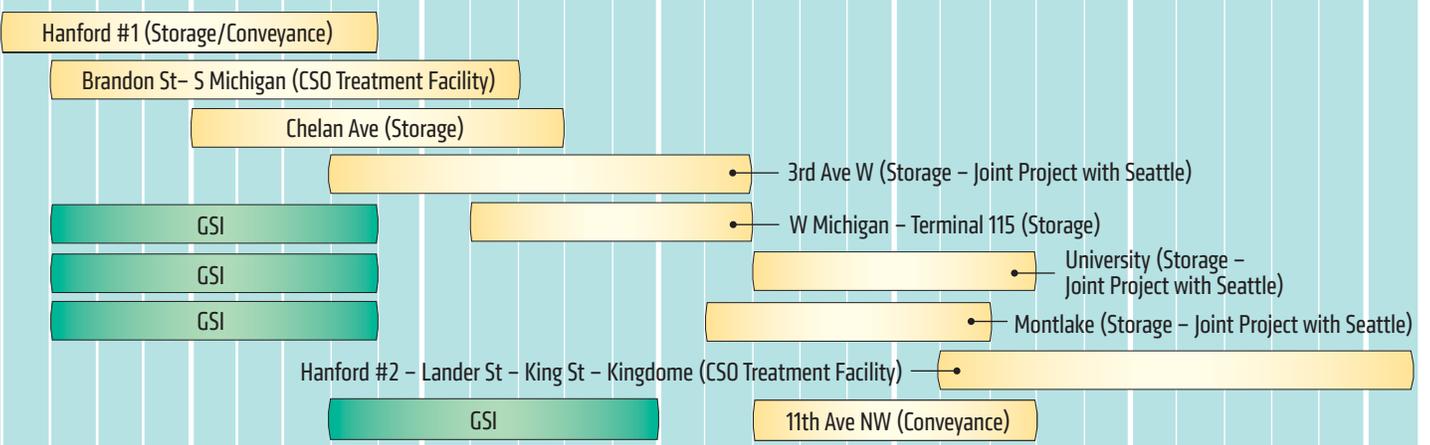
Schedule to Complete CSO Control Plan by 2030



Schedule to Complete CSO Control Plan by 2035



Schedule to Complete CSO Control Plan by 2040



How CSO Control Could Affect Wastewater Rates



The cost of CSO control

Controlling King County's remaining 14 CSO locations is estimated to cost wastewater ratepayers an additional \$711 million (in 2010 dollars), for a total investment of \$1.2 billion since the CSO Control Program began in the early 1980s. This significant financial investment is necessary for meeting our commitments to regulators and the public and for fulfilling WTD's mission to protect public health and the environment in the region.

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

Controlling costs: our priority and yours

While identifying and evaluating alternatives, WTD looked for ways to control costs and support the economic health of the region. Here are a few cost-control measures we're recommending or are already applying:

- ✓ Using existing facilities to transfer flows whenever possible.
- ✓ Reducing treatment facility costs by recommending these actions:
 - Building two facilities, rather than the four recommended in the 1999 plan update.
 - Using advanced CSO treatment technologies, which require less land than conventional primary treatment.
- ✓ Collaborating on projects with the City of Seattle when it's more cost-effective to do so and when it's better for the environment or reduces community impacts.
- ✓ Consolidating control of two or more CSO locations into single projects.
- ✓ Evaluating the use of GSI to provide amenities in project areas that can help reduce the volume of stormwater into combined sewers and also reduce the required size of CSO storage and treatment structures.
- ✓ Updating the hydraulic model to more accurately estimate CSO volumes.

WTD will continue seeking opportunities to control costs as we work to refine the projects.

WTD uses planning-level cost estimates to develop long-range capital schedules and budgets. Professional estimators consider the accuracy of planning-level estimates to be -50 to +100 percent. The accuracy of our estimates will improve during design of each CSO control project.

What you 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 wastewater rates. We compared the rate impacts of the schedule for completing all the projects by 2030—the recommended end date—to schedules for completing them by 2035 and 2040.

The table and graph below show how much the recommended CSO control projects could add to the

estimated wastewater rates between 2015 and 2040 for the three alternative end dates.

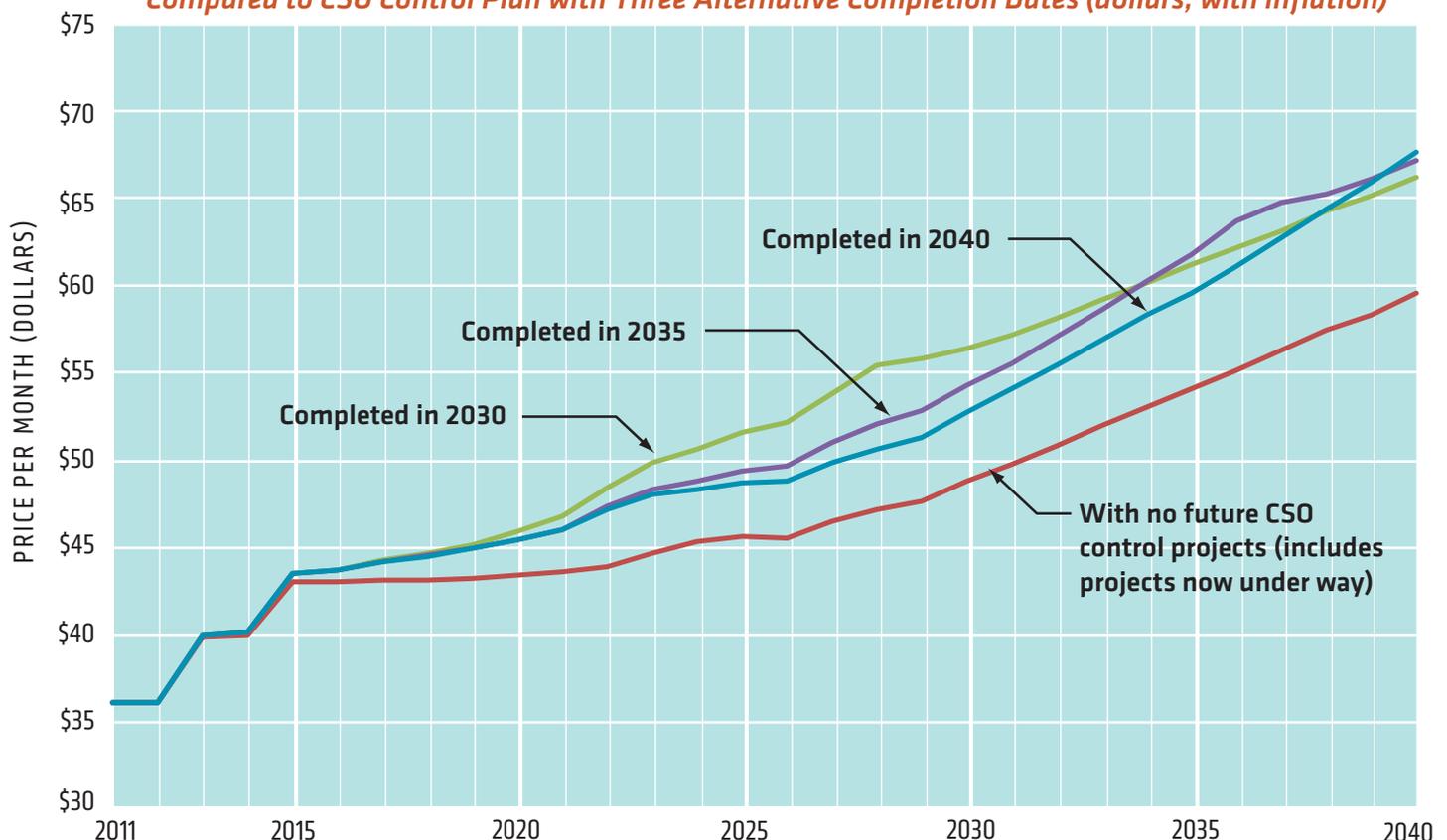
As shown, monthly wastewater bills could increase by an estimated \$7.61 by 2030, assuming the projects were completed by the recommended end date of 2030.

For comparison, extending completion to 2035 or 2040 would increase project costs because construction would occur later than 2030 and costs would be affected by higher levels of inflation. As a result, wastewater rates overall would be higher in the long-term than if all CSO control projects were completed by 2030.

Estimated Additions to Monthly Wastewater Rates Between 2015 and 2040 from Recommended CSO Control Plan with Three Alternative Completion Dates (dollars, with inflation)

	2015	2020	2025	2030	2035	2040
2030 Completion	0.47	2.50	5.92	7.61	7.06	6.70
2035 Completion	0.47	2.08	3.77	5.50	7.68	7.64
2040 Completion	0.47	1.94	3.02	4.26	5.50	8.12

Estimated Monthly Wastewater Rates Between 2015 and 2040—with No Future CSO Control Projects Compared to CSO Control Plan with Three Alternative Completion Dates (dollars, with inflation)



Where We Would Build Projects

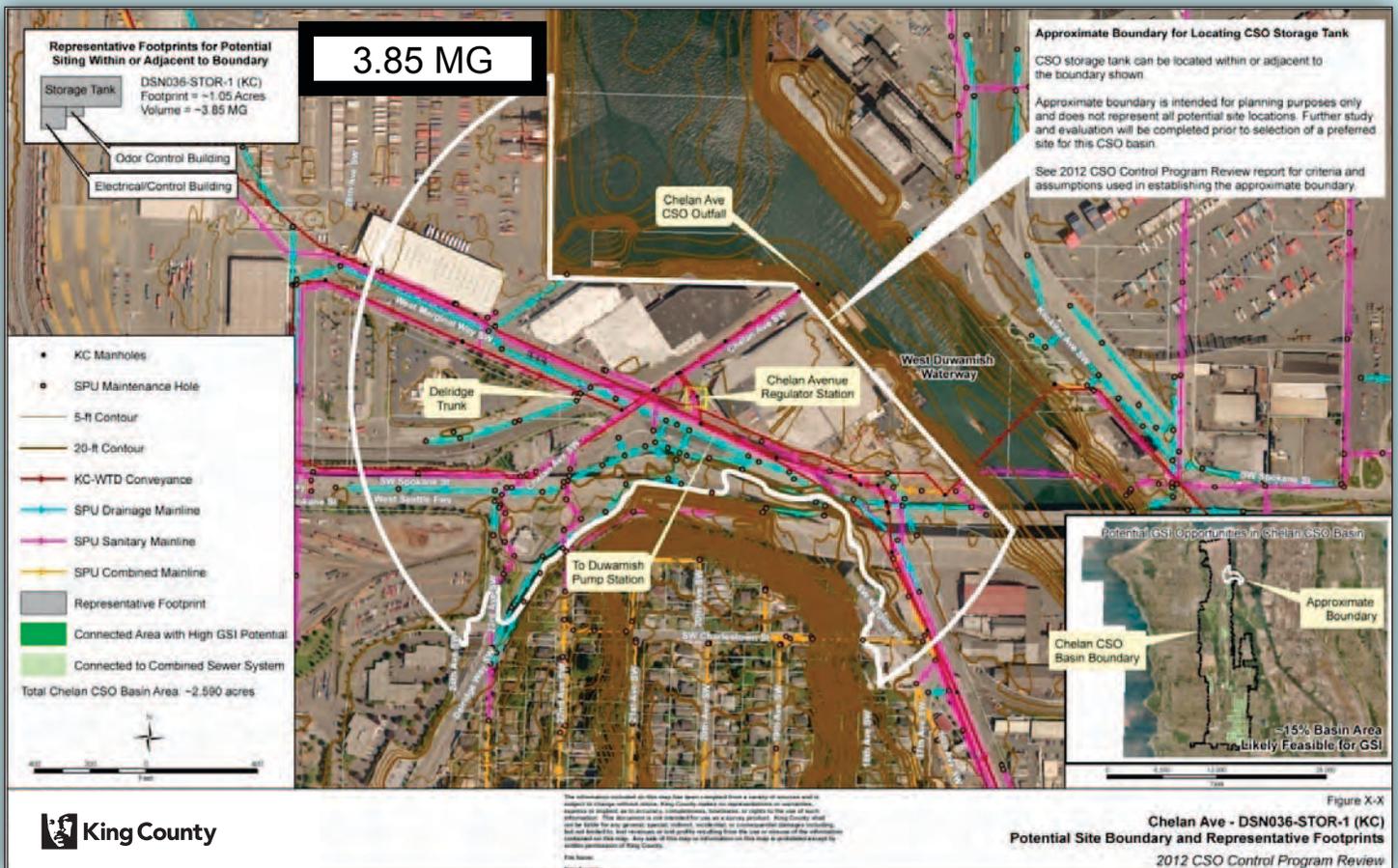
CSO control structures must be located near areas where CSOs occur. It would be more costly and disruptive to build and operate large conveyance pipes and other facilities to move the flows farther away for storage and treatment.

We have not yet selected sites for these structures. So far, we've identified general areas for each project to help us prepare planning-level cost estimates for the property values in a given area.

Finding the right site begins in earnest 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 property, street rights-of-way, and parks.

View the general areas for each project at www.kingcounty.gov/csocontrol.

Here's a small-scale example of the project area maps you can view on the Web and at local libraries. On each map, you'll find information including an outline of the general project area, an estimate of the amount of land needed for storage tanks or other structures, and where it may be possible to build green stormwater infrastructure.



How Projects Could Affect Your Neighborhood



We welcome comments at any time. As each of the recommended projects are designed and built, there will be many opportunities to be involved.

WTD's recommended CSO control plan includes ways to minimize potential impacts to the community:

- By consolidating our projects and collaborating on other projects with the City of Seattle, we would be building fewer facilities and affecting fewer neighborhoods.
- We would coordinate construction planning and scheduling of CSO control projects to coincide with other local projects.
- We are configuring projects to reduce the amount of land needed.
- Most of our recommended projects involve construction of underground storage pipes or tanks.

Even though we're planning on controlling CSOs mostly through underground storage, these storage projects may require some aboveground structures. Two projects require construction of aboveground treatment facilities in industrial areas. Each CSO treatment facility will require expanding existing outfall pipes or constructing new ones in the Duwamish River or some other location.

The typical CSO control project takes 8 to 10 years to complete—from planning through construction.

What to expect before construction

During project *planning*, WTD will work with the community to provide information about the project need and identify the project's likely community impacts. We tailor our public outreach activities to meet the specific needs of the project and the community.

During project *design*, the project team develops the recommended project proposal. We will provide project details to the community, who can inform our decisions on architecture, color, and landscaping and can help us identify reasonable solutions for short-term construction impacts.

The project team will likely conduct technical investigations during this time. Staff will notify you of any work that is visible, work on private property, and work that may involve improvements in the right-of-way. This work may include investigations of soil and groundwater using machines (drill rigs) and surveys of properties, rights-of-way, stormwater, and drainage.

What to expect during construction

The *construction* phase of CSO control projects lasts from three to four years. If you live or work near a construction site, you may experience temporary inconveniences such as heavy equipment noise, increased truck traffic, and possible traffic delays.

WTD follows permit conditions and local ordinances that limit noise and other construction impacts. We work with communities to understand their concerns and reduce construction impacts where possible. Staff are available 24/7 to address questions and concerns.



Planning and building new wastewater infrastructure is extremely complex. It can easily take more than a decade to go from project planning to cutting the ribbon on a newly completed facility. King County engages the community at every step of the way. This website tells you how we do this:

<http://www.kingcounty.gov/environment/wtd/Construction/phases.aspx>



Constructing an underground storage tank.



Access hatches for maintenance of a storage tank.

What facilities will look like

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

Storage tanks, pipes, tunnels, and many other facilities will be built below ground. Local codes and ordinances and safety concerns, however, 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 stacks. Where reasonable, design engineers may be able to locate some aboveground facilities in locations that do not restrict access to public areas or rights-of-way.

The two recommended CSO treatment facilities will require more aboveground structures and land area than storage tanks, pipes, or tunnels. Both facilities will be located in industrial areas near the Duwamish River and Elliott Bay.



Two views of the Denny Way Regulator Station at Myrtle Edwards Park.

What to expect after construction

WTD staff will access storage tanks, pipes, and tunnels regularly for maintenance and repairs:

- Staff will visit facilities weekly and at other times of the month. The length of these visits can range from several hours to a few days.
- Once a year, crews may need to replace the carbon in the facility's odor control unit. Work involves use of large equipment and takes about one or two days.
- During storms, crews may be on hand to take wastewater samples, monitor facility function, or make emergency repairs. After storms, crews may need to clean up or do other work to prepare for the next storm.

The CSO treatment facilities will start up automatically, but will need staff on-site to perform routine maintenance, make process adjustments, and receive chemical and other deliveries.

CSO control facilities tend to produce little odor because they operate intermittently and handle flows that are mostly stormwater. King County's goal is to prevent odor impacts. Our policy requires that new wastewater facilities use the most advanced and effective odor control systems and that WTD respond to odor complaints within 24 hours.

Responding to Regional Priorities

We've listened to what people told us during the three-year-long process to review our CSO Control Program. The following pages describe how the recommended plan responds to regional priorities.

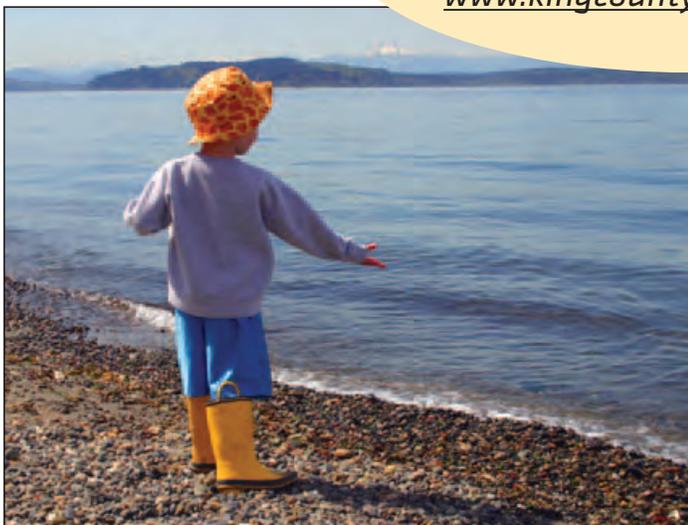
Meets our commitments to regulators and the public

Residents of King County's wastewater service area have consistently told us in surveys and other forums that water quality is one of their top priorities. Both the Washington State Department of Ecology (Ecology) and the U.S. Environmental Protection Agency (EPA) share this priority and enforce it through initiatives, laws, and regulations.

In a recent national public process led by EPA, "keeping raw sewage and contaminated stormwater out of our nation's waters" rose to top priority, higher than initiatives such as "cutting toxic air pollution that affects communities' health." EPA is working with King County, the City of Seattle, and other cities in the country to review their CSO control plans and their progress toward reducing CSOs.

Implementing this recommended plan will control all county CSO sites to the state standard of no more than an average of one CSO per year at each CSO location.

For a list of those we've met with during our CSO Control Program review, see www.kingcounty.gov/csocontrol.



Duwamish River.



Warning sign on the Duwamish River.

Photo: Washington State Department of Health

Starts with CSO control projects in the Duwamish River

Through WTD's public outreach efforts, we've learned that controlling CSOs in the Duwamish River is a priority, especially for groups who live, work, and consume fish in the area.

WTD reviewed more than 75 scientific studies and other resources to assess whether we should implement the Lake Washington Ship Canal/Montlake Cut projects or the Duwamish River/Elliott Bay projects first. The review focused on five factors—water quality, sediment quality, human health, ecological health, and effects of climate change—and recommended implementation of the Duwamish River/Elliott Bay projects first.

Water quality and the potential for human contact appear to be similar in both the Duwamish River/Elliott Bay and Lake Washington Ship Canal/Montlake Cut areas; the same is true for effects of climate change, although higher sea levels would have a greater impact on CSO control in the Duwamish River/Elliott Bay area. However, the priority that regulatory agencies have set on cleaning up contaminated sediment, preventing new sediment contamination, and reducing chemical exposure from eating fish from the lower Duwamish River help set a priority for control of CSOs in this area. Moreover, the studies done in support of this cleanup effort indicate that juvenile Chinook salmon in the river may be exposed to pollutants from CSOs and other sources.

Responding to Regional Priorities (continued)

Collaborates with the City of Seattle on CSO control

People in the region have told us that they strongly support WTD's continued coordination with the City of Seattle in controlling CSOs in the regional system. The two agencies are seeking joint alternatives that hold the potential to be more cost-effective, produce better environmental outcomes, and cause less disruption to the community than independent alternatives.

Three of the recommended projects are joint projects. The projects would control three county CSO locations and seven city CSO locations—all in the Lake Washington Ship Canal/Montlake Cut area.

Completing the joint projects will require a series of interlocal agreements at various stages of each project. The city cannot fully commit to the projects until it has completed an environmental review in early 2014. Until then, WTD will continue to recommend these joint projects with the knowledge that county-only alternatives are available.

Uses advanced CSO treatment technologies

WTD is recommending construction of two CSO treatment facilities to control six county CSO locations in the Duwamish River/Elliott Bay area. These locations require on-site treatment and discharge because the flows are too large to store and later send to West Point Treatment Plant.



Aboveground structure for Henderson CSO tunnel.



Elliott West CSO Treatment Facility—a collaboration between King County and City of Seattle.

Over the years, WTD has been researching and pilot testing CSO treatment technologies with the potential to do the job better, faster, and at lower cost than conventional primary treatment used at our existing CSO treatment facilities. We narrowed the field to two technologies.

Both treatment technologies produce cleaner water, require less land, and cost less than conventional primary treatment. WTD is recommending consideration of both technologies to give the teams more flexibility in designing projects. Either type of facility would include equalization basins that work to smooth out peak flows and help reduce the required size of the facility. After treating the flows, the facilities would use ultraviolet (UV) light to disinfect them. UV disinfection is safer, more reliable, and better for the environment than chemical disinfection.

WTD held two public workshops to learn what others thought of using these more advanced treatment technologies. People recognize that given the large volume of flows and the special needs of the Duwamish River, the technologies are essential to effective control and treatment.

Continues to improve sediment quality in the region

Most of the contamination in sediments near King County CSO locations occurred in the first half of the 20th century. The industrial and municipal wastewater and stormwater in combined sewers would empty directly into waterways without being treated first.

The recommended CSO treatment technologies produce cleaner water, require less land, and cost less than conventional primary treatment. Get more detail at www.kingcounty.gov/csocontrol.

For more information on sediment cleanup in the Duwamish River, see

<http://www.kingcounty.gov/environment/wastewater/Duwamish-waterway.aspx>.

In addition to pollutants from homes and streets, this discharge contained chemicals that industries are now required to remove before discharging their water to sewers. The pollutants have accumulated in sediments at the bottom of the waterways and can pose risks to people, animals, and fish.

King County is investing money and resources to help clean up this historical contamination. Since 2000, the County and its partners—the City of Seattle, Boeing, and the Port of Seattle—have been coordinating their efforts to clean up sediments in the Duwamish River under two Superfund projects. Superfund is the common name for the Comprehensive Environmental Response, Compensation, and Liability Act of 1980, a federal law designed to clean up sites contaminated with hazardous substances.

The sediment cleanup work has spurred the development of working groups composed of King County and its partners, regulators, scientists, environmental groups, and the community to determine how best to proceed with cleanup and prevent additional contamination. The work has also produced valuable scientific studies that are informing this CSO control plan update and other work in the region.

We expect that future partnerships will form to assess and address sediment contamination in other waterways such as the Lake Washington Ship Canal.

Uses green stormwater infrastructure as part of CSO control

People in the community have told us that we should use GSI as often and as effectively as possible. GSI offers attractive landscaping and visual elements that can reduce the size of needed CSO control facilities and improve stormwater quality at the same time.

GSI is a relatively new concept covering a range of small-scale measures to reduce pollution from stormwater runoff and the amount of stormwater that enters combined sewers. GSI techniques include rain gardens, green roofs, permeable paving, and other ways that use natural processes to intercept and reroute stormwater before it enters the combined sewer system. The techniques can be used alone or in combination with traditional means for reducing CSOs and improving water quality. Less CSO volume translates to lower costs for pumping and treating the flows.

WTD's first GSI CSO control project is under way! The project will build roadside rain gardens in the Westwood and Sunrise Heights areas of West Seattle to manage stormwater that contributes to CSOs.

GSI techniques won't work everywhere. They require specific zoning, soil properties, slopes, and other conditions. WTD has identified GSI potential for four of the recommended projects in this CSO control plan. We will implement GSI in these project areas if our analyses find it to be a feasible and cost-effective way to reduce the size of control facilities.



Roadside rain gardens capture and filter stormwater before it enters combined sewers.



Disconnecting roof spouts from the sewer and directing the flow to cisterns and rain gardens can help reduce CSOs.

We'd Like to Hear From You Again



Our CSO control plan has evolved over the years as we've listened to the community's thoughts and concerns. This document presents the highlights of the process and results of the most recent comprehensive review of King County's CSO Control Program. It recommends that WTD update its CSO control plan by implementing nine projects for controlling 14 county CSO locations by 2030 to the Washington state standard of no more than one overflow per year on average at each site, and it gives planning-level cost estimates and alternative schedules for completing the projects.

The comments, ideas, and suggestions you've given us so far have played a valuable role in the review and recommendation process. Thank you! Although the process was rigorous and your thoughts were incorporated, there's always room for further improvement.

Please comment on this recommended plan

We welcome comments on any aspect of this recommended plan. Here are some questions to aid your review and comment:

- Should we reconsider some of the alternatives evaluated earlier but not recommended?
- Should we change the sequence of projects?
- Which CSO control plan schedule should we use?
- Did we overlook something important?

When we need your comments

Comments received by **Dec. 31, 2011**, will be shared with King County Executive Dow Constantine. He will consider all comments while preparing his recommended plan. Meetings with stakeholders will take place between now and the end of the year.

The Executive will submit his recommended plan to the King County Council by the end of March 2012.

The Council is expected to review and then approve the plan by the end of August 2012. You will

have the opportunity to comment on the Executive's recommended plan during Council review through the same venues offered here.

Would you like more detailed information?

Technical memorandums provide the details behind our recommendations. You can read them at www.kingcounty.gov/csocontrol or go to selected King County and Seattle libraries to read them on the Web or in print.

A summary of the information in the memorandums will be available in the same places by **Nov. 30, 2011**.

Ways to comment and learn more:

Submit your comments in any of these ways:

- Complete the attached card and mail it to us.
- Fill out an online comment form: www.kingcounty.gov/csocontrol.
- Send us an email: review.cso@kingcounty.gov.
- Attend an informational meeting. A meeting is scheduled for **Wednesday, Nov. 9, 2011, 6:30-8:30 pm**, at the REI store: 222 Yale Ave N, Seattle.
- Call Dana West, Communications Specialist, at 206-684-1097 or TTY Relay: 711.

Visit www.kingcounty.gov/csocontrol or call Dana West at 206-684-1097 to learn more:

- Request a presentation for your community organization.
- Find out when we're holding additional meetings.
- Get email updates on the CSO Control Program review.
- Request printed versions of this document.

COMMENTS

We welcome your comments on the King County Wastewater Treatment Division's Recommended CSO Control Plan. Comments received by Dec. 31, 2011, will be shared with King County Executive Dow Constantine.

- Should the County reconsider alternative projects that were not recommended?
- Should we change the sequence of projects, and which schedule should we use?
- Is there something important that was overlooked?
- Other comments?

Provide comments online:

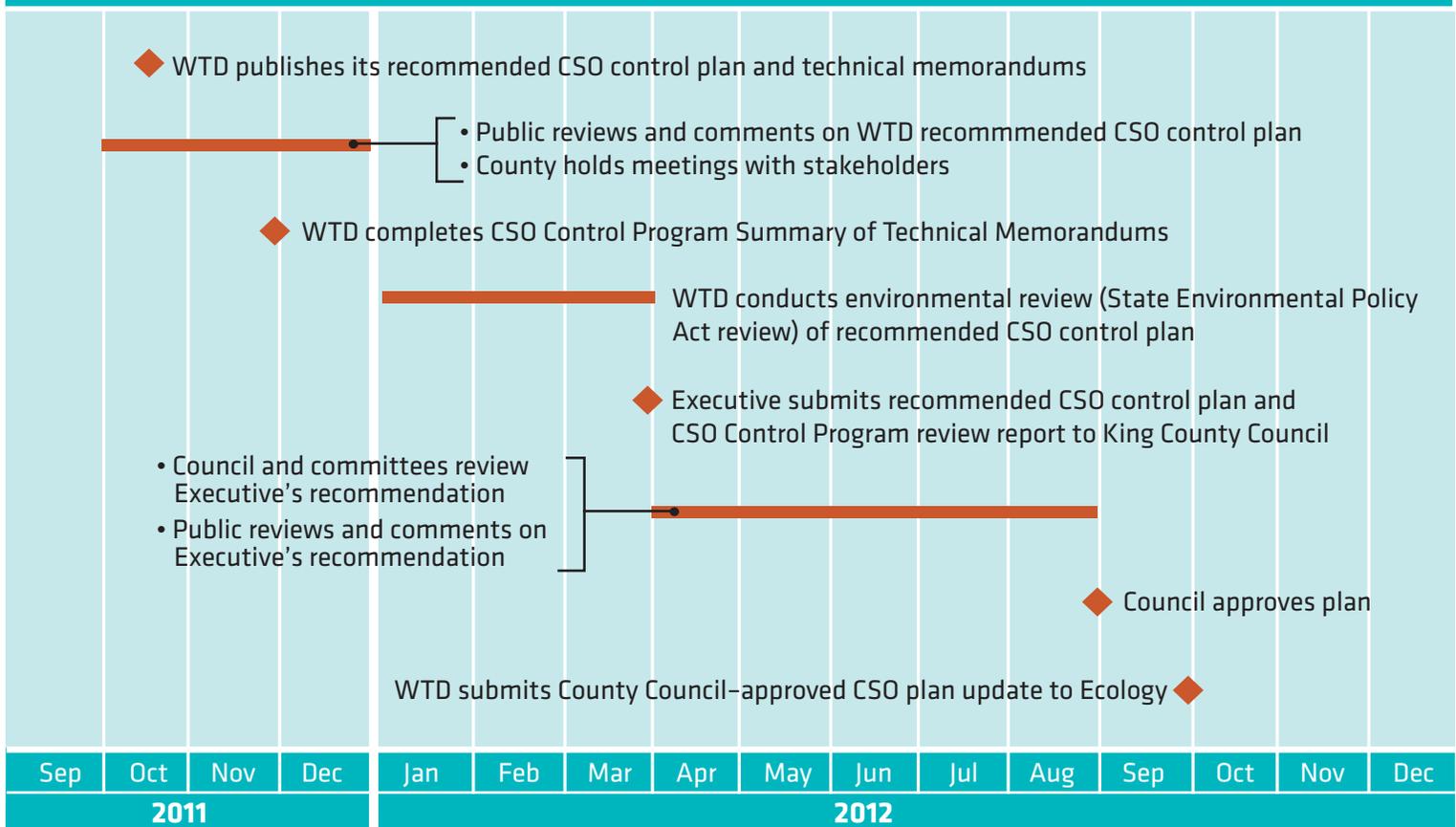
www.kingcounty.gov/csocontrol

Other ways to contact us, learn more, or comment:

Email: review.cso@kingcounty.gov

Call: Dana West at 206-684-1097

Recommended CSO Control Plan Timeline





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



King County

Department of Natural Resources and Parks
Wastewater Treatment Division
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