



King County

Wastewater Treatment Division

Department of
Natural Resources and Parks
King Street Center
201 South Jackson Street
Seattle, WA 98104-3855

March 27, 2006

The Honorable Cathy VonWald
Mayor, City of Woodinville
17301 - 133rd Avenue NE,
Woodinville, WA 98072-8534

Dear Mayor VonWald:

Thank you for your letter dated March 7, 2006, regarding Brightwater wastewater treatment facility seismic testing. I appreciate the City of Woodinville's ongoing efforts to ensure that King County builds a safe, reliable treatment plant that will be a good neighbor to the city. During the last six years, the City of Woodinville has spent considerable time and effort reviewing and commenting at every stage of the process, from the original establishment of siting criteria to the specific details of treatment plant design. We welcome your ongoing scrutiny of the project.

The most important goal we have as a wastewater utility is to protect public health and the environment. Planning for earthquakes has always been important since we are located in an area prone to earthquakes; however, we have learned so much more since the Nisqually earthquake in 2001. The Everett, Seattle, and Tacoma metropolitan areas straddle three active and significant fault zones. If we are to provide public services to residents and businesses that choose to live here, we will have to build roads, bridges, emergency facilities and shelters, and wastewater facilities in, near, around, and even over faults.

We cannot entirely avoid impacts of earthquakes, but we can design and plan for them to ensure that our residents and businesses will be safe. When Brightwater is built, the north King County and south Snohomish County areas, including Woodinville, will have the highest level of wastewater service, as well as the highest level of seismic protection, than anywhere else in our entire service area. I can say this because Brightwater will provide the highest level of treatment in the region and will have the capacity to carry more storm flows than any other part of our system.

Brightwater is being designed to higher seismic design standards than any other part of our regional wastewater treatment system. If necessary, we can shut down the flows to Brightwater and send them to other treatment plants. There is no other place in our system where we can shut down plant operations and send the flow to our other treatment facilities, achieving uninterrupted service for Woodinville. If we have earthquakes that damage our other treatment plants, we may

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have no other choice but to discharge untreated sewage into nearby waters until repairs can be made.

As you mention, we have done an extensive environmental analysis to identify impacts and mitigation, including a supplemental analysis focusing on seismic issues. I want to assure you that Brightwater is being designed to withstand a large earthquake similar to recent earthquakes in Kobe, Japan and Northridge, California. It will be constructed to seismic standards that exceed the current minimum standards for seismic design for these types of facilities.

Specifically, a site-specific probabilistic seismic hazard analysis has been completed for the Route 9 site. With that data, King County increased strength of the design for ground shaking by approximately 25 percent over that required by the published International Building Code (IBC) 2003 code. In addition, King County has decided to design both the chemical storage facilities and the odor control facilities for a seismic importance factor of 1.50, which is greater than the 1.25 factor required by IBC 2003 code. Water holding basins, which comprise the majority of Brightwater facilities, are being designed for crack control, which provides additional strength beyond that which is required by IBC 2003 code. Other design measures for Brightwater facilities include:

- locating new facilities several hundred feet from the identified Lineament 4 at the north end of the site and the potential Lineament X at the south end
- isolating individual tanks with shut-off valves and gates
- providing flexible connections where buried piping joins concrete tankage
- separating acidic and alkaline chemical storage facilities
- designing structural and nonstructural systems within the plant in accordance with the American Society of Civil Engineers guidance for seismic design
- providing emergency spill containment down slope from the treatment facilities to capture spills that may occur in the unlikely event of a major earthquake on or near the Route 9 site
- Designing the control and transfer systems so that if the treatment plant needed to shut down, the pump station in Bothell would immediately stop sending flows to Brightwater. Instead, the flows would be diverted to storage and then to King County's other two regional treatment plants.

Regarding your concern about "toxic chemicals," the Brightwater treatment facilities will not use any chemicals that are classified as "highly toxic" by the Environmental Protection Agency or the Occupational Safety and Health Administration. The acidic and alkaline chemicals that are being used will be stored in separate storage areas, approximately 1,200 feet apart. Chemical storage facilities will include secondary containment, and design will comply with federal, state, and local codes, guidelines, and industry standards for storage, handling, and distribution.

We are installing systems at the Brightwater treatment plant to protect the environment and the community in the unlikely event that the treatment plant was damaged by an earthquake. The majority of the contents of the wastewater plant and all of the large diameter piping are located

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below ground. Failure of these tanks would release wastewater into the underdrain system or surrounding ground, however, the underdrain system is being designed to allow sampling to determine if leakage is occurring and allow plugging of the system in the event of a major spillage so that clean-up and repair can be completed to protect the surrounding environment.

Based on soil and groundwater modeling studies, it would take 12 to 15 years for unremediated, contaminated groundwater from the largest below-ground tank, the aeration basin, to reach Little Bear Creek; no wells in the Cross Valley aquifer would be impacted. Clean up of any spill would begin immediately following the incident and assure protection of Little Bear Creek. The digesters are the largest liquid holding tanks located above-ground, and in the highly unlikely event of all tanks failing, the contents would be captured in stormwater detention ponds located down slope from these facilities.

Regarding your comments on the need for seismic testing, as I pointed out above, King County has done extensive site-specific seismic testing and used the results to improve treatment plant design. In addition, King County will conduct additional trenching in compliance with Section 3.2 of the Development Agreement between Snohomish County and King County dated October 11, 2005. The Development Agreement requires trenching in relation to the two chemical storage buildings on the Brightwater treatment plant site. If there is evidence of faulting where these facilities are located, then we will move them. We anticipate beginning the trenching this spring, as weather allows.

In regard to site soil class, our design engineers believe that there is ample evidence to support classification of the soil beneath the process facilities as IBC Site Class C. Numerous borings were drilled and sampled at the site. The deepest of these borings extended to 500 feet below the ground surface. Five other borings extended beyond 100 feet. These deep borings, as well as 40 other borings drilled for the project, when interpreted in terms of the geologic history of the Puget Sound area, provide sufficient information to characterize the site in terms of the types of soil deposits, the consistency of these soils, and the variability of these deposits within the project footprint. Additional borings, whether drilled to 100 feet or 200 feet, would not have changed this understanding and would not have changed the Site Class that was determined. Information about these borings can be found in the *Final Design Geotechnical Data Report* prepared by CH2M Hill, March 2005.

The results of the site class determination for the specific geologic deposits encountered at the site are consistent with the conclusions reached by other geologists and geotechnical engineers that apply the requirements of IBC 2003 to projects in the Puget Sound area. Simply put, the soils that have been overridden by past glaciations have been compressed to such a degree that they exhibit very high standard penetration blow counts (i.e., N values > 50 in Table 1615.1.1 of IBC 2003) and high shear wave velocities (i.e., $v_s > 1,200$ fps in the same value). N values recorded during more than 40 explorations at the site meet the $N > 50$ criterion. Results of seismic refraction tests in the vicinity of Lineament 1 also indicate that v_s easily meet the 1,200 fps criterion for Site Class C (Ref. Appendix A.B of the SEIS for Brightwater). These conditions are encountered within glacially overridden soils throughout the Puget Sound area.

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Regarding your concerns about soils and IBC standards, the site classification system that was used to adjust for local site effects (i.e., from firm ground) followed procedures in paragraphs 1615.1.1.1 and 1615.1.2 of IBC 2003. Note also that there is no reference to D2 classification within IBC 2003.

Regarding your reference to Figures 1615[1] and 1615[2] in IBC 2003, these figures show values of spectral ground acceleration determined by the United States Geological Survey (USGS) during its nationwide mapping project. King County did not use these maps; the county instead opted to use site-specific procedures to develop seismic design information for the Brightwater site. This alternative is allowed within Section 1615.2 of IBC 2003. A site-specific approach was taken to specifically incorporate the extension of the South Whidbey Island Fault, which was not represented in Figures 1615[1] and 1615[2]. The approach used by our consultants was reviewed with the USGS staff to confirm that appropriate modeling methods were being used.

In regard to lineament GA, King County's Final SEIS includes responses to a number of questions by the county's experts in seismology, geology, and geotechnical engineering that demonstrate that this lineament is not a design issue for the treatment plant site. Please review the discussion on pages 32, 33, and 34 of the Final SEIS; the response to Earth Consultants International, a consultant to the Sno-King Environmental Alliance (SKEA) on page 103 and 104; and the response to comment I11-1, which states "the lineament to be truncated at the south and that the lineament does not extend further into the Route 9 plant site." Further, as discussed in response G02-22 on page 81, any rupture of Lineament GA would be well north of any new treatment plant facility.

After reviewing the available information and discussing it with the USGS, King County concluded that Lineament GA is not significant to the proposed plant site and there is not evidence of a zone of pervasive active faulting from Lineament GA. Furthermore, the building King County intends to retain on-site (StockPot) will be an administration and maintenance building, not a process facility. If this building is damaged we can continue to run the facility.

I appreciate you sharing your concerns with us and the opportunity to respond. We feel that we have adequately addressed the seismic issues and gone beyond what we are required to do to assess the potential impacts and design to withstand them. If you have further detailed questions about the soils and seismic analysis, I invite you to contact Christie True at 206-684-1236 to set up a meeting with our technical experts. Brightwater is being built to very high standards and we are committed to providing safe and reliable services to our region.

Sincerely,



Don Theiler
Division Director

cc: Christie True, Manager, Major Capital Improvements Program, Wastewater Treatment
Division, Department of Natural Resources and Parks