Chapter 2

Treatment Plant Policies

The RWSP treatment plant policies are intended to guide King County in providing wastewater treatment at its existing plants and in expanding treatment capacity through the year 2030. The treatment plant policies include direction on providing secondary treatment and treatment beyond that level to meet water quality standards and other water quality, reclaimed water, or regulatory goals. The policies call for building the Brightwater Treatment Plant to meet the wastewater capacity needs of the northern portion of the county's wastewater service area, expanding the South Treatment Plant to meet future capacity needs in east and south King County, and reserving capacity at the West Point Treatment Plant to handle future needs associated with flows from Seattle and efforts to control combined sewer overflows. The policies also provide direction on complying with the West Point Settlement Agreement, meeting the county's odor control goal to prevent and control nuisance odor occurrences, and producing and using reclaimed water at its existing and future treatment plants.

This chapter provides an overview on implementation of the RWSP treatment plant policies from 2004 through 2006. In accordance with RWSP reporting policies, this chapter includes a summary of the activities carried out in 2006 related to construction of the Brightwater, Carnation, and Vashon treatment plants. The chapter concludes with summary information on King County Council adopted amendments to the RWSP treatment plant policies.

The complete text of all the treatment plant policies, including information on policy amendments and a summary of how each policy was implemented in 2004–2006, is provided in Appendix A.

2.1 Implementation of Treatment Plant Policies from 2004 through 2006

This section provides information on the activities, programs, and projects carried out in 2004–2006 to implement RWSP treatment plant policies.

2.1.1 Meeting Treatment Level Requirements and Goals

The RWSP treatment plant policies include direction to provide secondary treatment and consider treatment beyond that level to meet water quality standards and other water quality, reclaimed water, or regulatory goals.

The county's regional wastewater treatment plants, South plant in Renton and West Point plant in Seattle, continue to function as activated sludge secondary treatment plants. The South plant

has provided secondary treatment since its construction in 1965 and West Point plant has been providing secondary treatment since 1996.

In 1999, King County assumed ownership and operation of the Vashon Treatment Plant, which is an oxidation ditch secondary treatment plant. In 2004, construction began on major upgrades to increase capacity and enhance the facility's backup systems to ensure the facility meets or exceeds permit limits. Construction on the plant upgrades was complete in fall 2006. More details on the Vashon upgrade activities in 2006 are provided later on in this chapter.

Reclaimed water is produced at the West Point and South plants for on-site landscaping and in-plant processes. Some of the reclaimed water produced at South plant is distributed off-site as an irrigation source for nearby sports fields at the City of Tukwila's Fort Dent Park, a wetland plant nursery, and habitat restoration efforts. Reclaimed water will be produced at the future Brightwater and Carnation treatment plants. The county will be using membrane bioreactor technology (MBR) at these plants, which will result in treated wastewater that is seven to ten times cleaner than typical secondary treated wastewater. MBR systems can produce Class A reclaimed water, which meets strict standards of the Washington State Departments of Ecology and Health for use in non-drinking purposes.[1] Information on implementing RWSP water reuse policies is provided in Chapter 7.

2.1.2 Meeting Treatment Capacity Needs at Existing and Future Facilities

The RWSP provides policy guidance to ensure the county meets wastewater capacity needs through 2030 and beyond. The treatment plant policies call for the construction of the Brightwater Treatment Plant, future expansion of the South Treatment Plant, and reservation of capacity at the West Point Treatment Plant in the event of higher than anticipated population growth or needs associated with the combined sewer overflow control program.

Brightwater Treatment Plant

King County is building the Brightwater Treatment Plant, the county's third regional treatment plant, to meet the region's wastewater capacity needs in the northern portion of the county's wastewater service area. The Brightwater plant is on schedule for completion in 2010. Activities in 2004 focused on completing predesign, applying for permits, organizing staff to carry out the design and construction phases of the project, and continuing to involve stakeholders and 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. In 2006, final design was completed and construction began on the treatment plant. More details on the Brightwater Treatment Plant activities in 2006 are provided later on in this chapter. Details on the 2004 and

[1] "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.

2005 activities were documented in the 2004 and 2005 RWSP annual reports.[2] Information on Brightwater conveyance is provided in Chapter 3.[3]

Carnation Treatment Plant

In 2002, the King County Council amended the *Comprehensive Water Pollution Abatement Plan* and added the City of Carnation to the county's wastewater service area. The City of Carnation decided to replace on-site septic systems with a new wastewater treatment facility and collection system to better protect public health and the environment, achieve the city's comprehensive plan goals, and maintain and enhance community livability. The city will design and build the local wastewater collection system and has contracted with King County to design, build, operate, and maintain a new treatment plant and associated discharge facilities.

Activities in 2004 focused on preparing and completing the Carnation plant Final Environmental Impact Statement and selecting the treatment plant site. The focus in 2005 was on design and permitting activities, completion of a facilities plan for submittal to the Washington State Department of Ecology (Ecology), and progress on discharge options. In 2006, final design was completed and construction began on the treatment plant. The project is scheduled for completion in 2008. More details on the Carnation plant activities in 2006 are provided later on in this chapter. Details on the 2005 activities were documented in the *RWSP 2005 Annual Report*.

South Treatment Plant

To meet the projected growth in the southern and eastern portion of the wastewater service area, the RWSP calls for expanding the South Treatment Plant in 2029. The *2004 RWSP Update* noted that the South plant expansion may need to be accelerated to 2023 and that re-rating the plant to maximize the use of existing facilities was being evaluated. (Facility re-rating is the practice of evaluating a facility or unit treatment process to determine if it is possible to operate the facility at a higher capacity than the original design capacity and includes identifying needed capital improvements such as pumps, pipes, or odor control facilities.) A South plant capacity and re-rating evaluation was completed in 2004. Updated population projections (2003 Puget Sound Regional Council forecast by traffic analysis zones) and a 10 percent water conservation assumption by 2010 were then applied to update flow projections to South plant. Based on these projections and available capacity at South plant, taking into account the online date for Brightwater, it is projected that South plant will have capacity until 2023, at which point re-rating of unit processes could be implemented to provide additional capacity instead of doing a major expansion at that time. Expansion would then occur in 2029 as originally planned.

The county will continue to review future updated population projections and water conservation assumptions. Based on future information, the projected dates for re-rating or expansion of South plant could change.

[2] RWSP annual reports are available on the RWSP library Web site at http://dnr.metrokc.gov/wtd/rwsp/library.htm
[3] The Brightwater conveyance system includes the pipes and facilities that bring influent to the Brightwater plant and effluent from the plant to a marine outfall for discharge to Puget Sound. The system consists of approximately 14 miles of pipelines to be constructed in underground tunnels in north King County.

2.1.3 Complying with West Point Settlement Agreement

RWSP Treatment Plant Policy (TPP)-3 reconfirms the county's commitment to the West Point Settlement Agreement that was established in 1991. A significant provision of the agreement was completed in March 2006, when the King County Council approved Ordinance 15391, authorizing payment of $5.3 million to the City of Seattle in satisfaction of Section 1(d) of the agreement. This section requires the county to investigate alternative technologies that have the potential to remove digesters from the West Point Treatment Plant site, and if no alternatives could be implemented by December 31, 2005, King County agreed to pay an amount established via the agreement to the City of Seattle for deposit in the city's Shoreline Park Improvement Fund.

In December 2000, after a thorough process to assess technologies, the Applied Wastewater Technologies Citizens Advisory Committee, consisting of settlement agreement parties and other stakeholders concluded that an appropriate technology to replace the digesters at the West Point plant is not currently available. Therefore, the digesters could not feasibly be removed. The county concurred with this assessment. As a result, in accordance with Motion 11288, which was approved by the King County Council in September 2001, the King County Executive convened a West Point Citizens Advisory Committee (WPCAC) to develop recommendations for improvements to Discovery Park under the terms of the West Point Settlement Agreement.

The WPCAC finalized a recommended project list in May 2005, and in accordance with Ordinance 15391, King County and the City of Seattle signed a memorandum of agreement (MOA) in March 2006 regarding the transfer and expenditure of the funds. The MOA confirmed that the funds would be used exclusively for improvements to Discovery Park consistent with the Discovery Park Master Plan as directed by the Settlement Agreement. The MOA also directs the City of Seattle to establish a Citizens Oversight Committee to review progress made on the expenditure of the funds.

2.1.4 Preventing and Controlling Odors

RWSP TPP-4 provides guidance to prevent and control nuisance odor occurrences at the county's regional treatment plants and associated conveyance facilities. The direction provided in TPP-4 was established in 2003 via King County Council adoption of Ordinance 14712. The ordinance includes retrofitting existing treatment and conveyance facilities in a phased manner to control the most significant potential odor sources first. The goal is for the county's existing treatment facilities to meet the odor control levels that are considered best in the country for existing treatment facilities of a similar size. The policy also calls for new regional treatment facilities to be constructed with odor control systems that are designed to meet the odor prevention level that reflects the best in the country for new facilities of similar size. In addition, the policy calls for development of a comprehensive odor control and prevention monitoring program.

This section provides information on implementation of TPP-4 and the status of the odor prevention program in 2006. In accordance with RWSP reporting policies, the summary of odor complaints in 2006 is provided in Appendix N.

Phased Retrofit of the West Point and South Treatment Plants

The odor control policies in TPP-4 include implementation of phased improvements at the West Point and South treatment plants to control the most significant potential odor sources first, monitor improvement effectiveness, determine if additional improvements are required, and plan and implement additional improvements if necessary. To meet this direction, the Wastewater Treatment Division (WTD) implemented projects at both plants.

At the West Point plant, improvements include covering the division channel and modifications to the odor scrubber system (Figure 2-1). The improvements to the division channel ventilation system were completed in 2005. As a result of these improvements, fugitive odor emissions (odors that escape collection and treatment systems) have been reduced. Modifications to the odor scrubber system were completed in early 2007. WTD will evaluate the effects of these improvements through 2008 to determine if they meet the odor control goal for existing facilities.

Figure 2-1. Primary Process Odor Scrubbers at West Point Treatment Plant

At South plant, WTD has completed final design of covers for each first pass of the four aeration basins and of covers for the return activated sludge channel (Figure 2-2). Installation of the covers began in 2006 and is expected to be complete by the end of 2007. Because the aeration basins need to be taken out of service while the covers are installed, delays in the project schedule are possible. The amount of time that the aeration basins can be off-line depends on wet-weather flow volumes.

Figure 2-2. Aeration Basin and Returned Activated Sludge Channel at South Treatment Plant

Conveyance System Odor Control Improvements

RWSP TPP-4 calls for retrofitting conveyance facilities that pose nuisance odor problems with odor prevention systems as soon as such odors occur, subject to technical and financial feasibility. Table 2-1 lists the projects that are under way or planned to improve odor problems in the county's existing conveyance system. The table also includes information on the type of control technology planned and anticipated completion dates.

Table 2-1. Conveyance System Upgrades with Odor Control Components

Facility	Odor Control Technology	Anticipated Completion Date
Hidden Lake Pump Station	Carbon bed odor scrubber & chemical injection	4th quarter 2008
Kenmore Lakeline	Carbon bed odor scrubber & chemical injection	4th quarter 2008
Lake City Regulator Station	Replacement of phoenix/carbon scrubber with bioscrubber	4th quarter 2009
University Regulator Station	Carbon bed odor scrubber	3rd quarter 2007
Interbay Pump Station	Carbon bed odor scrubber	4th quarter 2010
King Street Regulator Station Odor Control	Carbon bed odor scrubber	4th quarter 2008
53rd Avenue Pump Station	Carbon bed odor scrubber	3rd quarter 2008
Juanita Bay Pump Station	Carbon bed odor scrubber & chemical injection	2nd quarter 2008
Kirkland Pump Station	Carbon bed odor scrubber	4th quarter 2009
Bellevue Pump Station	Carbon bed odor scrubber & chemical injection	4th quarter 2008
Eastside Interceptor	Chemical (nitrate) injection	4th quarter 2007
Soos Creek Pump Station & Pipeline	Carbon bed odor scrubber & chemical injection	4th quarter 2020

Brightwater Odor Control

RWSP TPP-4 directs the county to construct odor control systems for new regional treatment plants that are designed to meet the "best in the country for new facilities" level, described in Attachment A to Ordinance 14712.[4] Brightwater's odor control system is being designed to meet this level and ensure there are no detectable odors from the Brightwater Treatment Plant.

To remove odors, air will be collected from the covered process units, enclosed buildings, and loading areas and then routed to the odor control systems. All treatment process units will be covered and buildings that house the headworks and solids handling equipment will be fully enclosed.[5] Odors from these facilities will be absorbed and neutralized through a multistage treatment process that includes the use of biological, chemical, and carbon odor scrubbers.

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. 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.

Comprehensive Odor Control and Prevention Monitoring Program

In December 2006, WTD completed the *Odor and H_2S Corrosion Control Plan*. This plan describes the odor control and prevention monitoring program's goals and strategic approach to reducing or preventing odors and corrosion of the county's wastewater facilities. It also identifies points in the system where odor or corrosion problems are occurring, describes the source of the problems, and provides information on projects that are under way to address these problems. The plan will be updated as necessary.

WTD carries out ongoing efforts to control odors and corrosion in the wastewater system. Staff routinely monitors and inspects the existing system to identify problems, determine the source, analyze the cause, and develop solutions to the problems. Tracking, reviewing, and responding to odor complaints is a key component in identifying and determining the source of an odor problem. People can report an odor problem 24 hours per day via the South plant's or West Point plant's odor control hotlines. In addition, a sign with a telephone number to report problems or complaints is posted at each pump station, regulator station, and combined sewer overflow treatment plant. Information about how to report an odor problem is also available on the King County Web site at http://dnr.metrokc.gov/wtd/odorcontrol/complaints.htm. The goal is for a staff member to respond within two hours of receiving a complaint. A record is kept of all odor complaints and investigations as well as any corrective actions taken or needed.

[4] Ordinance 14712 and accompanying attachment is available on the King County Council's legislation site at http://mkcclegisearch.metrokc.gov/detailreport/?key=4469

[5] Headworks refer to the facilities where wastewater enters a wastewater treatment plant.

Near Facility Neighbor Surveys

The RWSP calls for the use of near facility neighbor surveys as part of the efforts to monitor, control, and prevent odors. Surveys of businesses and residents that are near neighbors of the South and West Point plants are carried out on an annual basis. The survey asks several questions relating to awareness and impacts of the treatment plant, such as noise, traffic, and odors, and on whether the plants are good neighbors. Survey respondents have the opportunity to provide specific suggestions on how county facilities can be a better neighbor. The surveys provide important information to WTD on neighbor's issues and concerns as well as important feedback on how the division is meeting its goals to be a good neighbor and control and prevent odors.

The 2006 near neighbor survey found that 77 percent of Magnolia residents said they do not experience negative impacts from the treatment plant; about 89 percent of Magnolia businesses said they do not experience noticeable impacts. Residents and neighbors said the two top priorities for the plant should be exploring new methods of odor control and responding to complaints within 24 hours. These are the same items listed as the two top priorities in previous years' surveys.

Regarding South plant, the survey found that 73 percent of Renton residents said they do not experience negative impacts from the treatment plant; about 86 percent of Renton businesses said they do not experience negative impacts. Residents and businesses said that the two top priorities for the plant should be exploring new methods of odor control and responding to complaints within 24 hours. Awareness of the wastewater treatment plant has strongly increased among Renton businesses. Furthermore, the percentage of both businesses and residents in Renton saying that King County has been a good neighbor has increased from previous years' surveys.

For more information on King County's Odor Control Program, visit the program's Web site at http://dnr.metrokc.gov/wtd/odorcontrol/

2.2 2006 Annual Report Activities of Treatment Plant Projects in Design and Construction

The RWSP reporting policies require the RWSP comprehensive review to include all elements of the RWSP annual report, replacing the annual report for the years that the comprehensive review report is produced. The RWSP annual report provides information on RWSP capital projects in design and construction. This section meets the 2006 annual report requirements for the Brightwater, Vashon, and Carnation treatment plants.

2.2.1 Brightwater Treatment Plant

The RWSP calls for the construction of a new regional wastewater treatment plant and conveyance system in the northern portion of King County's wastewater service area, which includes portions of north King and south Snohomish counties, by the year 2010. The locations of the Brightwater facilities are shown in Figure 2–3.

The Brightwater 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 an average of 36 million gallons per day (mgd) of wastewater, with room for a planned expansion in 2040 to 54 mgd. In addition to the treatment plant, the Brightwater system includes approximately 14 miles of conveyance 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) as shown in Figure 2-3.

This section focuses on the activities and accomplishments in 2006 related to construction of the Brightwater Treatment Plant. Information on the activities and accomplishments in 2006 related to the construction of Brightwater conveyance is provided in Chapter 3.

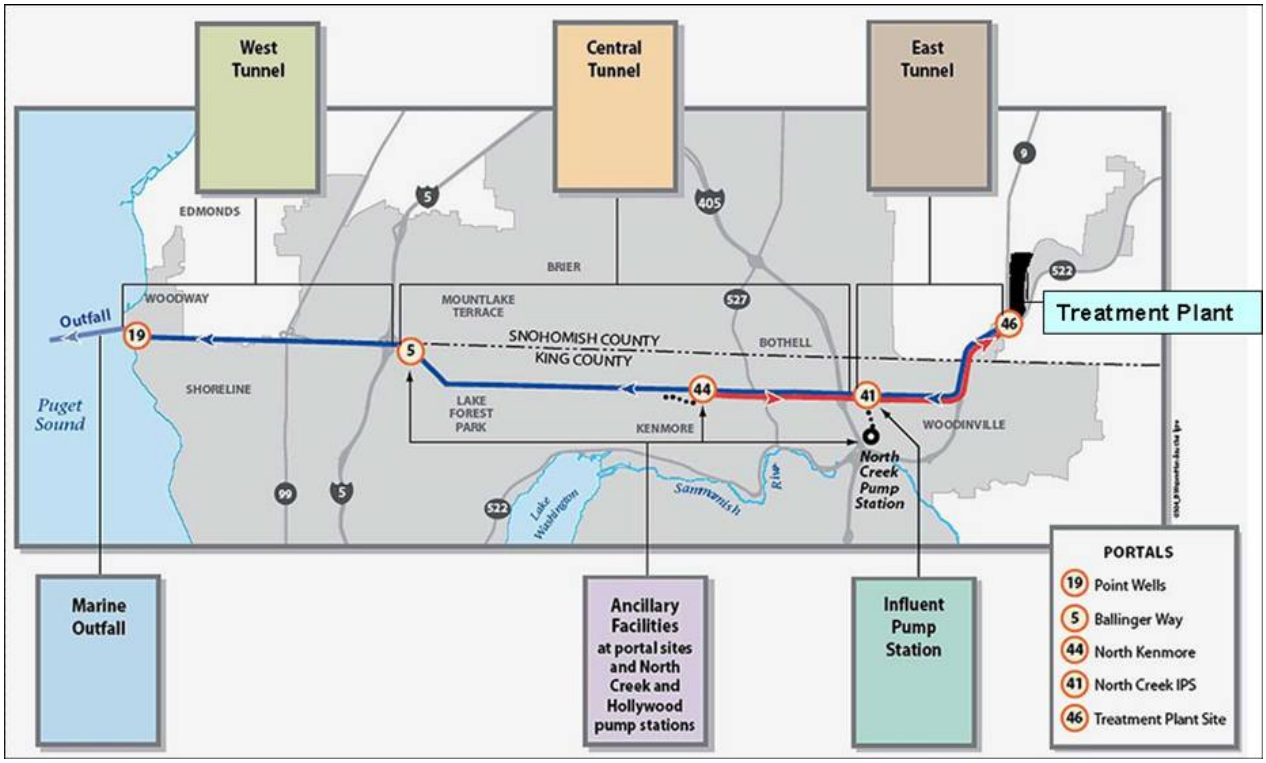

Figure 2-3. Components of the Brightwater System

Overview of 2006 Accomplishments

King County made substantial progress on the Brightwater project in 2006. The project is on schedule for completion in 2010. Highlights of Brightwater Treatment Plant milestones achieved in 2006 are as follows:

- **Activities related to Development and Mitigation Agreements with Snohomish County.** In accordance with the Development Agreement with Snohomish County that was established in December 2005, King County excavated seismic trenches in June, July, and August 2006 to assess whether there are earthquake faults at the proposed locations of two chemical storage buildings at the Brightwater Treatment Plant site. Results of this investigation indicated no evidence of active faults. In December 2006, Snohomish County issued a letter to King County accepting the seismic trenching and design reports, acknowledging that King County satisfied the seismic investigation and construction standards of the Development Agreement, and concluded that assumptions and design parameters for the treatment plant site are in compliance with 2003 International Building Codes.

  The Snohomish County mitigation agreement authorized payments in exchange for a predictable timeline of permit approvals, with the first payment to be made 60 days following the resolution of all appeals associated with the Snohomish County Binding Site Plan Permit. In November 2006, King County delivered the first payment of $33.5 million in mitigation funding to Snohomish County. This funding will be spent on park projects, pedestrian and bike improvements, trails, and fish habitat preservation projects.

- **Treatment Plant Design.** In December 2006, the county completed review of the 100 percent design documents, which included 33 volumes of plans, specifications, and equipment lists.

- **Preparations for treatment plant construction.** In preparation for construction, activities at the treatment plant site in 2006 included mass grading and removal of contaminated soil, installation of dewatering equipment, installation of temporary stormwater systems and erosion control measures, effluent drop structure construction, and placement of yard piping. Figure 2-4 depicts the construction of the effluent drop station and treatment plant site preparation as of October 2006.

Figure 2-4. Effluent Drop Structure Construction and Treatment Plant Site Preparation

- **Construction of the North Mitigation Area.** As part of Brightwater mitigation, the northern 43 acres of the treatment plant site are being enhanced to provide salmon habitat and a reforestation area that will be accessible to the public via trails and boardwalks. Activities in 2006 included construction of the stream beds, boardwalks, hills, and trails. Figure 2-5 depicts construction of the north mitigation area as of October 2006.

Figure 2-5. North Mitigation Area Construction

- **Permitting.** Much progress was made regarding the issuance of permits needed to construct the Brightwater Treatment Plant. Permits issued by Snohomish County in 2006 are as follows:
    - A permit relating to the construction of the north mitigation area was issued in February.

- The Site Grading Permit and Right-of-Way Use Permit for plant site preparation was issued in April.
- The Binding Site Plan Permit was issued in May.
- A Treatment Plant Portal Grading Permit was issued in June.
- A Building Permit was issued in August for the lower pond overlook, which is part of the north mitigation area.
- The Site Development Grading Permit was issued in November.

The Cross Valley Water District issued final approval for the north mitigation area water line in June. The Washington State Department of Transportation issued the General Permit for Matching Grades between State Route 9 and the Brightwater plant site and a Developer Access Permit in October. The Developer Access Permit establishes permanent access points to the Brightwater site to accommodate the long-term needs of the finished facility.

In addition, WTD submitted the Air Quality Permit application to the Puget Sound Clean Air Agency in July. The remainder of the building permits for treatment plant construction are scheduled to be issued in spring 2007.

- **Public Involvement.** WTD continues to place a high priority on involving stakeholders and members of the public in Brightwater design, permitting, and construction. Over 35 meetings and briefings with residents, community leaders, and groups were held in 2006, including informational meetings and open houses 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 design for the treatment plant was also available at some of these events.

  A groundbreaking ceremony took place in April 2006 to celebrate the start of construction on the Brightwater project and to thank all of the jurisdictions, consultants, contractors, and individuals who have been a part of the project through planning, siting, design, permitting, and now construction.

  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.

  Community interest and support for an education/community center at the treatment plant site continued to be facilitated by the Education/Community Center Advisory Group (ECCAG) organized in mid-2005. The ECCAG included representatives from local jurisdictions, tribes, environmental groups, and educational groups. The group's purpose was to provide input on the design of the center and a final design was unveiled in late 2006.

- **Brightwater Monthly Project Reports.** In accordance with RWSP reporting requirements, WTD continues to submit Brightwater monthly project reports to the King

County Council in the format that was approved in August 2005 via Motion 12189. This report includes information on project issues, schedules, expenditures, and a status of the project's contracts associated with the Brightwater Treatment System.

- **Brightwater Oversight Monitoring Consultants.** In accordance with the King County Council adopted 2005 budget ordinance, WTD retained R.W. Beck as the oversight monitoring consultant (OMC) for the Brightwater project in March 2005. The work of the OMC is 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 Brightwater project with other projects of similar scope and scale or industry standards. In addition, as required by the 2005 budget ordinance, the OMC provided quarterly reports to the King County Council in 2006.

Brightwater Cost Update Report[6]

As reported in the *RWSP 2005 Annual 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. The 2005 trend estimated the potential cost of the Brightwater project to be about $1.621 billion in constant dollars without inflation.

In mid-2007, an update to the 2005 December cost trend was submitted to the King County Council. As of January 2007, the current lifetime cost estimate for the Brightwater project is $1.767 billion in nominal dollars, which is about $14 million, or less than 1 percent, above the December 2005 trend estimate adjusted for inflation, as shown in Table 2-2.

Table 2-2. Comparison of Brightwater Cost Estimates since December 2005 (millions)

Brightwater Component	December 2005 with 3% Inflation	January 2007 Inflated	Change from Dec. 05 to Jan. 07	Change from Dec. 05 to Jan. 07 (percent)
Treatment	$584.0	$629.4	$45.4	7.8%
Conveyance	926.5	891.2	(35.3)	(3.8)
Land/ROW	97.6	97.1	(0.5)	(0.5)
Mitigation	145.0	149.7	4.7	3.3
Total[a]	**$1,753.0[b]**	**$1,767.3[c]**	**$14.3**	**0.8%**

[a] Totals may not add due to rounding.

[b] The December 2005 trend estimate was stated in 2005 constant dollars of $1.621 billion; this cost is shown here in nominal dollars to be consistent with the way costs are presented in the *Brightwater Cost Update – Current Conditions and Trends,* January 2007.

[c] January 2007 costs include 3 percent inflation on estimated costs and actual inflation on awarded contracts and historical costs.

Table 2-2 shows that compared to the December 2005 cost trend estimate, there was an overall increase of about $45 million in treatment plant costs and an overall decrease of about

[6] More details on the 2007 Brightwater cost trend are provided in the report titled *Brightwater Cost Update, Current Conditions and Trends*, dated January 2007.

$35 million in conveyance costs. These changes, combined with a $0.5 million reduction in land costs and a $4.7 million increase in mitigation costs, result in a net increase in Brightwater costs of about $14 million since December 2005.

The increase in the treatment plant costs is the result of higher-than-anticipated inflation, design refinements, and allied costs that were partially offset through the use of project contingency. The $35 million decrease in conveyance costs reflects an increase in construction costs ($45 million) that is more than offset by a reduction in non-construction costs ($80 million).[7] Most of the conveyance construction cost increase is attributable to inflation, with the remainder attribuatble to insurance costs. As with the treatment plant, King County is using project contingency to offset conveyance cost increases while still maintaining sufficient construction contingency to handle issues that may arise during construction.

Current Cost Estimate Compared to the Baseline

The October 2004 Brightwater cost estimate of $1.483 billion (2004 dollars) was used to develop the baseline budget for the Brightwater project. Table 2-3 shows the baseline budget forecasts in October 2004 with inflation at 3 and 5 percent per year and the current Brightwater trend estimate of $1.767 billion projected with inflation.

Table 2-3. Brightwater Baseline Costs Compared to the Current Cost Estimate (millions)

Brightwater Component	Baseline Cost (2004$)	Baseline Cost with 3% inflation	Baseline Cost with 5% inflation	January 2007 Inflated
Treatment Plant	$ 426.4	$ 490.6	$ 537.8	$ 629.4
Conveyance	869.7	974.4	1051.3	891.2
Land/ROW	98.9	101.3	102.0	97.1
Mitigation	88.0	94.4	98.8	149.7
Total[a]	**$1,483.1**	**$1,660.7**	**$1,789.9**	**$1,767.3**

[a] Totals may not add due to rounding.

Table 2-3 shows that the current cost estimate (January 2007 inflated) is nearing the 5 percent inflation total of the baseline budget forecasted in 2004. This is consistent with predictions made in the October 2004 predesign cost report, which suggested that given recent and significant increases in commodity prices and a tighter bidding environment, an inflation assumption of 5 percent might better reflect future conditions.[8]

[7] Non-construction costs refer to contingency costs, sales tax costs, and allied costs, which include engineering services, planning and management services, permitting and other agency support, and staff labor.
[8] King County Department of Natural Resources and Parks. Brightwater Facilities: Addendum to August 23 Report: Brightwater Predesign Cost Estimates. October 2004. p. 20.

A Note about Presenting Brightwater Costs

Generally speaking, the estimated cost of a capital project is the product of the price times the quantity of the elements that make up the project. However, for a multi-year project like Brightwater, presenting this information is complicated by the fact that these costs are incurred over time during which conditions change, most notably prices. In the planning phase of the Brightwater project, cost estimates were presented in present value terms, which provided a consistent means of comparing the various alternatives. Once the current project configuration was adopted, cost estimates were presented in constant dollars; that is, dollars adjusted for inflation (deflated) to reflect base-year prices. For example, a cost estimate in 2004 constant dollars reflected the cost of the project in the prices available in 2004. Another reason constant dollars were used is because it avoided having to forecast future prices in addition to estimating quantities.

In the December 2005 cost trend report, the future costs in constant 2005 dollars were spread over the remaining project lifetime by year and inflation was added at 3 percent per year to develop total lifetime costs in nominal (inflated) dollars. This 3 percent inflation rate was applied to all of the construction costs and future allied costs, primarily staff labor and consultants. Consequently, the current January 2007 cost estimate reflects a blend of inflated costs including the following.

- Actual costs through December 2006, which include inflation occurring since the start of the project
- Conveyance construction contract costs for awarded contracts, which incorporate the contractor's estimates of inflation
- Increases in general and extraordinary inflation on construction costs for both the treatment plant and conveyance system
- Inflation on the remaining allied costs of 3 percent per year

The Brightwater project is now transitioning to construction, and King County is awarding contracts based on contractor bids that identify the cost of the various work packages, including inflation. These nominal costs are now the most reliable source for creating the cost estimate and are used as the basis for presenting the costs in the January 2007 Brightwater cost update report.

Changes in Contracting Assumptions

The fourth and fifth Brightwater cost estimates were developed at 30 and 60 percent design, respectively, for the treatment plant. Both estimates assumed that the treatment plant would be constructed using the general contractor/construction manager approach. However, at about the 90 percent design cost estimate, the treatment plant's general contractor/construction manager (GC/CM), Hoffman Construction Company, notified King County that it had insufficient surety bonding capacity to obtain a performance and payment bond to cover the entire $450 million estimated cost of the treatment plant.

Under Washington state law, a GC/CM is required to provide a bond for the full amount of the project's guaranteed construction costs. The bond protects the owner and construction subcontractors if the contractor were unable to complete the project. However, after years of losses in the surety market because of rising inflation, surety companies consolidated and significantly tightened their bonding requirements for large projects such as Brightwater, leaving many contractors unable to secure performance bonds.[9]

King County addressed this unforeseen circumstance by reducing the GC/CM's scope of work by removing the solids, odor control systems, and energy facilities from the GC/CM contract. King County bid this work separately under the design-bid-build contracting method in summer 2007. The GC/CM will continue to manage construction of the earthwork and liquids processing facilities. No impacts to the overall project schedule are anticipated.

Schedule for 2007

Approximately 270 construction workers will be involved with the construction activities scheduled for 2007. The construction activities in 2007 for the Brightwater Treatment Plant include:

- Excavating areas for the plant's headworks, primary treatment, solids handling, and digesters
- Forming and pouring foundations
- Installing yard piping
- Completing north mitigation area
- Renovating the Stockpot Building; the Brightwater Operation and Maintenance Building will be housed in the Stockpot building

Visit the Brightwater project's Web site for more information:
http://dnr.metrokc.gov/wtd/brightwater/

2.2.2 Vashon Treatment Plant

Since 1999, King County has managed and operated the Vashon Treatment Plant for the Vashon Sewer District. The collection system, owned and maintained by the Vashon Sewer District, delivers wastewater to the plant from about 425 residential and commercial customers in and around the main business area.

Since 2004, the county has carried out several steps to improve the Vashon Treatment Plant, including extending the marine outfall an additional 1,450 feet farther into Puget Sound. The pipe now carries the treated water to a discharge point 2,800 feet offshore, which will help to protect geoduck beds in the area. The outfall construction also presented an opportunity to remove 5.3 acres of derelict gill nets in Colvos Passage, which posed safety risks to divers and

[9] *Engineering News Record*. Bond Firm Profits Are Rising Fast as Sureties Climb Out of the Hole. Richard Korman with E. Michael Powers, Angelie Bergeron, Joe Florkowski, Tony Illia, and Eileen Schwartz. January 29, 2007.

marine life. Interim upgrades to improve the plant's performance and compliance with NPDES (National Pollution Discharge Elimination System) permit requirements were also completed.[10]

In 2004, construction began on major upgrades to increase plant capacity and enhance the facility's backup systems. These improvements include new headworks, an oxidation ditch, two secondary clarifiers, a stormwater detention tank, an administration building, and an electrical building. The upgrade is funded in part by loans from the Public Works Trust Fund, the Washington State Department of Ecology (Ecology), and the U.S. Environmental Protection Agency (EPA). Completion of this project will allow the plant to meet permit requirements and to protect human health and the environment.

A great deal of progress was made in 2006. Figure 2-6 shows an aerial view of the plant site as of July 2006. In fall 2006, substantial completion of the upgrades was achieved and startup activities began. Closeout of the construction contract is expected to occur in the fourth quarter of 2007.

Throughout 2006, WTD staff worked closely with Vashon community members and near neighbors of the Vashon plant to keep them informed of activities associated with the plant upgrades, to minimize construction impacts, and to respond to concerns and questions. Community members could also contact the project's 24-hour construction hotline with questions or concerns. The project Web site provided up-to-date information on a regular basis.

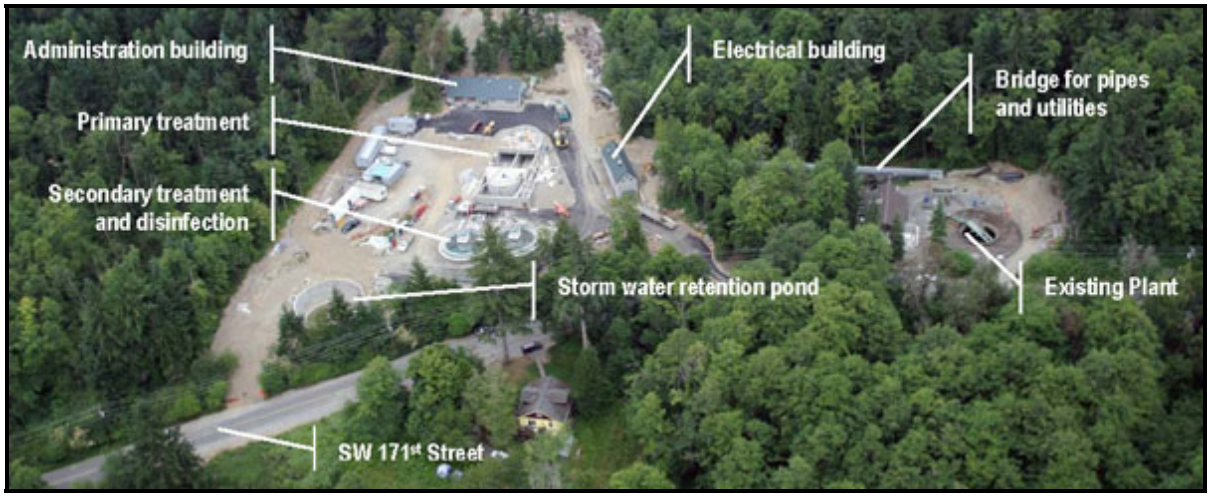

Figure 2-6. Aerial view of Vashon Treatment Plant site in July 2006

[10] NPDES permits are issued by the Washington State Department of Ecology and set limits on the quality and quantity of effluent (treated wastewater) discharged from point sources such as treatment plants, CSOs, and industrial facilities.

Other milestones in 2006 are as follows:

- Submittal and approval of the revised NPDES permit application for the upgraded facility
- Completion of and submittal to Ecology of the facility's operations plan; this document provides a systematic plan for how the transition from the existing plant to the new plant will occur
- Completion of project site improvements, such as landscaping and paving the access road

An open house to celebrate the completion of the Vashon Wastewater Treatment Plant was held in May 2007.

Visit the Vashon Treatment Plant project Web site for more information:
http://dnr.metrokc.gov/wtd/vashon/

2.2.3 Carnation Treatment Plant

The City of Carnation decided to replace on-site septic systems with a new wastewater treatment facility and collection system to better protect public health and the environment, achieve the city's comprehensive plan goals, and maintain and enhance community livability. The city is designing and building the local wastewater collection system, and the city contracted with King County to design, build, operate, and maintain a new treatment plant and associated discharge facilities. The facilities will serve about 2,000 people in Carnation's urban growth area, with capacity to serve up to 4,000 in 2030. At startup, the plant will have the capacity to treat a maximum daily flow of about 430,000 gallons of wastewater per day, and the average daily flow capacity will be 210,000 gallons of wastewater per day.

The treatment plant will be located at the west end of Entwistle Street in downtown Carnation. A 12-inch-diameter effluent pipeline approximately 1.6 miles long will be built from the treatment plant to a discharge outfall into the Snoqualmie River at the Carnation Farm Road Bridge. The plant will use membrane bioreactor technology (MBR) and will produce reclaimed water that will be used to enhance a wetland in the Chinook Bend Natural Area. This 59-acre property is owned by King County and managed as an open space and habitat protection area by the Water and Land Resources Division (WLRD) in King County's Department of Natural Resources and Parks. After startup is complete, the wetland enhancement discharge at the Chinook Bend Natural Area will become the primary discharge location for reclaimed water. The river outfall will remain operational and will serve as a backup to the wetland when maintenance or equipment problems prevent the facility from producing reclaimed water. Figure 2-7 shows the location of the Carnation treatment and discharge facilities.

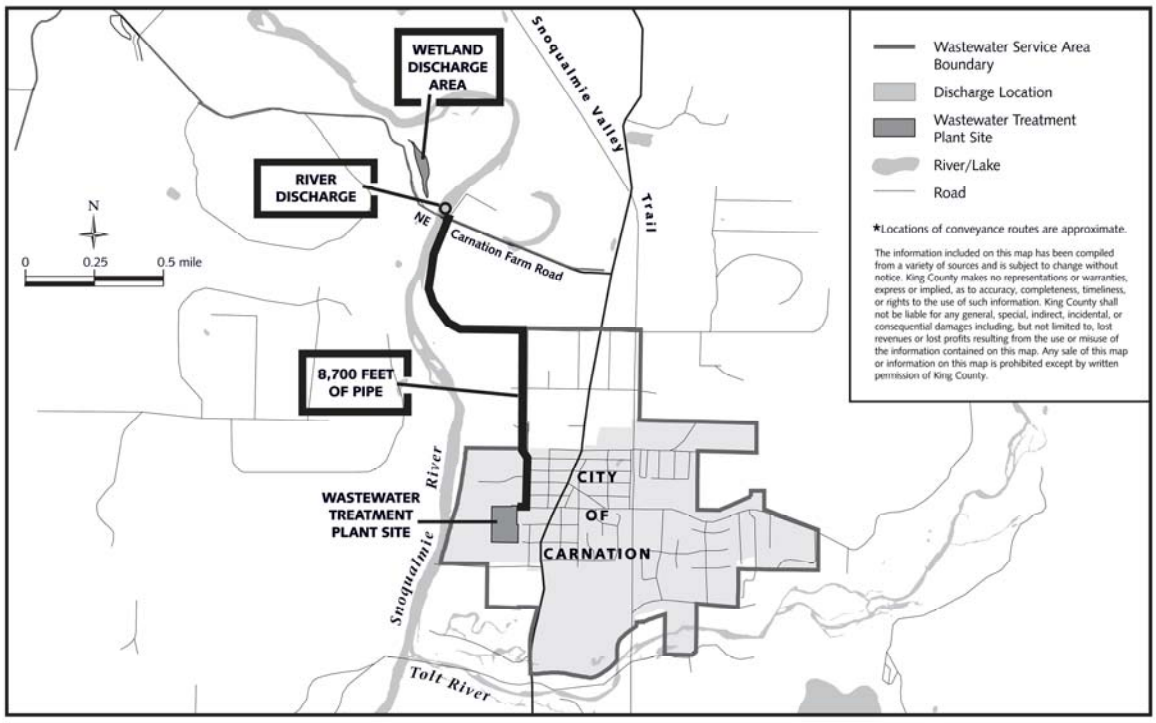

Figure 2-7. Location of Carnation Treatment Facilities

Overview of 2006 Accomplishments

King County made substantial progress on the Carnation Treatment Plant in 2006, including purchase of the two-acre plant site from the City of Carnation. The groundbreaking ceremony for the new Carnation wastewater system was held on July 6, 2006. The project is on schedule for completion in 2008. Milestones achieved in 2006 include the following:

- **Treatment plant final design and construction.** Final design was completed in March 2006. Construction on the treatment plant began in late summer 2006. Although record-setting severe weather in November and December caused construction delays, the treatment plant remains on schedule for completion in 2008.
- **Permitting.** All permits for the Carnation Wastewater Treatment Plant project were obtained in 2006. Highlights are as follows:
    - The Washington State Department of Natural Resources approved an easement to allow a permanent structure (pipe) over and in the Snoqualmie River.
    - Two private property conveyance easements were finalized.
    - The Washington Trout appeal of the Shoreline Permit for the treatment plant site and conveyance was resolved in June 2006.
    - The Washington State Department of Ecology issued the Construction Stormwater Permit.
    - The Washington State Department of Fish and Wildlife issued the Hydraulic Project Approval for the project.

- Construction related permit approvals included the King County Department of Roads and Department of Development and Environmental Services (DDES) Utility Right of Way and Clear & Grade Permits, as well as City of Carnation Construction Permits.
- Permitting for the extended discharge pipe that will bring reclaimed water to the Chinook Bend Natural Area was initiated in 2006, including submittal of preliminary applications to the U.S. Army Corps of Engineers and to DDES.

- **Environmental review process.** An addendum to the Carnation Final Environmental Impact Statement (EIS) was issued in August 2006. The addendum includes new information about discharging reclaimed water from the treatment plant to enhance wetlands and help control invasive species at the Chinook Bend Natural Area. The information in the addendum does not substantially change the analysis of significant impacts and alternatives in the Final EIS.
- **Chinook Bend Natural Area wetland enhancement discharge.** The Chinook Bend Natural Area is located adjacent to the river outfall site at the Carnation Farm Road Bridge approximately one and a half miles north of the City of Carnation in unincorporated King County. The county is partnering with Ducks Unlimited, a non-profit group dedicated to wetland conservation, to develop the wetland enhancement. The county and Ducks Unlimited worked with the Snoqualmie Tribe and other interested stakeholders to develop a design for the wetland. The wetland design will increase the size of the wetland to nearly four acres, benefiting wildlife and enhancing opportunities for passive recreation at Chinook Bend. The conceptual enhancement of the Chinook Bend Natural Area is shown in Figure 2-8.

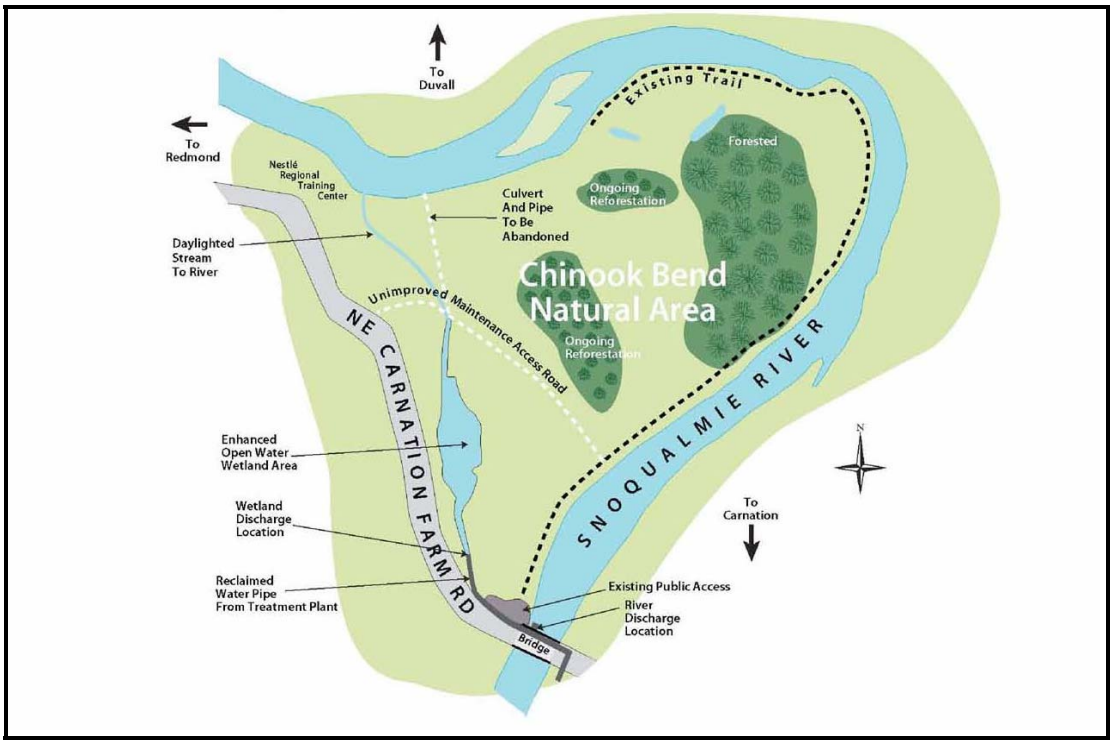

Figure 2-8. Conceptual Enhancement of the Chinook Bend Natural Area

- **Public involvement activities.** WTD staff and City of Carnation staff are continuing to work closely to involve Carnation residents and businesses in the project and to minimize potential construction impacts. In July 2006, community members joined Carnation and King County elected officials and other local dignitaries to break ground on the Carnation treatment facility and collection system. Construction kickoff meetings were held in June and July 2006 to solicit input and respond to questions from community members. A 24-hour construction hotline is available for community members to call with questions or concerns.

  WTD staff also participates in meetings and informational booths to ensure community members are kept informed about the Carnation Treatment Plant project. In May, a field day was held at the Chinook Bend Natural Area for community members to find out more about the reclaimed water wetland enhancement project. Informational booths were held at the Carnation Farmer's Market in the summer. In addition, newsletters and the project Web site provide updates on a regular basis about the project. WTD staff also continues to periodically attend Carnation City Council meetings and work sessions to facilitate coordination between the county and the city on the project.

Schedule for 2007

Construction on the treatment plant will continue through 2007. The facility is expected to be substantially complete in mid-2008. Construction of the wetland at Chinook Bend Natural Area is scheduled to begin in the second half of 2007.

Visit the Carnation Treatment Plant project Web site for more information:
http://dnr.metrokc.gov/wtd/carnation/

2.3 Amendments to Treatment Plant Policies

The King County Council approved amendments to the RWSP treatment policies via adoption of Ordinance 15384 in March 2006, and Ordinance 15602 in September 2006. The amendments are as follows:

- Replaced references to "north treatment plant" with "Brightwater treatment plant" (Ordinance 15602)
- Required inclusion of a status of the odor prevention program in RWSP annual reports (Ordinance 15384)
- Added the words "municipal water supply" to a sentence in Treatment Plant Policy (TPP)-7; the sentence now reads:

  "To ensure costs and benefits are shared equally throughout the region, all reclaimed water used in the community shall be distributed through a municipal water supply or regional water supply agency consistent with a regional water supply plan." (Ordinance 15602)

- Deleted policies TPP-9 and TPP-10, which provided guidance to the Brightwater siting process; these policies were fully implemented with the completion of the siting process in 2003 (Ordinance 15602)