
Foreword

King County is proposing to build a new regional wastewater treatment system called Brightwater to provide additional treatment capacity in the northern part of the King County wastewater service area, which includes a portion of south Snohomish County. The population in the Puget Sound region will continue to grow over the coming decades. If Brightwater facilities are not constructed and operating by 2010, it is highly probable that there will be an increasing number of wastewater overflows to the Sammamish River and Lake Washington as our area continues to grow.

Purpose of This Supplemental EIS

This document is a supplement to the environmental impact statement (EIS) issued for the Brightwater project in November 2003, which is incorporated herein. It has been prepared and issued pursuant to the State Environmental Policy Act (SEPA) (Chapter 43.21 RCW and Chapter 197-11 WAC). An appeal of the Brightwater EIS was filed with the King County Hearing Examiner in January 2004 challenging the adequacy of the EIS. The Hearing Examiner ruled in August 2004 that the EIS was adequate to support the King County Executive's December 2003 decision to build Brightwater, which includes a treatment plant at the Route 9 site north of Woodinville, a conveyance tunnel across north King County, and an outfall off Point Wells. The Hearing Examiner also directed King County to excavate at least one investigative trench on or near the Route 9 site to determine the location of a suspected fault on the northern portion of the Route 9 site and the extent of recent earthquake activity on the suspected fault, if any. King County was directed to prepare a Supplemental EIS if the suspected fault was found to be active.

Pursuant to the direction of the King County Hearing Examiner and in keeping with King County's commitment to careful evaluation of environmental impacts, King County has decided to prepare this Supplemental EIS. Arguably this is not required, because none of the new information developed since the EIS was issued establishes any "probable" new significant adverse environmental impact associated with construction and operation of the Brightwater facilities. The work of the U.S. Geological Survey (USGS) described below, including the recent trenching and seismic investigation in the vicinity of the Route 9 treatment plant site, provides a great deal of data. However, these data do not lead to the conclusion that any major seismic event that would cause surface rupture and significant adverse environmental harm is probable at the Route 9 plant site during the estimated 50-year design life of Brightwater facilities. In fact, all of the scenarios evaluated in detail in this Supplemental EIS are extremely remote and speculative possibilities at best; as such, they are very unlikely to ever materialize in the next 50 years. Nonetheless, to avoid further delay, King County has decided to be responsive to the King County Hearing Examiner's direction and conduct the comprehensive analysis contained in this Supplemental EIS.

USGS has been conducting an ongoing research program to identify and evaluate potentially active faults throughout the Puget Sound region. Recently, it conducted

investigations indicating that the Southern Whidbey Island Fault (SWIF) extends from the southern end of Whidbey Island onto the mainland in south Snohomish County. Consistent with the direction of the King County Hearing Examiner, in October 2004, King County, in a cooperative agreement with USGS, studied a strand of the SWIF that crosses the northernmost portion of the Route 9 site. This potential fault was identified by the USGS in March 2004 and referred to as Lineament 4. Information gathered from a trench dug on the Route 9 site near Lineament 4 confirmed that Lineament 4 consists of folding or warping of the ground surface as opposed to a rupture along a defined fault plane. The trench revealed evidence that the most recent deformation occurred no more than about 2,730 years ago. Thus, Lineament 4 is considered to be an active strand of the SWIF.

Approach Used to Analyze Significant Adverse Environmental Impacts

The purpose of an EIS is to evaluate the probable significant adverse environmental impacts that could result from a proposal and identify measures that could be used to mitigate those impacts. SEPA calls for a “worst case” analysis of impacts and their likelihood of occurrence in situations where there are data gaps or scientific uncertainty (WAC 197-11-080). The only two identified lineaments on the Route 9 site, based on the work of USGS and all other technical data developed to date, are at Lineament 4 and what has been labeled “Lineament X.”

None of the new structures proposed by King County would be within hundreds of feet of either lineament. Thus, there are no new significant impacts raised by the new seismic information that have not already been analyzed and mitigated in the original Brightwater EIS. There has been no evidence identified by USGS or any other experts to suggest any additional lineament between Lineaments 4 and X. Accordingly, there is arguably no requirement under SEPA to do any further analysis beyond the EIS and subsequent addenda. This is especially true given that the likelihood of any lineament in this area resulting in a surface fault in the 50-year design life of the Brightwater facilities is extremely remote. Under SEPA’s “rule of reason,” analysis of remote and speculative impacts is not required in an EIS.

Nonetheless, King County has decided to err on the side of more evaluation and information to the public and decision-makers by providing a “worst-case” analysis as part of this Supplemental EIS. SEPA provides minimal guidance at WAC 197-11-080 as to what kind of analysis is supposed to be included as part of a worst-case analysis. There is no recognized methodology.

The worst-case analysis in this Supplemental EIS focuses on various seismic scenarios. Experience in this country and around the world confirms that predicting when, where, and how strong an earthquake will be is a highly speculative endeavor, and not capable of being estimated with any precision. While endless investigations and studies might yield some information, that information does not produce, in the seismic area, any reliable level of certainty.

At the Route 9 site, for example, attempting to trench the entire site would be very expensive and time-consuming, and would not necessarily lead to any greater real certainty as to the likelihood of a surface rupture in the next 50 years. Part of the cost of doing this additional testing would be the loss of time. In this case, the loss of time is especially important, given the region's paramount need to have a new regional wastewater treatment plant online by 2010 in order to protect water quality in the streams and rivers in the region, as well as in Lake Washington and Puget Sound. An added cost of not having a third regional wastewater plant in place by 2010 would be the likelihood that building restrictions would be imposed, with resulting adverse impacts on the land use plans of all jurisdictions in the service area.

Given the uncertain nature of additional seismic investigation at the Route 9 site and the cost, both direct and indirect, of added investigation beyond that summarized in this Supplemental EIS, King County has opted to do a "worst-case" analysis in this Supplemental EIS. The analysis errs on the side of being conservative by considering what might take place in the very unlikely event of any of the seismic scenarios happening and what the impacts, mitigation measures, and unavoidable impacts might be. Even though none of these scenarios are "probable," decision-makers will have this added "what if?" information in hand when making regulatory decisions related to Brightwater facilities.

The above approach is used in this Supplemental EIS to analyze the likelihood and scope of the worst outcomes that potentially could occur if an earthquake fault were to rupture the ground surface on the Route 9 site. This Supplemental EIS discloses these extreme worst-case outcomes, but also likely overstates the likelihood and extent of possible impacts. In considering any worst-case analysis, it is important to keep in mind the very low likelihood of any identified possible impacts actually occurring. In this case, for example, by all estimates, it is highly improbable that an earthquake would result in a rupture of the ground surface on the Route 9 site within the design life of the Brightwater project.

Puget Sound is a seismically active region; it has experienced three large earthquakes and many small ones within the past 60 years. Based on information available today, researchers believe that numerous faults are distributed over the landscape in north King County and south Snohomish County. Further, the absence of documented existing faults does not mean that a new fault could not develop or be found in the future. This distribution of earthquakes and the likely existence of faults throughout the area make it very difficult to select a site that does not have a risk of ground shaking or even fault rupture within the Puget Sound area. The focus on site selection and design is, therefore, on methods of limiting the risk by selection of sites that can be designed such that the risk from earthquake damage is very low.

This Supplemental EIS evaluates a range of scenarios involving rupture of the ground surface on the Route 9 site during an earthquake and the varying types and degrees of damage and impacts that would result. However, none of the scenarios is likely to occur. The timing and extent of earthquakes cannot be predicted with any level of certainty; all scenarios were developed using a combination of historical information and currently

available predictive methods. Damage to treatment facilities that could occur under each scenario is described, and the environmental impacts that could result from damaged treatment facilities are evaluated. The evaluation of impacts that could result from an extremely unlikely event, such as a large-magnitude earthquake occurring on one particular fault and producing displacement of the ground surface during the design life of a specific facility, requires first postulating scenarios that have not been observed in the Puget Sound region in the past and then postulating and evaluating impacts that have not been observed in the past.

The earthquake used as a “worst case” in this Supplemental EIS is the largest magnitude that can be reasonably expected from the SWIF. It is assumed that it would be located on a strand of the SWIF beneath the proposed Brightwater Treatment Plant site at Route 9. An earthquake of the size (or magnitude) that was selected for this “worst-case” evaluation has not occurred historically on the SWIF. The three largest historical earthquakes in the Puget Sound area occurred in 1949, 1965, and 2001. None of these earthquakes was related to the SWIF, and all were centered deep below the Earth’s surface rather than in the shallow zone. The “worst-case” earthquake on the SWIF could be a shallow earthquake, which could produce more violent shaking in the Seattle area than a deeply centered earthquake. Furthermore, ground surface fault rupture could accompany this large-magnitude shallow earthquake.

As discussed above, none of the scenarios evaluated in this Supplemental EIS are likely or probable. The evaluation finds that the least unlikely of the three hypothetical worst-case earthquake scenarios—a ground rupture and very strong shaking on Lineament 4 on the Route 9 site—would be the least damaging. The proposed Brightwater Treatment Plant at Route 9 has been designed to withstand major damage from such an event. The most unlikely earthquake scenario evaluated (i.e., the most improbable) would be a ground surface rupture from a hypothesized new fault that would develop and cross directly under any of the new wastewater process units. This most unlikely scenario could cause very serious damage to facilities located directly over the rupturing fault. If the ground were to rupture under the digesters, there could be an immediate release of the contents of the digesters to the aquatic environment of Little Bear Creek and protracted, intermittent limited releases of untreated wastewater to area streams, the Sammamish River, and Lake Washington while the treatment plant was being repaired. Fish and other aquatic wildlife could be killed downstream of the plant, and habitat in the river and lake could be impaired until some time after the plant was repaired and brought back on line. People would need to avoid these areas while the public health risks of contact with untreated wastewater remained unacceptable. It would take from months to a few years for habitat in the streams and lake to fully recover.

These potential consequences of earthquake ground rupture beneath the Route 9 treatment plant site must be placed in perspective. Wastewater treatment plants in Japan and China have performed well during large earthquakes. Facilities have been affected by ground movements from earthquake-induced liquefaction, but the damage has not resulted in catastrophic environmental effects. In most cases these plants were returned to an operational condition within a few months, although a plant damaged at Kobe required one year for repairs. Hence, in the extremely unlikely event that fault movement occurs

beneath the Route 9 treatment plant site, historical data would suggest that while some releases of treatment plant contents could occur, the effects would be limited in time and extent.

Furthermore, given that the hypothetical worst-case scenarios analyzed in this Supplemental EIS are highly unlikely to occur, significant adverse environmental impacts are more likely to result from not constructing Brightwater than from a ground surface rupture on the Route 9 site. Those likely significant impacts would result from increasingly frequent wastewater overflows from the King County system as available capacity is consumed by a growing population. The waters of Lake Washington and the Sammamish River would receive most of those overflows, which would jeopardize water quality if allowed to continue without building the Brightwater system.

Local and Regional Earthquake Preparedness

Because of the extensive amount of faulting throughout the region and the location of its wastewater customers, King County cannot avoid the risk of placing facilities near or over possible faults. The ongoing USGS study of the SWIF is timely for the Brightwater project in that the level of detailed information from the USGS study can be used during project engineering and design to further limit the potential risk from fault rupture and strong ground shaking associated with a large earthquake on the SWIF.

King County routinely considers the most recent information on seismicity in the region and takes the following measures to protect people and property in the event of an earthquake:

- **Design.** As new treatment plant facilities are designed, the latest code requirements are followed. These code requirements include special provisions that are specifically applicable to treatment plants and that result in an increased capacity to withstand seismic loading relative to standard structures. The code that applies to aboveground structures for the proposed Brightwater facilities is the 2003 edition of the International Building Code (IBC). Under this code, a site-specific analysis of potential seismic activity is used to determine design requirements for the structures.

King County also specifically considers changes that will likely occur in future editions of the code, such as changes in requirements related to earthquake ground motion. An additional conservative measure has been to assume that another potential fault on the southern end of the Route 9 site is in fact active and capable of producing shaking. This assumption has resulted in a more robust design for the proposed structures on the site.

Additional standards apply to belowground liquid-holding structures to minimize cracking and provide additional protection from leaks. These standards for crack and leak control provide increased strength over that required by the IBC code for seismic design.

Finally, King County's design team is incorporating seismic detailing that has been found to perform well during past earthquakes in California and Japan.

- **First Responder Training.** Local fire and police departments are trained and equipped for emergency response in the event of natural and manmade disasters. Treatment plant operations staff are trained to address onsite emergencies, including facility breakdowns, spills, and leaks.
- **Emergency Management Program.** The King County Wastewater Treatment Division operates under King County's Emergency Management Program for mitigating, preparing for, responding to, and recovering from natural and technological disasters. The Office of Emergency Management considers earthquakes to be one of the most potentially damaging emergencies King County could face. The Emergency Management Program sets out the protocol and priorities for inspection, repair, and public notification of any pollutant releases following a disastrous event. Among the program's requirements is that King County provide resources for permanent repair and restoration of County-owned structures and wastewater treatment and conveyance facilities.
- **Wastewater Treatment Division Seismic Upgrades.** Building codes are constantly changing to incorporate new knowledge about how structures perform in earthquakes. King County recognizes the importance of retrofitting existing wastewater treatment and conveyance facilities and of building new facilities to meet current codes. In the early 1990s, King County retrofitted pump stations and treatment plants in response to a seismic vulnerability analysis completed in 1987. Another study, completed in 2003, evaluated the seismic vulnerability of major conveyance pipelines that are underwater or in liquefiable soils. The study recommended short-term and long-term protective measures. King County is using the results of the study to identify possible retrofits or other actions to be taken in conjunction with planned asset improvement programs and projects.
- **Treatment Plant Emergency Response.** Treatment plants in the King County system are designed so that treatment components can be isolated when they are damaged and the rest of the treatment plant can continue to operate. Backup power sources are maintained for storms and other events that can cause loss of power to the plants and pump stations.

The proposed Brightwater Treatment Plant at Route 9 would include multiple control centers dispersed around the treatment plant site so that if the main control were damaged, another center could function as main control and continue to operate the plant. In the case of an earthquake, the treatment plant and the influent pump station to be located at the Bothell Business Park would be shut down so that King County's inspection and damage assessment protocol could be conducted at the plant and in the conveyance system (pump stations and pipelines) leading to and from the plant. If damage were found, emergency repairs, bypasses, or alterations of processes would be initiated where feasible. If there were any spills from the conveyance system, emergency cleanup would be

initiated immediately. Permanent repairs to damaged facilities would be prioritized and carried out as quickly as possible.

Several of these measures are described in this Supplemental EIS.

How this Supplemental EIS Is Organized

This document supplements the EIS for the Brightwater Regional Wastewater Treatment System (November 2003) and does not repeat information detailed in the EIS. For example, the EIS adequately evaluated impacts of three action alternatives for the Brightwater System and a No Action Alternative. Those impacts are not included again here. Moreover, it does not attempt to evaluate impacts or mitigation measures that will be addressed by applicable codes or local, state, and federal regulations (RCW 43.21C.240; WAC 197-11-158).

- Chapter 1** Explains the environmental review and design processes to date, including EIS addenda that were issued, the administrative appeal of the November 2003 EIS, and revisions to the project since the EIS was issued. It describes areas of uncertainty about construction of new buildings and use of existing buildings on the treatment plant site, and then discusses the likelihood of occurrence of the worst-case scenarios and summarizes environmental impacts that were analyzed in this Draft Supplemental EIS.
- Chapter 2** Explains how researchers determine where an earthquake fault may be located. The chapter provides an overview of regional seismic characteristics and features, including the SWIF. It also describes recent studies of lineaments related to the SWIF and remaining areas of uncertainty regarding seismic features on or near the Route 9 treatment plant site.
- Chapter 3** Describes proposed Brightwater treatment plant facilities, with emphasis on the relationship of the design and location of planned facilities to potential seismic features on the site.
- Chapter 4** Describes three distinct hypothetical worst-case scenarios that assume that a rupture of the ground surface from a strong earthquake would occur on documented and hypothesized faults located in different portions of the treatment plant site. It describes assumed damage to wastewater facilities on the site under each scenario.
- Chapter 5** Analyzes the impacts to the environment from treatment plant site damage arising out of the three worst-case scenarios and describes mitigation measures that have been applied to the project and potential measures to mitigate damage and environmental impacts resulting from damage.

Technical Appendices Document technical analyses that were done to enhance understanding of seismic features on or near the treatment plant site, provide a basis for seismic design of treatment plant facilities, and analyze worst-case environmental impacts. The five appendices are bound in a separate volume.

Next Steps

Comments on this Draft Supplemental EIS will be accepted for 30 days, and a public hearing will be conducted. (Please see the Fact Sheet for date, time, and location.) King County will consider comments received and issue a Final Supplemental EIS in summer 2005. The King County Executive will consider the new environmental information contained in the Final Supplemental EIS, along with other factors such as cost and likelihood of earthquakes, and reevaluate the decision made in December 2003 to locate the Brightwater Treatment Plant at the Route 9.