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. These facilities are collectively termed the Brightwater System. Locations for these facilities were identified during a siting process that took place during 2000–2003.[1] The focus in 2004 was completing predesign, applying for permits, hiring new employees to carry out the design and construction phases of the project, and continuing to involve stakeholders and members of the public in the Brightwater design and permitting process. In 2005, the project team continued its permitting, design, and stakeholder involvement activities in addition to other activities such as purchasing properties and negotiating mitigation agreements with local jurisdictions.

This chapter briefly describes the Brightwater System, gives an overview and more detailed discussion of project accomplishments in 2005, and presents a schedule for 2006. For more information, visit the Brightwater project Web site at http://dnr.metrokc.gov/wtd/brightwater/

## 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. The tunnel will be constructed in three segments (east, central, and west) at the five portal sites shown in Figure 2-1.

[1] A summary of the Brightwater siting process was provided in the December 2003 *RWSP Annual Report*. This report can be accessed at http://dnr.metrokc.gov/wtd/rwsp/library.htm.

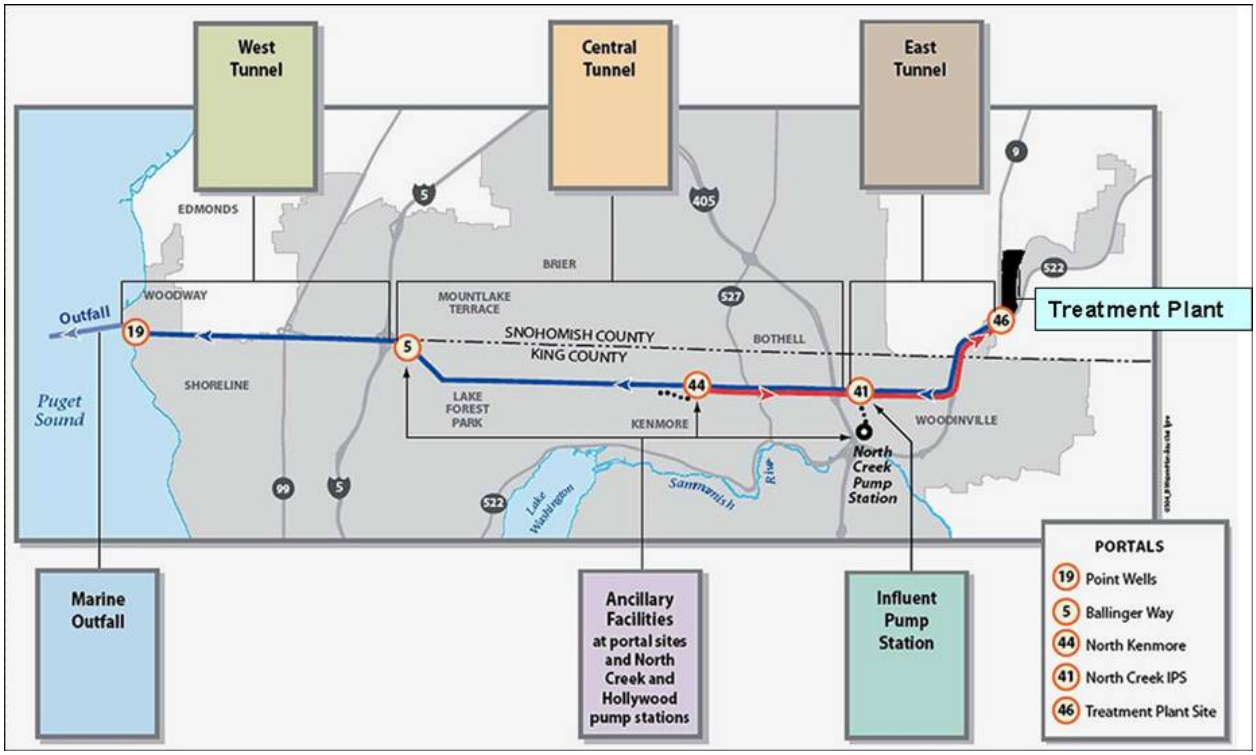


**Figure 2-1. Components of the Brightwater System**

## 2.2 Overview of 2005 Accomplishments

King County made substantial progress on the Brightwater project in 2005. The project is on schedule for completion in 2010. Milestones achieved in 2005 include the following:

- Prepared a supplemental environmental impact statement to evaluate potential environmental impacts that could result if an earthquake were to damage Brightwater facilities at the treatment plant site.
- Initiated final design on the treatment plant and conveyance system, including additional value engineering review.
- Secured agreements with property owners to purchase all 25 treatment plant parcels and acquire 92 percent of conveyance parcels and easements.
- Acquired nearly all major permits needed for construction.
- Continued to involve the public and stakeholders in the design and permitting processes.
- Developed and signed Project Labor Agreements with building and construction trades councils.
- Met the Metropolitan King County Council's provisos in the 2005 budget (monthly cost reports, baseline budget, hiring of oversight consultant).
- Incorporated a reclaimed water "backbone" into the design of the conveyance system.

- Negotiated mitigation agreements with Snohomish County and other affected jurisdictions.
- Developed a cost trend based on preliminary cost estimates for the treatment plant from the General Contractor/Construction Manager (GC/CM).[2]

## 2.3 Supplemental EIS

As required by the State Environmental Policy Act (SEPA), King County issued a Final Environmental Impact Statement (Final EIS) for the Brightwater project on November 19, 2003. In January 2004, an appeal was filed with the King County Hearing Examiner challenging the adequacy of the Final EIS. The Hearing Examiner ruled in August 2004 that the EIS was adequate to support the King County Executive's decision in December 2003 to build the Brightwater Treatment Plant on the Route 9 site north of Woodinville, a conveyance tunnel across north King County, and an outfall off Point Wells. This ruling was upheld in June 2005 by the King County Superior Court.

In the August 2004 ruling, the Hearing Examiner directed King County to excavate a trench on the northern portion of the Route 9 site to evaluate whether a suspected fault identified by the U.S. Geological Survey (Lineament 4) was active. If the fault was determined to be active, King County was further directed to prepare a supplemental environmental impact statement (Supplemental EIS) for the treatment plant site. The U.S. Geological Survey also postulated that a second fault trace, Lineament X, may exist in the southern portion of the Route 9 site, south of the proposed treatment plant facilities.

Examination of a trench dug in September 2004 indicated that Lineament 4 could be an active fault, even though it does not meet the International Building Code's (IBC) definition of an active fault.[3] King County prepared a Draft Supplemental EIS in accordance with the Hearing Examiner's direction. The Draft Supplemental EIS, issued in April 2005, analyzed the types and degrees of impacts that could result from a range of hypothetical worst-case scenarios involving a potential earthquake on Lineament 4 or Lineament X. King County also analyzed the highly unlikely possibility of a hypothetical fault between Lineaments 4 and X, even though no active faults are known to exist beneath the treatment plant structures. King County used the findings to redesign features of the plant and conveyance system. For example, the caustic and acidic chemical storage areas will be in different locations at the plant, flexible piping systems will be used, and safeguards will be incorporated to capture a spill in the stormwater system.

[2] GC/CM is an alternative project delivery method in which the contractor provides input into the design. During design, the owner and GC/CM negotiate a guaranteed maximum price for project construction. The GC/CM then manages construction and acts as general contractor.

[3] The IBC defines an active fault as one that has two qualities: a) an average historic slip rate of 1 mm/yr or more ***and*** b) geologic evidence of seismic activity within Holocene times. Earthquakes producing slip on the SWIF (including Lineament 4) have not occurred during historical time; therefore, the average historical slip rate is less than 1 mm/yr.

Conveyance pipelines will now have thicker walls and stronger joints, and the spaces around pipelines in the tunnel will be filled with grout to reduce potential leakage.[4]

King County received over 600 comments on the Draft Supplemental EIS from 26 agencies, organizations, and community members. The comments, while substantive, did not prompt any major changes to the analysis presented in the Draft Supplemental EIS. In July 2005, a Final Supplemental EIS was released that responded to comments and clarified certain points made in the draft analysis. The adequacy of the Final Supplemental EIS was subsequently appealed and the issue was unresolved as of December 2005.

The Brightwater Supplemental EIS is available on the Web at http://dnr.metrokc.gov/wtd/brightwater/env/seis.htm

## 2.4 Final Design

Following completion of predesign in October 2004, King County initiated the final design process on the various components of the Brightwater System. Final design involves the process of successively breaking down, analyzing, and designing the facility and its elements so that it complies with recognized standards of safety and performance. The design is then rendered in a set of explicit drawings and specifications that tell the contractors how to build the facility. The major activities associated with the final design process in 2005 are as follows:

- **Treatment Plant:** Completed 60 percent design, updated cost estimates, and value engineering workshops.
- **East Conveyance Tunnel:** Completed final design and contractor selection.
- **Central Tunnel:** Completed 90 percent design.
- **Influent Pump Station:** Completed 60 percent design.
- **West Tunnel:** Submitted 60 percent design for review.
- **Ancillary Facilities:** Submitted 60 percent design for review on North Creek facilities.
- **Marine Outfall:** Received approval for use of design-build contracting method; initiated bid process for design-build contractor.

In April 2005, the 60 percent design drawings for the treatment plant were used to develop an updated construction cost estimate. In an effort to ensure the reasonableness of this estimate, King County requested that URS, an engineering and design firm, and the treatment plant GC/CM prepare independent cost estimates. Each of these estimates indicated a significant upward trend from the construction cost anticipated during predesign. As a result, King County

[4] A subsequent technical memorandum released on October 27, 2005, evaluated the impacts of ground shaking and faulting on the East Tunnel, Portal 46, and the effluent drop structure associated with an earthquake along Lineament X (*Brightwater Conveyance Final Design Technical Memorandum; Scope Item 730.5 – Summary of Seismic Design for East Contract Conveyance*). In general, the memo concluded that while the conveyance system would sustain damage during an earthquake at Lineament X, it would maintain its serviceability and not undergo a catastrophic failure that would result in large negative impacts to the environment.

decided to suspend the design and conduct a series of value engineering workshops in summer 2005. During value engineering, participants review and challenge a project's design elements, including underlying assumptions and methodologies, to identify ways to improve performance, reliability, quality, and safety, and to reduce life-cycle costs. The workshops resulted in a set of recommendations that have the potential to reduce estimated plant costs by approximately $50 million. These recommendations are being incorporated into the final design of the Brightwater Treatment Plant.

## 2.5 Land and Right-of-Way Acquisition

Another significant effort in 2005 was the work involved with acquiring nearly all the parcels and easements needed to move forward with constructing the Brightwater System. As of December 2005, a team of King County staff had secured agreements with property owners to purchase all 25 of the treatment plant parcels, purchased two of the portal properties, and secured rights for possession and use of the remaining two portal properties. (One portal is on the treatment plant property.) In addition, the county acquired 92 percent of parcels/easements for the conveyance system (Table 2-1).

King County has pursued all property acquisitions with voluntary negotiations as the highest priority. Condemnation filing became necessary only once. Furthermore, the county has been able to stay under the overall budget for land acquisition.

**Table 2-1. Conveyance Easements**

| Tunnel Section | Easements | Easements Signed | Percent Signed |
|---|---|---|---|
| **East** | 22 | 19 | 86 |
| **Central** | 95 | 90 | 95 |
| **West** | 30 | 26 | 87 |
| **Total** | **147** | **135** | **92** |

## 2.6 Permitting

One of the primary activities undertaken by Brightwater project staff in 2005 has been working with federal, state, and local agencies to secure the permits necessary to develop and construct the Brightwater facilities. As a result of these activities, King County's Wastewater Treatment Division (WTD) received approval for all the required systemwide permits at the federal and state level in early 2005, including permits under Sections 404, 402, and 401 of the Clean Water Act and Section 7 of the Endangered Species Act. These permits regulate construction-related discharges to wetlands and surface water and impacts to endangered species and their habitat. In addition, WTD coordinated with all local agencies and jurisdictions to obtain the necessary demolition, grading, and building permits.

## 2.7 Public Involvement Activities

WTD continues to place a high priority on involving stakeholders and members of the public in the Brightwater design and permitting process. Over 30 meetings and briefings with residents, community leaders, and groups were held in 2005, including informational meetings for community members who live or work near the portal areas and treatment plant. Brightwater informational booths were available at several community fairs, festivals, and public events. A model of the preliminary design for the treatment plant was also available at some of these events.

Other public involvement activities in 2005 were as follows:

- **Public hearings.** WTD hosted a public hearing in May on the Brightwater Draft Supplemental EIS. A public hearing was also held in October on a proposed transfer of property and easements to the Washington State Department of Transportation and Snohomish County Public Utility District.
- **Education/Community Center Advisory Group.** Increased interest and support for an education/community center at the treatment plant site led to the formation of the Education/Community Center Advisory Group (ECCAG) in May. The ECCAG includes representatives from local jurisdictions, tribes, environmental groups, and educational groups. The group's purpose is to provide input on the design of the center.
- **Odor control system peer review.** In June 2005, WTD convened a peer panel of national odor control experts to review Brightwater's proposed odor control system and to comment on odor control alternatives that had been generated during value engineering workshops. The panel also provided advice on longer term odor control monitoring, formation of an odor control advisory board, and use of an odor control reserve fund. Panelists concurred that the odor control system will meet the goal of no detectable odors at the property line and offered recommendations to reduce costs of the system without compromising this goal. Representatives from nearby jurisdictions and sewer districts attended the panel sessions as observers.
- **Bulletins, newsletters, news releases, and responses to questions.** The Brightwater project team continues to respond to questions and comments received on the project from property owners, jurisdictions, neighbors of future facilities, and the general public. In addition, the team produced project newsletters, bulletins, and news releases to keep people informed about project activities.

## 2.8 Project Labor Agreements

In June and July 2005, the Metropolitan King County Council approved the use of project labor agreements (PLAs) to construct the Brightwater System. Both Washington State criteria and King County policies support the use of PLAs for projects that will extend for a long period of time; involve a substantial number of contractors, subcontractors, and trades and craft workers; have a large dollar value; and provide public benefit.

The Brightwater PLAs were negotiated between and agreed to by the King County Department of Natural Resources and Parks, the Northwest Washington Building and Construction Trades Council, the Seattle/King County Building and Construction Trades Council, and the Washington State Building and Construction Trades Council. The agreements establish labor terms and general work rules for the entire Brightwater construction period and will help to avoid potential disruptions from strikes, lockouts, or slowdowns. The Brightwater PLAs will also do the following:

- Ensure that small non-union contractors can effectively compete for work on the Brightwater project
- Set goals for achieving broad representation of women, minority, and disadvantaged business enterprises and workers in the Brightwater workforce
- Help provide and maintain a highly trained construction work force in the Puget Sound region
- Include provisions for safe working conditions and employee compliance with all safety rules
- Ensure that all workers are paid a livable wage and receive health, welfare, and retirement benefits

## 2.9 2005 Budget Provisos

The King County Council's adopted 2005 budget included two provisos related to the Brightwater project. The first required WTD to hire a consultant to provide independent oversight and monitoring of the design of the Brightwater System. The second proviso required WTD to develop a reporting format and a baseline budget for the project. King County's actions in 2005 related to each proviso are summarized in the following sections.

### 2.9.1 Oversight Monitoring Consultant

On March 10, 2005, WTD retained R.W. Beck as the oversight and monitoring consultant (OMC) for the Brightwater project. The budget proviso requires the OMC to provide to the executive, council, and Brightwater project representatives the results of an initial comparison of the scope, schedule, budget, and distribution of budget categories of the project with other projects of similar scope and scale or industry standards. The proviso further requires the OMC to review the scope, schedule, and budget for 30, 60, 90, and 100 percent design submittals.

The findings of the initial comparison were documented in June 2005 in the *Brightwater Project Overview Report* (POR). The OMC presented these findings to the Regional Water Quality Committee (RWQC) in July and the council's Budget and Fiscal Management (BFM) Committee in August. Brightwater staff incorporated a number of suggestions from the POR into the Brightwater design process. The OMC completed a number of design reviews in 2005—the East Tunnel (60 and 90 percent), the Central Tunnel (60 percent), and the treatment plant (60 percent)—and reported the findings to the RWQC and BFM. The OMC also provided insight to

project staff on the GC/CM contracting method and on overall design and construction considerations. To continue this beneficial relationship, King County will extend the scope of the OMC to oversee construction activities in 2006.

In addition to the OMC, the council and executive audit services provided direction on the management of design and construction contracts. This effort will continue in 2006.

### 2.9.2 Brightwater Reporting Format and Baseline Budget

Another 2005 budget proviso required WTD to develop a monthly management and budget reporting format for the Brightwater project that was modeled after formats in use for other large capital improvement projects in the region. The proviso also required WTD to submit a proposed baseline budget for the Brightwater program based on the proposed budget reporting format and the October 2004 predesign estimate. The baseline budget—once approved by council—would then serve as a performance measurement planning tool for the Brightwater program.

In February 2005, WTD transmitted monthly reporting and budget formats and a baseline budget to the council. The baseline budget, derived from the October 2004 predesign estimates, showed the expected cost of the Brightwater project, by year, for the life of the project. Future costs were presented in 2004 dollars and with inflationary adjustments of three and five percent. The council approved the monthly report format and baseline budget via Motion 12189 in August 2005.

## 2.10 Reclaimed Water Backbone

During 2005, King County developed the concept of a reclaimed water "backbone"—a dedicated reclaimed water pipeline located within the Brightwater conveyance tunnel. Starting in 2011, the backbone will convey Class A reclaimed water produced at the Brightwater Treatment Plant to the Sammamish Valley and to potential customers along the conveyance tunnel.[5] This concept solidified as a result of negotiations with the Washington State Department of Ecology (Ecology) on the *Brightwater Facilities Plan* (finalized in May 2005 and approved by Ecology in June 2005). The backbone will provide widely available high quality reclaimed water for meeting the competing—and increasing—demands on the region's future water supply. The County Council approved the project cost of $26 million in November 2005 as part of the WTD's 2006 budget.

[5] "Class A Reclaimed Water" is reclaimed water that, at a minimum, is at all times an oxidized, coagulated, filtered, and disinfected wastewater. Allowed end uses of Class A reclaimed water are irrigation of food and non-food crops and irrigation of open access areas, such as parks. The water could also be used for industrial cooling and process water and other non-drinking-water (non-potable) uses.

# 2.11 Mitigation

The county's goal is to construct regional wastewater facilities that enhance the quality of life in the region and in the local community. As part of the adopted RWSP, the County Council established mitigation policies to address systemwide impacts of construction and operation of WTD facilities and to create attractive facilities that complement surrounding neighborhoods. The policies stipulated that funds set aside for mitigation of impacts will be at least 10 percent of the costs associated with new facilities.

For Brightwater, the county worked with each jurisdiction, agency, and tribal government that would be affected by project construction and operation to negotiate formal mitigation agreements. By the end of 2005, nearly all the mitigation agreements were negotiated and signed.

## 2.11.1 Snohomish County Agreement

In late 2005, King County reached an agreement with Snohomish County to mitigate short- and long-term impacts of the Brightwater facilities in Snohomish County. The $70 million agreement included $30 million for parks improvements, $26 million for pedestrian and bicycle paths, and $11 million for habitat mitigation and conservation in the Little Bear Creek watershed. King County will also provide free use of an educational and community center at the treatment plant for Snohomish County government and nonprofit agencies if they provide services at the center that benefit the public ($3 million). The mitigation agreement also identifies procedures and timelines for the review and issuance of Brightwater permits in order to reduce the uncertainty associated with the permitting process. In addition to the agreement, King County has been working with communities in Snohomish County on developing design guidelines, constructing the education center, landscaping, and open space at the treatment plant site.

## 2.11.2 Other Mitigation Agreements

King County has reached mitigation agreements to address systemwide impacts of construction and operation of Brightwater facilities. In 2005, agreements were reached with the City of Shoreline, City of Kenmore, City of Bothell, City of Woodinville, Lake Forest Park Water District, Cross Valley Water District, Bothell Business Park, Suquamish Tribe, and the Muckleshoot Indian Tribe.

More information on the Brightwater mitigation package and the specific agreements are available on the Web at http://dnr.metrokc.gov/wtd/brightwater/mitigation/

# 2.12 Cost Trend Report

In December 2005, King County developed a Brightwater cost trend as part of an ongoing effort to keep decision-makers and stakeholders informed about the Brightwater project. A report on the cost trend was released in March 2006. The report identifies current trends, market

conditions, and design refinements as of December 2005 that could potentially affect the final cost of the Brightwater project.

The 2005 trend estimated the potential cost of the Brightwater project to be about $1.621 billion, as shown in Table 2-2. This amount is approximately $138 million over the October 2004 predesign cost estimate of $1.483 billion. One significant factor contributing to the increase was inflation, including contractor markups, which contributes about $61 million to the overall increase. Another factor was mitigation costs, which increased by about $50.5 million to accommodate additional mitigation to Snohomish County. The remainder of the increase was largely due to scope and pricing refinements on the treatment plant, along with corresponding increases in sales taxes and allied costs. The increases were partially offset by decreases in conveyance and land costs, which fell by about $37 million and $1.4 million, respectively, compared to predesign.

**Table 2-2. Summary of Current Brightwater Cost Trend Estimates[a]**

| Brightwater Component | Oct. 2004 Predesign Estimate (2004$ x 1M)) | Dec. 2005 Trend Estimate (2004$ x 1M)) | Difference over/(under) (2004$ x 1M) | Dec. 2005 Trend Estimate (2005$ x 1M) | 2005 Trend minus 2004 Predesign[b] (2005$ x 1M) |
|---|---|---|---|---|---|
| Treatment Plant | $426.4 | $515.9 | $89.4 | $529.4 | $102.9 |
| Conveyance | $869.7 | $832.7 | ($34.1) | $852.9 | ($16.9) |
| Land/ROW | $98.9 | $97.5 | ($1.4) | $97.8 | ($1.1) |
| Mitigation | $88.0 | $138.5 | $50.5 | $140.9 | $52.9 |
| **Total** | **$1,483.1** | **$1,584.6** | **$101.5** | **$ 1,620.9** | **$137.9** |

[a] Costs are in millions of dollars; totals may not add due to rounding.
[b] Includes inflation since October 2004.

## 2.13 Schedule for 2006

Table 2-3 shows the major accomplishments expected in 2006 for each of the main components of the Brightwater project.

**Table 2-3. Anticipated Accomplishments of the Brightwater Project in 2006**

| 2006 Accomplishment | Anticipated Completion |
|---|---|
| **Treatment Plant** | |
| Advertise bids for North Mitigation Area (NMA) | March |
| Advertise bids for site preparation construction | April |
| Receive plant site preparation grading permit | April |
| Issue Notice to Proceed (NTP) for NMA and plant site preparation construction | May |
| Complete demolition on treatment plant site | May |
| Begin site preparation | May |
| 90 percent design submittal | May |
| Submit building permit package | June |
| 100 percent design submittal | October |

| 2006 Accomplishment | Anticipated Completion |
|---|---|
| Receive treatment plant grading permit | November |
| **East Tunnel** | |
| Receive grading/noise permits for Portal 46 | January |
| Issue NTP for East Tunnel construction | February |
| **Central Tunnel** | |
| Complete 100 percent design | January |
| Advertise bid for Central Tunnel construction | January |
| Issue NTP for Central Tunnel construction | July |
| **West Tunnel** | |
| Receive building/grading/right-of-way permits for Portal 19 | May |
| Complete 100 percent design | July |
| Advertise bid for West Tunnel construction | July |
| **Influent Pump Station** | |
| Complete 90 percent design peer and constructability review | January |
| Complete 100 percent design | September |
| Advertise bid for construction | September |
| **Marine Outfall** | |
| Issue NTP for consultant construction management contract | May |
| Advertise for design-build contractor | July |
| Receive contractor statement of qualifications; review of statements of qualifications, and develop shortlist of contractors | October |
| **Ancillary Facilities** | |
| 90 percent design for North Creek facilities | June |
| Complete 100 percent design of North Creek facilities | August |