
Chapter 2

Brightwater Treatment System

The RWSP calls for the construction of a new regional treatment plant and conveyance system in the northern portion of King County's wastewater service area by the year 2010. King County made substantial progress on the Brightwater project in 2007. Over 98 percent of the construction contracts have been awarded. The project is a few months behind schedule. The system is expected to start operating in May 2011.

This chapter focuses on the activities and accomplishments in 2007 related to construction of the Brightwater System. The chapter also reports on mitigation activities, public involvement activities, progress on the reclaimed water system, and the updated cost trend for the project. The chapter concludes with a schedule for 2008.

2.1 Description of the Brightwater System

The locations of the Brightwater facilities are shown in Figure 2-1. The treatment plant will be built in Snohomish County on a site just north of the City of Woodinville. It will have an initial capacity to treat 36 million gallons per day (mgd) with room for future expansion to 54 mgd. In addition to the treatment plant, the Brightwater System includes approximately 14 miles of pipelines to be constructed in underground tunnels in north King County. The pipelines will convey untreated wastewater (influent) to the plant and treated wastewater (effluent) from the plant for discharge through an outfall in Puget Sound.

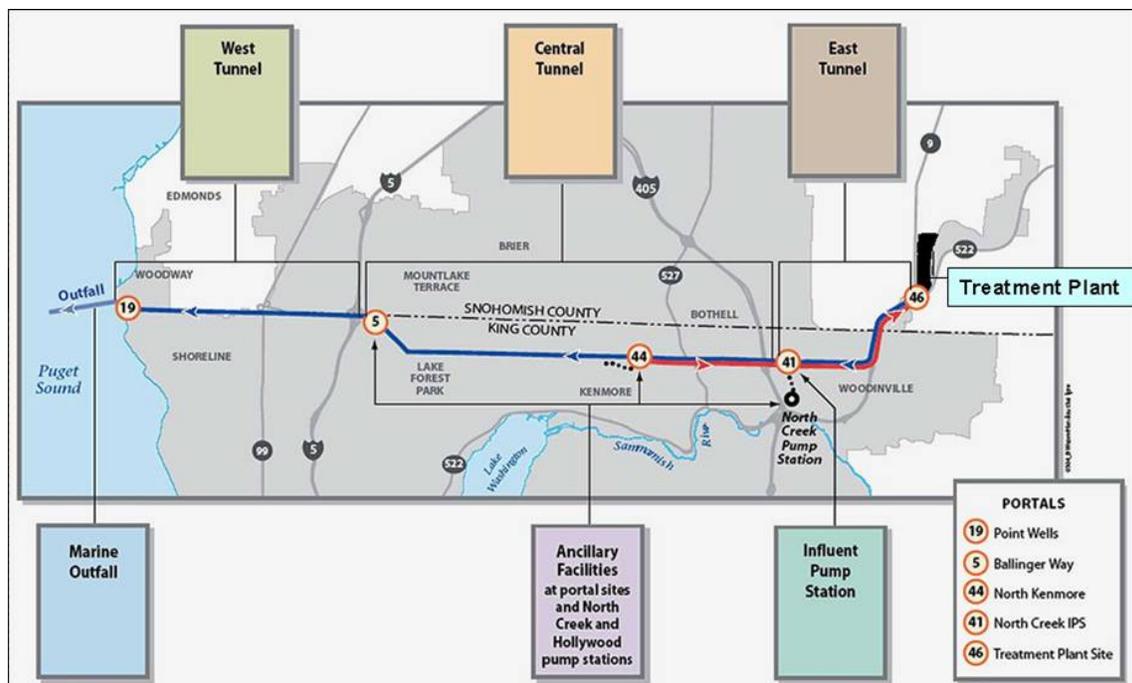


Figure 2-1. Components of the Brightwater System

2.2 Brightwater System Construction

The Wastewater Treatment Division (WTD) and its consultants and contractors completed a significant amount of work on the Brightwater project in 2007. Treatment plant and conveyance system construction accomplishments are summarized below.

2.2.1 Treatment Plant Construction

The 114-acre treatment plant site (known as the Route 9 site) is located in unincorporated Snohomish County east of State Route 9 (SR-9) and just north of the intersection of SR-9 and SR-522. Treatment and support facilities will cover approximately 43 acres.

Highlights of progress made in 2007 on construction, design, and contracting for the treatment plant and associated facilities are as follows:

- Completed preconstruction grading and site preparation activities that started in mid-2006
- Initiated earthwork and concrete work for the grit, headworks, and primary structure foundations (Figure 2-2)
- Completed detailed design for treatment plant instrumentation and controls
- Completed negotiations for construction of the liquids stream facilities and awarded construction contracts for the solids/odor control facilities

In 2008, WTD will continue major site construction activities, including construction of tanks and buildings, installation of major pipes, and demolition of existing buildings (Opus Building). Shaping of landforms on the plant site will continue into 2008, as well.

For more information on the Brightwater Treatment Plant, see <http://dnr.metrokc.gov/wtd/brightwater/plantsite/index.htm>.



Figure 2-2. Concrete Work for Brightwater Treatment Plant Headworks Building

2.2.2 Conveyance System Construction

The conveyance system includes the pipes and facilities that bring wastewater to and from the treatment plant, and a marine outfall where treated wastewater is discharged to Puget Sound. The system is being built almost entirely below ground in tunnels 40 to 400 feet deep. Five shafts, called portals, provide access to and from the tunnels for workers and tunnel boring machines (TBMs).

Construction of the conveyance system is divided into six major components: the East Tunnel, Central Tunnel, West Tunnel, Influent Pump Station, Marine Outfall, and Ancillary Facilities (see Figure 2-1). Conveyance system construction began in 2006. In 2007, the King County Industrial Waste Program presented Silver and Gold Certificates to WTD for discharge compliance associated with conveyance system construction.

The following sections present highlights of accomplishments in 2007 for each of the six conveyance system components.

East Tunnel

The East Tunnel will consist of about 14,050 feet of 16.6-foot internal-diameter tunnel between the Brightwater Treatment Plant and the North Creek Portal in Bothell. The TBM was launched from the North Creek Portal (Figure 2-3) in September 2007 and is tunneling east to the treatment plant site where it is scheduled to be retrieved in November 2008. Approximately 350 feet of the East Tunnel was tunneled in 2007.



Figure 2-3. North Creek Portal Construction Site

Central Tunnel

The Central Tunnel consists of two 14.3-foot internal-diameter tunnels. One tunnel is about 11,600 feet long, extending from the North Kenmore Portal in Kenmore to the North Creek Portal in Bothell. The second tunnel is 20,100 feet long, extending from the North Kenmore Portal to the Ballinger Way Portal in Shoreline. (Figure 2-4 shows construction at the North Kenmore Portal site.) A TBM was launched from the North Kenmore Portal in mid-September 2007 and is tunneling east to the North Creek Portal, where it is expected to be retrieved in February 2009. Another TBM was launched in December 2007 and is tunneling west toward the Ballinger Way Portal, where it is expected to be retrieved in November 2009. The Ballinger Way Portal is under construction and is expected to be complete in fall 2008.

The construction contract for the Central Tunnel also includes the North Creek Connector, which will connect the new Brightwater Influent Pump Station at the North Creek Portal site and the existing North Creek Pump Station. Construction of this 2,300-foot-long, 65-foot-deep, 72- and 36-inch-diameter pipe began in 2007 and is expected to be complete in 2008. The pipe is being installed via microtunneling.



Figure 2-4. North Kenmore Portal Construction Site

West Tunnel and Marine Outfall Connector

The West Tunnel is about 21,200 feet of 12-foot internal-diameter tunnel starting at the Point Wells Portal in unincorporated Snohomish County and leading east to the Ballinger Way Portal in Shoreline. Shaft construction at the Point Wells Portal was under way in 2007; tunneling will begin in 2008.

Preparation for microtunneling of the Marine Outfall Connector took place in 2007. The Marine Outfall Connector will extend northwest from the Point Wells Portal to the start of the Marine Outfall. It will be installed in 2008 using a remotely controlled microtunneling machine.

Marine Outfall

The Marine Outfall will discharge effluent from the Brightwater Treatment Plant into Puget Sound. Extending a total of 5,200 feet, the outfall will include a single 84-inch-diameter pipe followed by two 63-inch-diameter pipes, each with a 250-foot-long diffuser discharging effluent at a depth of approximately 600 feet. The portion of the outfall from the Marine Outfall Connector to a depth of 80 feet will be constructed in a trench. The portion between depths of 80 and 600 feet will be laid on the bottom of the Sound. WTD awarded the construction contract for the Marine Outfall in October 2007. Geotechnical work necessary to finalize project design was completed in late fall 2007. Construction of the outfall is expected to be complete by fall 2008.

Influent Pump Station

The new Influent Pump Station, located at the North Creek Portal, is being built to pump influent to the treatment plant. The pump station will be largely underground; odor control and other facilities at this site will be above ground. The construction contract was awarded in June 2007, construction planning is under way, and construction is expected to start in early 2009.

Ancillary Facilities

Ancillary facilities are being constructed in the existing WTD conveyance system to incorporate Brightwater into the system. Installation of facilities at the Hollywood Pump Station, including odor control equipment, new generators, and electrical panels, started in 2007 and will be complete in 2008. Other facilities, such as flow monitoring equipment and electrical equipment, will be installed in 2008 at other points in the conveyance system.

For more information on Brightwater conveyance system construction, see <http://dnr.metrokc.gov/wtd/brightwater/construction/index.htm>.

2.3 Mitigation Activities

Mitigation refers to the various measures taken to address construction and operational impacts and enhance the community that hosts a development project. To address the possible impacts of Brightwater construction and operation and to comply with RWSP environmental mitigation policies, WTD has negotiated mitigation agreements with cities, tribal governments, jurisdictions, and local utilities. Some of the mitigation measures address the short-term impacts of construction; other measures are intended to cover longer-term impacts. The sections below describe the progress made in 2007 associated with Brightwater system-wide mitigation.

2.3.1 North Habitat Area

The Brightwater Treatment Plant site will include many acres of publicly accessible open space, trails, and salmon habitat restoration. Forty of these acres, called the North Habitat Area, are at the north end of the site and now include native wildlife habitat, restored salmon streams, trails, and boardwalks (Figure 2-5). Construction, including creation of streams and hills, of the North Habitat Area occurred in 2007.



Figure 2-5. North Habitat Area on the Brightwater Treatment Plant Site

2.3.2 Environmental Education/Community Center

The Brightwater Environmental Education/Community Center will be located on the treatment plant site and will include two learning laboratories, an exhibit hall, and meeting facilities. The building permit for the center was obtained in 2007. The Washington State Legislature awarded a \$675,000 grant to the Friends of Hidden River, a Bothell non-profit group, to help cover costs associated with final architectural and sustainable features design. Friends of Hidden River is partnering with WTD and NatureVision, another non-profit group, to secure additional financial and community support for the center. Construction of the building will be completed in 2010.

2.3.3 Mitigation Agreements and Permits

In 2007, King County reached mitigation-related agreements associated with Brightwater construction with the Cities of Shoreline and Kenmore. A Surface Use Agreement was signed with the City of Shoreline to create a community park at the Richmond Beach Pump Station site near the Point Wells Portal, and a Land Transfer Agreement was signed with the City of Kenmore to create 26 acres of public park at the North Kenmore Portal.

Also in 2007, King County obtained all building permits for the treatment plant site from Snohomish County and made a mitigation payment of \$17.5 million to Snohomish County. From this payment, approximately 145 acres of habitat and recreational land were purchased to provide improvements to the community surrounding the Brightwater plant.

In addition, a request for proposals to procure landscape plant material for the treatment plant site was issued in 2007. A contract for a portion of the material was awarded in 2008; the

remaining material was included in a subsequent invitation to bid due in July 2008. Plants will be installed through 2011.

2.4 Public Involvement Activities

King County continues to place a high priority on involving stakeholders and members of the public in the Brightwater project. Over 30 meetings and briefings with residents, community leaders, and groups were held in 2007, including informational meetings for community members who live or work near the portal and treatment plant sites, and Brightwater information booths were set up at several community events.

Examples of public involvement activities in 2007 are as follows:

- **Planting event and public tours.** The county hosted a planting event and community tours of the North Habitat Area. The planting event in October provided the opportunity for volunteers to assist with planting native species in this area. Guided public tours of the North Habitat Area took place in April and May.
- **Community meetings and informational booths.** Community meetings on construction and activities at the Point Wells Portal took place in January and May. Brightwater staff worked in information booths at festivals in Shoreline and Woodinville in March, May, and August.
- **Conveyance construction groundbreaking.** In September, the county recognized the startup of construction at the North Creek Portal site in Bothell with the “Tunneling to the Future” celebration.
- **Bulletins, newsletters, news releases, and responses to questions.** The Brightwater project team continued to respond to questions and comments from property owners, jurisdictions, neighbors, and the general public. In addition, the team produced newsletters, bulletins, and news releases and updated the Brightwater Web page to keep people informed about project activities.

2.5 Brightwater Reclaimed Water System

Almost all the wastewater treated at the new Brightwater Treatment Plant will meet Washington State reclaimed water standards and can be safely recycled for irrigation and industrial purposes. In late 2005, the King County Council approved funding for the Brightwater reclaimed water “backbone,” a system of pipes to carry reclaimed water south and west of the plant (Figure 2-6).

The backbone is divided into two segments. Reclaimed water pipes in the West Segment are being installed during construction of the Brightwater tunnels. The South Segment, consisting of both new reclaimed water pipes and conversion of an existing force main, will extend south from the new Brightwater Influent Pump Station to Willows Run Golf Course in the Sammamish Valley. Construction of the portion of the South Segment north of the North Creek Pump Station will begin in 2008 and take about five months to complete. Engineering design, environmental review, and permitting for the portions south of the North Creek Pump Station were undertaken

in 2007. Conversion of the existing force main between the North Creek and York Pump Stations is scheduled to be completed in 2008. Acquisition of the remaining land use permits and award of a construction contract for the new pipe extending from the York Pump Station to Willows Run are scheduled for 2008; construction is expected to start in 2008 and be completed in 2009.

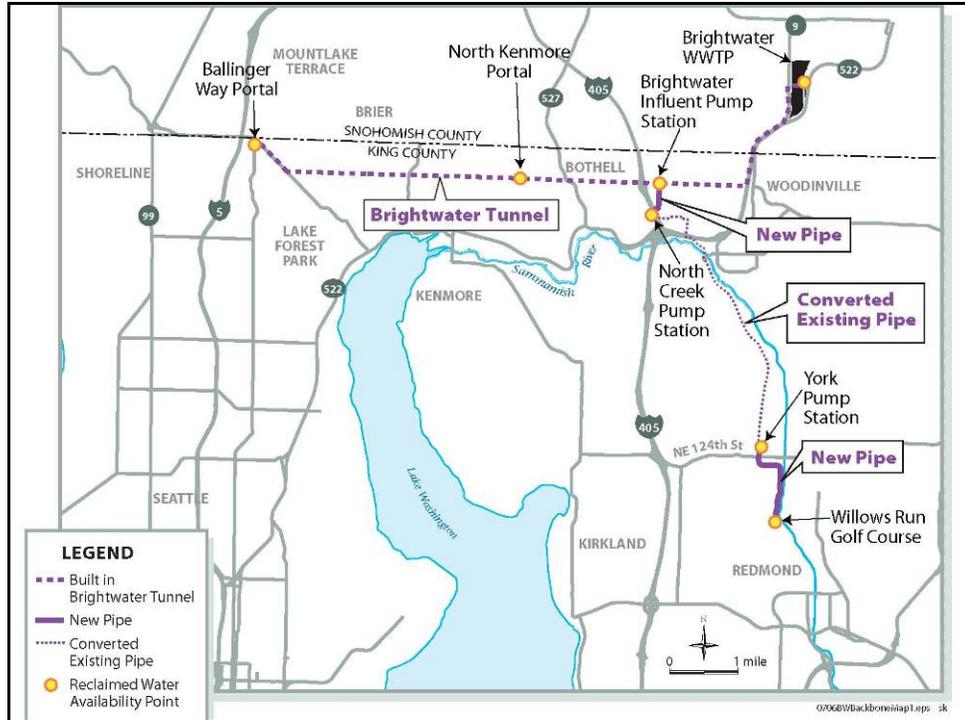


Figure 2-6. Brightwater Reclaimed Water System

2.6 Brightwater Cost Update

Cost estimating is an important part of managing the Brightwater project and of keeping decision makers informed about trends and conditions that could potentially affect project cost. King County has prepared seven cost estimates to date, beginning with the first conceptual estimate in 2001.¹ An independent oversight monitoring consultant reviews the estimates and makes recommendations.

Table 2-1 shows the January 2008 estimate for the project at \$1.802 billion (including inflation)—representing an overall increase of about \$34.9 million over the January 2007 estimate (an increase of \$35.5 million in estimated treatment plant costs and a decrease of about \$0.6 million in estimated conveyance costs). The increase is primarily due to inflation of materials and commodities.

¹ *Brightwater Cost Update: Current Conditions and Trends*, Department of Natural Resources and Parks, Wastewater Treatment Division, January 2008. A copy of the report is available on request.

Table 2-1. Comparison of January 2007 and January 2008 Brightwater Cost Estimates (million dollars with Inflation)

	Jan. 2007 King County Estimate	Jan. 2008 King County Estimate	Change Jan. 2007– Jan. 2008	Percent Change	January 2007 OMC Estimate
Treatment plant	\$839.8	\$875.3	\$35.5	4.22%	\$882–\$911
Conveyance	\$927.5	\$926.9	\$(0.5)	-0.06%	\$ 946–\$953
Total	\$1,767.3	\$1,802.2	\$34.9	1.98%	\$1,827–\$1,862

Note: Estimates assume project completion in 2012. Inflation was calculated based on costs spent to date in inflated dollars, awarded construction contracts (and associated sales tax and contingency) in inflated dollars, mitigation costs in inflated dollars, and 3 percent inflation over 2008 dollars for remaining construction costs, King County labor, and some consulting costs.

OMC = Oversight Monitoring Consultant.

A baseline budget was prepared for the project in October 2004 after completion of predesign. Table 2-2 shows the baseline budget of \$1.483 billion both in 2004 dollars and with inflation at 3 and 5 percent per year through 2012, and compares these numbers with the January 2008 estimate of \$1.802 billion with inflation. The January 2008 cost estimate is \$12.8 million above the baseline budget forecasted in 2004 with 5 percent inflation. It was predicted in October 2004 that given the significant increases in commodity prices, an inflation assumption of 5 percent might better reflect future conditions.² This prediction was borne out by actual inflation experienced over the last two years in construction-related markets.

Table 2-2. Comparison of Brightwater 2004 Baseline Budget Forecast and January 2008 Cost Estimate (million dollars)

	Baseline Budget (2004\$)	Baseline Budget with 3% inflation over (2004\$)	Baseline Budget with 5% inflation over (2004\$)	January 2008 Estimate with Inflation
Treatment plant	\$578.4	\$639.6	\$684.4	\$875.3
Conveyance	\$904.7	\$1,020.5	\$1,105.5	\$926.9
Total	\$1,483.1	\$1,660.1	\$1,789.9	\$1,802.2

Note: Estimates assume project completion in 2012. Inflation for the January 2008 estimate was calculated based on costs spent to date in inflated dollars, awarded construction contracts (and associated sales tax and contingency) in inflated dollars, mitigation costs in inflated dollars, and 3 percent inflation over 2008 dollars for remaining construction costs, King County labor, and some consulting costs.

² King County Department of Natural Resources and Parks. *Brightwater Facilities: Addendum to August 23 Report: Brightwater Predesign Cost Estimates*. October 2004. p. 20.

2.7 Schedule for 2008

Activities anticipated in 2008 for the Brightwater Treatment System are as follows:

- Begin construction of the solids/odor control facilities.
- Complete demolition of the Opus Building.
- Award contracts for all components of the treatment plant liquids facilities including the Environmental Education/Community Center and landscaping.
- Complete tunneling of the East Tunnel.
- Continue tunneling of the Central Tunnel.
- Begin tunneling of the West Tunnel.
- Install the Marine Outfall Connector and complete construction of the Marine Outfall.
- Complete construction of ancillary facilities at the Hollywood Pump Station.
- Initiate construction of the South Segment of the reclaimed water backbone and complete associated plumbing at the North Creek Pump Station.
- Transmit mitigation payments and continue to oversee purchases of mitigation properties for parks and recreational lands.