

Chapter 2

Brightwater Treatment System

The RWSP calls for the construction of the Brightwater Treatment System by 2010 or as soon thereafter as possible to handle wastewater flows from the northern portion of King County's wastewater service area.

The locations of the Brightwater facilities are shown in Figure 2-1. The treatment plant is located in unincorporated Snohomish County, just north of the City of Woodinville. It will have capacity to treat an average of 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, treated wastewater (effluent) from the plant for discharge through an outfall in Puget Sound, and reclaimed water for distribution to customers located along the effluent pipeline and down through Sammamish Valley (see Chapter 8).

Construction of the Brightwater system started in 2006; the system is expected to be operating in fall 2011.

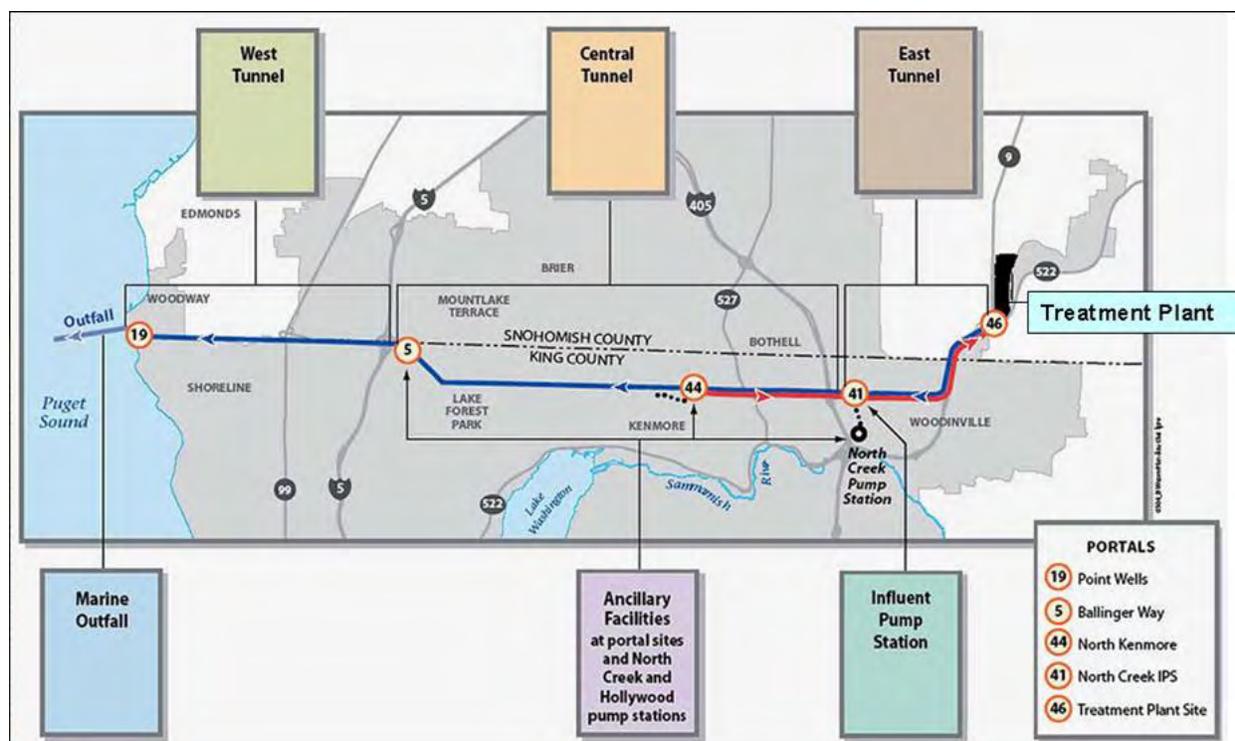


Figure 2-1. Components of the Brightwater System

This chapter summarizes construction, mitigation, and public involvement activities and accomplishments in 2008 related to the Brightwater system. It concludes with a schedule for 2009.

Information on the Brightwater Reclaimed Water System and on the Brightwater cost trend update is provided in Chapters 8 and 9, respectively.

2.1 Brightwater System Construction

The Wastewater Treatment Division (WTD) and its consultants and contractors completed a significant amount of work on the Brightwater project in 2008. Treatment plant and conveyance system construction accomplishments are summarized below.

2.1.1 Treatment Plant Construction

The 114-acre Brightwater Treatment Plant 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 2008 on these facilities are as follows:

- Completed site excavation and earthwork in preparation for tank and gallery foundations
- Completed concrete foundation bottom slabs and started walls for the grit, headworks, primary clarifiers, aeration basins, and galleries
- Completed foundations and started rebar installation and concrete work for the digesters and the Energy and Solids Building
- Installed underground utilities, piping for processes, and conduit for electrical and instrumentation control wiring
- Completed software graphical development for the treatment plant supervisory control system.

Figure 2-2 shows examples of the progress made at the treatment plant site in 2008.



Figure 2-2. Construction at Brightwater Treatment Plant Site

More information on the Brightwater Treatment Plant is available at <http://www.kingcounty.gov/environment/wtd/Construction/North/Brightwater/Activities/Construction/Treatment-Plant.aspx>.

2.1.2 Conveyance System Construction

The Brightwater conveyance system consists of pipes and facilities that will bring wastewater to and from the treatment plant, including a marine outfall where treated wastewater will be 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 (Figure 2-1).

Highlights of accomplishments in 2008 for each component are presented in the following sections.

More information on Brightwater conveyance system construction is available at <http://www.kingcounty.gov/environment/wtd/Construction/North/Brightwater/Activities/Construction.aspx>.

East Tunnel

The East Tunnel, or Brightwater Tunnel-1 (BT-1), consists of about 14,050 feet of 16.6-foot internal-diameter tunnel between the North Creek Portal in Bothell and the Brightwater Treatment Plant. The BT-1 TBM was launched from the North Creek Portal in September 2007, and excavation of the tunnel was completed in November 2008 (Figure 2-3). Remaining work to be completed includes installing four pipelines in the tunnel and filling the tunnel interior with concrete.

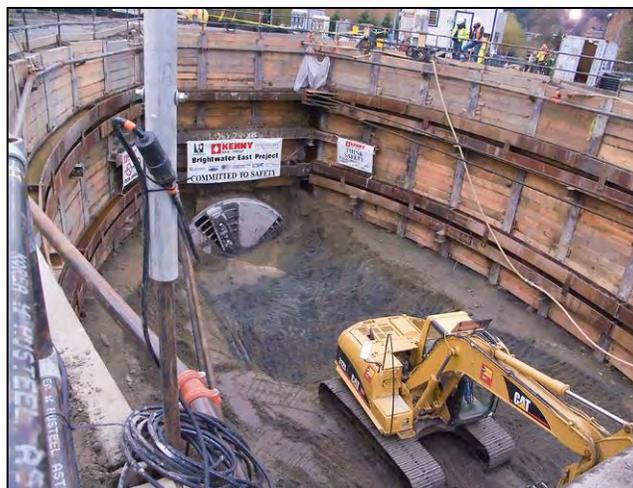


Figure 2-3. Tunnel Boring Machine Emerging at Brightwater Treatment Plant Site

Central Tunnel

The Central Tunnel consists of two 14.4-foot-internal-diameter tunnels: the eastbound and westbound tunnels.

The eastbound tunnel (BT-2) is 11,600 feet long, extending from the North Kenmore Portal to the North Creek Portal in Bothell. The BT-2 TBM was launched in September 2007. Approximately 56 percent (6,502 feet) of the tunneling was completed by the end of December 2008 (Figure 2-4).

The westbound tunnel (BT-3) is 20,100 feet long, extending from the North Kenmore Portal to the Ballinger Way Portal in Shoreline. The BT-3 TBM was launched in March 2008. Approximately 26 percent of the tunneling was completed (5,136 feet) by the end of the year.

Excavation of the Ballinger Way portal shaft was completed in summer 2008, and activities associated with lining the shaft continued through the remainder of the year. Construction of the Ballinger Way Portal is expected to be complete in early 2009.



Figure 2-4. Brightwater Tunnel-2

Progress on the Central Tunnel has gone slower than anticipated because of underground conditions. WTD is working with the contractors to develop alternatives to minimize potential systemwide impacts due to delays in the Central Tunnel schedule.

West Tunnel

The West Tunnel (BT-4) consists of 21,200 feet of 12-foot internal-diameter tunnel starting at the Point Wells Portal (Figure 2-5) in unincorporated Snohomish County and heading east to the Ballinger Way Portal in Shoreline. As part of the West Tunnel work, the 550 feet of 60-inch-diameter pipeline connecting the tunnel to the marine outfall was completed in the spring of 2008. This pipeline is also referred to as the marine outfall connector. The BT-4 TBM was launched in September 2008. Approximately 14 percent (2,900 feet) of the tunneling was completed by the end of the year.



Figure 2-5. Point Wells Portal

Marine Outfall

Construction of the marine outfall began in spring 2008 and was completed in December 2008. The 5,400-foot outfall extends from the end of the marine outfall connector to a depth of 600 feet in Puget Sound. The outfall begins onshore with 420 feet of 80-inch-diameter polyurethane coated and lined steel pipe. At approximately 80 feet of depth a Y-shaped segment splits the flow between two 63-inch-diameter concrete-weighted high density polyethylene pipes. The end of each outfall pipe consists of a 250-foot-long diffuser section designed to disperse effluent into Puget Sound.

The outfall pipes were assembled at a staging area in the Snohomish River at the Port of Everett and were towed 17-nautical-miles by tug boats to Point Wells (Figure 2-6). Workers attached the pipes to onshore connectors, lowered them in a controlled submergence 600 feet to the bottom of the Puget Sound, and then backfilled and removed sheet piles at the near-shore trench.



Figure 2-6. Towing of the Outfall Pipes

Influent Pump Station

The Influent Pump Station, located at the North Creek Portal, is designed to pump up to 130 mgd of wastewater to the Brightwater Treatment Plant. The pump station will be largely underground; odor control and other facilities at this site will be aboveground. Site preparation began in 2008. Completion of the pump station is scheduled for 2011.

Ancillary Facilities

Ancillary facilities are being constructed to incorporate Brightwater into the county's regional conveyance system. In 2008, odor control equipment, new generators, and electrical panels were installed at the Hollywood Pump Station; work began on the odor control facility at the North Creek Pump Station; and final design was under way on the North Kenmore and Ballinger Way odor control facilities.

2.2 Mitigation Activities

Mitigation refers to the various measures taken to address construction and operational impacts in communities that host a disruptive regional 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. Examples of mitigation measures include funding mitigation to address traffic impacts on local roadways, installing additional landscape plantings to buffer views, transferring land to local communities for public parkland after Brightwater construction is completed, and restoring salmon habitat. Highlights of progress made in 2008 on Brightwater systemwide mitigation are as follows:

- The City of Shoreline completed design of the Richmond Beach Pump Station Community Park.
- Snohomish County designed safety improvements for streets surrounding the treatment plant site.
- King County transmitted the final mitigation payment of \$16 million to Snohomish County according to the Settlement Agreement.
- All conditions of the City of Woodinville mitigation agreement were met, and the county transmitted \$1.9 million to the city.
- Brightwater received \$275,000 in state grant funds to complete design of the Energy Technology Demonstration Facility and construct the Environmental Education/Community Center (EECC) outreach and storage space.
- Contracts were awarded to Washington State nurseries to provide plant materials for the treatment plant site landscape.

A summary of the Brightwater systemwide mitigation package is available at <http://your.kingcounty.gov/dnrp/library/wastewater/wtd/construction/brightwater/docs/MID-doc-0601.pdf>.

2.3 Public Involvement Activities

King County places a high priority on involving affected residents and businesses and interested parties in the Brightwater project. Brightwater project staff continues to engage interested parties and keep them informed about construction-related activities, provide informational booths at community events, and hold events in the North Habitat Area at the treatment plant site.

Examples of public involvement activities in 2008 are as follows:

- **North Habitat Area events.** In May, community members were given the opportunity to tour the trails, native plant species, rebuilt stream corridors, and emerging wetlands habitat of the North Habitat Area. More than 50 people participated in the North Habitat Area tours.

In October, the county hosted an educational event for 160 students from the Lake Washington and Northshore School Districts. The students explored forest ecology, identified and catalogued freshwater insects, and tested water and soil samples. The event was organized by the county and Friends of the Hidden River, a community group of local teachers who have played an integral role in planning and securing funds for the EECC.

- **Construction site tours.** In 2008, Metropolitan Water Pollution Abatement Advisory Committee members and national and international visitors had the opportunity to view the progress of Brightwater construction and learn more about the project.

- **Information booths.** Brightwater staff set up information booths at community events, including the Richmond Beach Strawberry Festival, the Celebrate Woodinville event, and the Ballinger Neighborhood Walk and Fitness Fair.
- **Bulletins, newsletters, news releases, and responses to questions.** The Brightwater project team continued to respond to questions and comments from 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.

2.4 Schedule for 2009

Activities anticipated in 2009 for the Brightwater Treatment System are as follows:

- Accept delivery of process control equipment
- Complete construction of the electrical substation at the treatment plant site
- Complete most of the structural concrete work for the liquids, solids, and odor control process areas at the treatment plant and continue installation of mechanical and electrical systems in these areas
- Begin construction of the EECC
- Continue work on landscape areas at the treatment plant site
- Complete East Tunnel (BT-1) pipe installation
- Complete construction of the Ballinger Way Portal shaft
- Continue tunneling the Central Tunnel's eastbound tunnel (BT-2)
- Continue tunneling the Central Tunnel's westbound tunnel (BT-3)
- Continue tunneling the West Tunnel (BT-4)
- Begin construction of the Influent Pump Station
- Complete construction of ancillary facilities at the North Creek Pump Station.