Final Environmental Impact Statement

BRIGHTWATER REGIONAL WASTEWATER TREATMENT SYSTEM

April 2004

Brightwater
TREATMENT SYSTEM

King County
Department of Natural Resources and Parks
Wastewater Treatment Division

ADDENDUM 3

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

April 30, 2004

TO: Recipients of Brightwater Final EIS

FROM: Shirley Marroquin, Supervisor
Environmental Planning and Community Relations

RE: Addendum No. 3 to Brightwater Final EIS

The King County Wastewater Treatment Division is issuing Addendum No. 3 to the Final Environmental Impact Statement (EIS) for the Brightwater Regional Wastewater Treatment System (issued November 2003). Please note that consistent with the State Environmental Policy Act (WAC 197-11-625), King County is sending this addendum to recipients of the Final EIS. However, King County did not circulate a draft addendum, and there is no comment period for the addendum.

The addendum has been prepared in compliance with the State Environmental Policy Act (SEPA) (RCW 43.21C), the SEPA Rules (WAC 197-11), and Chapter 20.44 King County Code, implementing SEPA in King County procedures.

The impacts evaluated in Addendum 3 are within the range of significant adverse environmental impacts previously analyzed in the Brightwater EIS, and this addendum does not substantially change that analysis (see WAC 197-11-600).

Addendum No. 3 provides additional information on and/or evaluation of geotechnical and seismic studies:

- An updated evaluation of aeromagnetic and LiDAR imagery for the postulated onshore extension of the South Whidbey Island Fault.
- A review of boring data and a seismic refraction survey at the Route 9 site.
- An analysis of ground motion studies at the Route 9 site.

- A description of geotechnical data that will be used for design of the conveyance system and outfall.

- Additional discussion of the Final EIS worst-case analysis of impacts and mitigation measures associated with major seismic events.

As other addenda are prepared, you will receive copies. If you have questions, please contact the Brightwater Project Team at (206) 684-6799, toll-free 1-888-707-8571, or 711 TTY.

King County Brightwater TREATMENT SYSTEM

Final Environmental Impact Statement

for the

Brightwater Regional Wastewater Treatment System

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This information is available in alternative formats upon request by calling 206-684-1280 (voice) or Relay Service 711 (TTY).

King County

Department of Natural Resources and Parks

Wastewater Treatment Division
King Street Center, KSC-NR-0503
201 South Jackson Street
Seattle, WA 98104

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Chapter 1
Introduction

1.1 Summary

On November 19, 2003, King County issued a Final Environmental Impact Statement (Final EIS) analyzing the probable significant adverse environmental impacts and proposed mitigation of alternative combinations and configurations of facilities that would constitute the proposed Brightwater Regional Wastewater Treatment System. On December 1, 2003, King County Executive Ron Sims selected the locations of proposed Brightwater facilities and authorized King County staff to proceed to work with host jurisdictions and regulatory agencies to secure permits and commence design, construction, and operation of Brightwater facilities. In coming months, King County and other jurisdictions will take additional actions on the proposal after considering the information and analysis in the Brightwater Final EIS and related environmental documents.

1.2 Purpose of Addendum

Under the State Environmental Policy Act (SEPA), issuance of an addendum is appropriate to provide additional information or analysis that does not substantially change the analysis of significant impacts and alternatives in an existing environmental document (WAC 197-11-600[4][c], -706). Since issuance of the Brightwater Final EIS, additional information has become available in a technical area that was addressed in the Final EIS—additional data on possible earth and seismic-related impacts of the Brightwater proposal, and related mitigation measures. The purpose of this Addendum is to address this new information.

As part of the mitigation in the Final EIS, King County committed to work on an ongoing basis with the United States Geological Survey (USGS) to develop and evaluate new seismic and geologic research information that may pertain to the siting, construction, and operation of the Brightwater facilities. This new information builds upon the current understanding of seismic activity in the Puget Sound region and provides useful additional information to other agencies and the public. However, this new information does not substantially change the analysis of significant impacts and alternatives in the Final EIS. The Final EIS identifies King County's ongoing close collaboration with the USGS to coordinate information and develop seismic design criteria for the Brightwater system. King County, as part of both its predesign and final design, will be conducting additional testing, borings, and analysis at the Route 9 site of the Brightwater Plant to

identify appropriate locations for structures and to design foundations and other structural components to mitigate the risk of damage from a seismic event (Final EIS, p. 4-17). It is anticipated that in future months and years, new information and analysis on possible seismic and geologic risks may be developed by King County, USGS, and other agencies. The USGS issued an Open-File Report on April 29, 2004 (Blakely and others, 2004), and information from the Report has been incorporated into this Addendum.

1.3 Background

Following the November 2003 issuance of the Final EIS and the December 1, 2003 selection of locations of proposed Brightwater facilities, the planning and analysis associated with the predesign of proposed Brightwater facilities have continued, as part of the ongoing project implementation and permit application processes. Included in such predesign and permit application work are more refined environmental analyses that add information to the Final EIS and that are appropriately included in an EIS addendum.

Addendum 1 to the Brightwater Final EIS was published on January 27, 2004. It provides an updated analysis of traffic impacts and mitigation measures and additional information about potential use of the existing ChevronTexaco Richmond Beach Asphalt Terminal barge dock during construction.

Addendum 2 to the Brightwater Final EIS was published on April 2, 2004. It provides an updated description of selected portal sites and an analysis of impacts of the transportation of excavated materials from Portal 19, impacts of a proposed temporary construction access road at the Route 9 site, and impacts of demolition and construction at the Route 9 site.

This document, Addendum 3 to the Brightwater Final EIS, provides additional information on the following seismic and geologic topics:

- Chapter 1: Introduction
- Chapter 2: Evaluation of New Data Characterizing the Postulated Mainland Extension of the South Whidbey Island Fault (SWIF)
- Chapter 3: Geotechnical Data for Design of the Conveyance System and Outfall
- Chapter 4: Final EIS Worst-Case Analysis of Major Seismic Events–Additional Discussion
- Chapter 5: Documents Incorporated by Reference

The chapters (1) present updated information about seismic and geologic issues discussed in the Final EIS; (2) discuss potential impacts and mitigation related to seismic and geologic issues; and (3) summarize additional information and explain the relationship of such new information to information and analysis in the Final EIS.

Additional addenda may be issued as the Brightwater design and permit application processes move forward and as additional information on topics covered in the Brightwater EIS becomes available, provided that the information does not substantially change the analysis of significant impacts and alternatives in the EIS. If additional information becomes available that is beyond the range of impacts and mitigation discussed in the Final EIS and if such information presents new, unanalyzed significant environmental impacts that cannot be mitigated, appropriate environmental review will be conducted at that time.

Chapter 2
Evaluation of New Data Characterizing the Postulated Mainland Extension of the South Whidbey Island Fault (SWIF)

2.1 Final EIS Discussion of Seismic Conditions

Chapter 4, Earth, of the Final EIS, evaluates the earth impacts of the Brightwater proposal. It describes the affected environment, regional earth conditions, seismicity as it relates to all Final EIS alternatives, and mitigation measures common to all systems and unique to each alternative. It emphasizes in Section 4.2.7.7 the extent to which the entire Puget Lowland has been subjected to seismic events in the past and is expected to be in the future. It identifies the postulated onshore extension of the South Whidbey Island Fault (SWIF) as being the nearest significant seismic feature to the Route 9 site. It notes the ongoing work of the USGS in studying the location of the SWIF, and the ongoing collaboration of the Brightwater design team with USGS SWIF researchers to "incorporate the latest information into the facility design" (Final EIS pp. 4-8). This chapter also discusses how the location and design of Brightwater facilities will be in accordance with the International Building Code (IBC), which is based on probabilistic modeling of all seismic sources in the region. Here again, King County is working closely with the USGS SWIF researchers and will update the design seismic standards for the Brightwater system design if appropriate (Final EIS pp. 4-17).

2.2 Seismic Terms

The following technical terms are used in the subsequent discussions and are defined as follows:

Active Fault - A fault that is likely to have another earthquake sometime in the future. Faults are commonly considered to be active if they have moved one or more times in the last 10,000 years.

Aeromagnetic Survey – Measurements of the Earth's magnetic field gathered from aircraft. Magnetometers towed by an airplane or helicopter can measure the intensity of the Earth's magnetic field. The differences between actual measurements and theoretical values indicate anomalies in the magnetic field, which in turn represent changes in rock type or in thickness of rock.

Anomaly (or anomalous condition) - Data that would suggest differing geologic conditions or differing measurements over a short distance.

Linear Aeromagnetic Anomalies – Linear alignment of measurement differentials from an aeromagnetic survey that may be an indicator of differing subsurface rock conditions, such as sloping rock boundaries or contrasting rock types.

Crust -The outermost major layer of the earth, ranging from about 10 to 65 km in thickness worldwide. The uppermost 15-35 km of crust is brittle enough to produce earthquakes.

Documented Fault – As used in the Engineering and Environmental Constraints Analysis of the siting studies, fault lines that have been mapped and reported in the geologic literature and that are fundamentally based on geologic evidence.

Fault - A fracture along which the blocks of crust on either side have moved relative to one another parallel to the fracture.

LiDAR – A light detection and ranging imagery obtained from laser equipment aboard an airplane to precisely measure ground surface elevations.

Lineament – A linear alignment of landforms, including streams, low ridges and cliffs, and ravines that may be the result of faulting, erosion or glacial processes.

Seismic Refraction Line – A line of acoustic or vibration measuring devices that are used as part of a seismic refraction survey.

Seismic Refraction Survey - A non-destructive test that measures the travel time of compressional or shear waves through soil or rock. The wave travel times are used to compute shear or compressional wave velocities and the associated stiffness of the soil or rock. In this test, seismic waves are generated at the ground surface and travel down through the soil and along discontinuities or zones of

contrasting velocities and are subsequently refracted back to the ground surface where the energy waves are recorded on geophones or recording devices placed at the ground surface.

Shear Wave (or S wave) - A seismic body wave that shakes the ground back and forth perpendicular to the direction the wave is moving.

2.3 Initial Site Screening – Seismic Considerations

As part of the site selection studies, CH2M HILL conducted an Engineering and Environmental Constraints Analysis to eliminate unsuitable locations for the siting of the treatment plant facility (King County, 2001). The screening criteria included 6 recommended engineering constraints. One of the constraints was described as follows: "location within 0.5 km (1,600 feet) from a documented fault" (King County, 2001, Appendix J, p. 46). For the Route 9 treatment plant site, the South Whidbey Island Fault (SWIF) is the nearest documented fault.

As indicated on Figure 4-2 of the Final EIS, there are a number of different interpretations of the location of the SWIF. While the location of the SWIF is best constrained on Whidbey Island, extensions of the SWIF on the mainland are based on scant data and are largely speculative. Accordingly, the Constraints Analysis used the Gower and others (1985) and Rogers and others (1996) interpretations of the SWIF because these interpretations appeared to be better correlated with known geologic rock outcrops that would constrain potential fault locations. Because the Route 9 site was located about 5 km from Rogers' interpretation of the SWIF and about 8 km from Gower's interpretation of the SWIF, the site was in compliance with the recommended siting acceptance criteria.

In addition to the interpretations of the SWIF by Gower and Rogers, Figure 4-2 in the Final EIS also shows two interpretations of the SWIF by Johnson and others (1996) and Johnson and others (2001). These interpretations differ from each other not only in the location of the fault on Whidbey Island, but also in the location and length of the inferred extension of the fault projection on the mainland. The differing locations of the fault on the mainland again reflect the paucity of data upon which the inferences of the mainland extensions are based.

Also, there are minor differences between Figure 4-2 of the Final EIS and Figure 2-1 of this addendum in plotting Johnson's 1996 location of the SWIF on the mainland. These differences are attributed to differing methods of transferring Johnson's projections of the SWIF from the original large-scale map in the 1996 report. Regardless, Johnson's mainland extension of the SWIF is an extrapolation of fault locations on Whidbey Island and is based on limited data on the mainland (Blakely and others, 2003). Consequently, because of the speculative nature of Johnson's mainland extrapolation of the SWIF, this

data source was not used in the siting studies. Instead, the geologically-based interpretations of the SWIF by Gower and others (1985) and Rogers and others (1996) were used in the Engineering and Environmental Constraints Analysis.

2.4 Lineament Locations

2.4.1 Clarification of Lineaments Described in the Final EIS

Pages 4-8, 4-42, and 4-48 of the Final EIS discussed three northwest trending linear aeromagnetic anomalies or lineaments that might represent potential geologic features associated with the SWIF. While the locations of these potential features were described in the text, these features were not shown on the figures accompanying the text. To provide additional clarity, these features are illustrated in Figure 2-1, which is based on an illustration published by Blakely and others (2003) showing a preliminary interpretation of the aeromagnetic lineaments along with the residual magnetic data upon which the interpretations are based.

The three northwest trending anomalies identified on page 4-8 of the Final EIS include the Cottage Lake lineament, which is shown on Figure 2-1 as being located about 1 to 2 km east of the Route 9 plant site, and two other anomalies located further to the west that intersect the alignment of the conveyance system. Besides representing a magnetic anomaly, a portion of the Cottage Lake lineament also corresponds to a topographic break in the slope of the ground surface that was identified in LiDAR imagery and confirmed in limited field studies conducted by the United States Geological Survey (USGS) (Blakely and others, 2004). The coincidence of the magnetic interpretation, together with the LiDAR imagery and field observations, has led the USGS to speculate that the lineament might be a trace of the SWIF. The USGS is planning to excavate a trench across the Cottage Lake lineament this year to evaluate whether the feature might be fault related. Additionally, if the trenching provides an indication of past fault movement, the USGS will attempt to date the potential movement to determine if the feature is an active fault.

The other two linear anomalies located west of the Cottage Lake lineament have not been correlated with surface expressions of movement by the USGS and, as such, represent minor features in comparison to the Cottage Lake lineament. If these two other anomalies are possibly fault related, significantly smaller displacements would be anticipated for these features relative to the Cottage Lake lineament.

2.4.2 Conclusions Based on Final EIS Analyses

Based on the above, the Brightwater geotechnical team concludes the following:

- None of the features shown on the mainland area of Figure 2-1 have been verified as an active fault.
- Of the features shown on Figure 2-1, the Cottage Lake lineament has the strongest possibility of being an active fault.
- The Cottage Lake lineament is located 1 to 2 km east of the Route 9 plant site.
- There are no known active faults within 0.5 km of the Route 9 plant site.
- There are no known active faults underlying the Route 9 plant site.
- There are no known active faults underlying the alignment of the conveyance system.

Because the above presents no new information confirming the presence of active faults beneath the Route 9 plant site or conveyance system, there are no significant changes to the impacts or mitigation sections of the Final EIS.

2.4.3 New USGS Studies

The USGS conducted more detailed investigations of the mainland extension of the SWIF in April 2004 (Blakely and others, 2004) to provide a more complete review and documentation of the aeromagnetic data that was discussed in the preliminary studies of Blakely and others (2003). The USGS study of the SWIF, Open-File Report 2004-1204, incorporates recently available LiDAR data that includes the Route 9 treatment plant site, the alignment of the conveyance system, and other locations in north King County and south Snohomish County.

The Open-File Report confirms that the Cottage Lake lineament is the most likely location of a hypothesized projection of the SWIF. The USGS plans to trench this structure later this year to determine if this feature is fault related. Furthermore, the USGS identified a LiDAR lineament that crosses the northern portion of the Route 9 treatment plant site and is parallel to an inferred aeromagnetic lineament located southeast of the plant site. The approximate location of this lineament, as shown on Figures 2-2 and 2-3, trends in a northwesterly direction and intersects the northeast corner of the existing StockPot property.

2.5 Additional Plant Site Seismic Studies

In response to the USGS interpretations of the newly released LiDAR data (Blakely and others, 2004), King County conducted additional studies during April 2004 at the Route 9 plant site to assess the potential presence of features that may be related to the SWIF (King County, 2004c). These studies, which are discussed below, included a review of the noted zones of disturbance encountered in the deep boring drilled at the plant site (Boring PB-12) and geophysical surveys conducted on the plant site to investigate the potential presence of discontinuities of subsurface materials. Finally, King County conducted ground motion studies to evaluate the level of ground shaking that could occur at the site (Shannon and Wilson, 2004), considering that various interpretations of the SWIF could be active near the plant site. The following briefly discusses the results of these studies.

2.5.1 Review of Boring PB-12

Considering the proximity of the Route 9 treatment plant site to the SWIF, the core samples retrieved from the deepest boring that was drilled at the treatment plant site (Boring PB-12) were reviewed in detail to assess whether the "fractures" or "disturbed" zones noted on the boring log were caused by displacement associated with tectonic faulting in the underlying bedrock. Boring PB-12 was drilled as part of the predesign study for the plant site, and the log of the boring is found in Appendix 4-A of the Final EIS.

Essentially, the locations of "fractures" or "disturbance" occurred at depths below 200 feet. No disturbance was noted or observed in the overlying, younger Holocene deposits. The zones of infilling show dense conditions or hard soils on either side of the feature, indicating that they have been glacially overridden and the disturbance predates the Fraser glaciation of the Puget Lowland 13,000 to 15,000 years ago. This evidences suggests that if the features were fault related, the fault would not be considered active.

The "features" that were observed in the sample core can be described as being subtle and not suggestive of large scale shearing or deformation. Specifically, the features generally consisted of small (less than 1-inch-wide) sand or clay filled cracks. The soil exposed on either side of the cracks generally consisted of hard clayey silt. These conditions are not suggestive of large-scale faulting.

In summary, the subtle cracks or fissures observed at limited locations within Boring PB-12 are not consistent with large scale, active faulting.

2.5.2 Plant Site Geophysics

King County consultant, AMEC Earth and Environmental, Inc. (AMEC), conducted a seismic refraction survey at the plant site on April 21, 2004, in an attempt to identify any discontinuities or displacements in the top of the glacially overconsolidated sediments that could potentially be correlated with the USGS inferred LiDAR lineament that intercepts the northeast corner of the Route 9 treatment plant site. The April 27, 2004, report (King County, 2004c), incorporated by this reference, sets forth in detail the analysis and conclusions summarized in this Addendum. This work by AMEC consisted of computing shear wave velocities along 9 lines in the former Northshore School District property and along 2 lines in the Woodinville North complex, as shown on Figure 2-3. The lines established on the Northshore School District property were located to generally intercept the LiDAR lineament inferred by the USGS. This lineament is also shown on Figure 2-3.

The findings of the refraction survey support the following conclusions:

- Refraction lines performed in the Woodinville North complex (south of the StockPot property) indicated uniform conditions that would not be suggestive of faulting.
- Some refraction lines in the northern portion of the site on the former Northshore School District property identified higher velocities (i.e., approximate 3,000 feet-per-second shear wave velocities at depths of about 45 to 65 feet) whereas adjacent seismic refraction lines showed greater depths to materials with similar velocities. This area of the change in depth to the higher velocities is correlated with the approximate location of the USGS inferred lineament from the LiDAR data.
- The refraction data in the former Northshore School District property do not, however, unequivocally support the presence of an underlying fault based on the following:
    - Uniform conditions of 1,600 feet-per-second shear wave velocity were determined in lines 1-9 at a depth of about 15 feet, suggesting that the sediments at this depth, which is inferred to correspond to the top of the glacially overconsolidated sediments, is continuous without significant breaks or fault offsets.
    - The absence of offsets in the top of the glacially overconsolidated sediments suggests that the surface has not been displaced in the past 10,000 to 15,000 years and that any potential underlying structure is not an active fault.
    - The continuity of the surface of the top of the glacially overconsolidated sediments is not supportive of any LiDAR interpretation of an inferred fault.

  - The continuity of the surface of the top of the glacially overconsolidated sediments is consistent with the termination of the inferred aeromagnetic lineament south of the Route 9 treatment plant site.

  - While the 3,000 feet-per-second shear wave velocity was observed at selected lines, it was not observed within line 8, which includes the areas of lines 1–6. The absence of this higher shear wave velocity zone in line 8 does not support the intepretation that a fault is present in deeper soils in the area of the projected lineament.

  - The continuity of the top of the glacially overconsolidated sediments, as inferred from the velocities in lines 1-7, suggests that any fault that may be inferred from the high shear wave velocity data is not an active fault.

AMEC reviewed the USGS interpretation of aeromagnetic and detailed LiDAR data in the region suggesting that a southeast trending lineament projects through the northern part of the proposed Brightwater site and interpreted the results of the shallow p-wave seismic refraction and shallow and deep ReMi s-wave surveys presented in AMEC report. Based on this review and interpretation, AMEC concluded:

- The results of the testing in the northern part of the Brightwater site does not clearly support a subsurface contrast that could be associated with the inferred lineament, but neither does it indicate uniform subsurface conditions across the lineament. The location where the subsurface profile differences seem to occur approximately coincides with the projection of the lineament identified by the USGS.
- The testing results more southerly on the site and the USGS interpretation of aeromagnetic and LiDAR data do not suggest the presence of other lineaments that cross the area of the site where Brightwater facilities are proposed. Therefore, based on its consultants' recommendations, King County concludes that the site is suitable for the Brightwater treatment facility and will proceed with final design.
- While the recent seismic refraction survey is not supportive of faulting, the design-specific engineering studies for the plant site will include additional geophysics, borings, and cone penetrometer tests to support final design of specific structures and facilities.

2.5.3 Plant Site Ground Motions

Because the Route 9 treatment plant site is located near features that could be interpreted as being related to the SWIF, a Probabilistic Seismic Hazard Analysis was conducted to determine the level of ground motion that could occur at the plant site, assuming that the Cottage Lake lineament is the mainland extension of the SWIF and is an active fault. More specifically, the analysis was performed assuming that the Cottage Lake lineament

represents an active strand of the SWIF. The results of these analyses (Shannon and Wilson, 2004) indicated that the plant site could experience about 25% higher ground accelerations should the mainland extension of the SWIF be found to be active. These higher levels of ground motions than required by the applicable design code, IBC 2003, will be used in the design of the plant site structures. A copy of this draft report is specifically described below and is incorporated by reference into this Addendum.

2.6 Conclusions

The following conclusions on the seismic conditions at the Route 9 treatment plant site are derived and summarized from the above evaluation:

1. The Route 9 treatment plant site meets the Engineering and Environmental Constraints recommended 0.5-km separation from a documented fault based on the interpretations of the location of the SWIF by Gower and others (1985) (8 km distance) and Rogers and others (1996) (5 km distance).

2. The Route 9 treatment plant site also meets the Engineering and Environmental Constraints recommended 0.5-km separation from the Cottage Lake lineament (1 to 2 km distance).

3. Based on communications with the USGS, it is King County's understanding that, of all the recently identified lineaments from a reinterpretation of the aeromagnetic data and the recently released LiDAR data near the treatment plant site, the USGS considers the Cottage Lake lineament to be the most likely candidate as being an active feature related to the SWIF.

4. Based on communications with the USGS, it is King County's understanding that, of all the recently identified lineaments from a reinterpretation of the aeromagnetic data and the recently released LiDAR data near the treatment plant site, the USGS plans to trench only the Cottage Lake lineament to determine if this feature represents a fault (i.e., all other recently inferred lineaments are of secondary importance compared to the Cottage Lake lineament).

5. The USGS has recently interpreted a lineament from the LiDAR data that crosses the northeast corner of the plant site footprint (Figures 2-2 and 2-3). This lineament:

    - Is partially supported by aeromagnetic data southeast of the Route 9 treatment plant site.

    - Is not clearly supported in the plant site seismic refraction survey data.

    - Has not been confirmed as a fault.

- Has not been confirmed as an active fault.

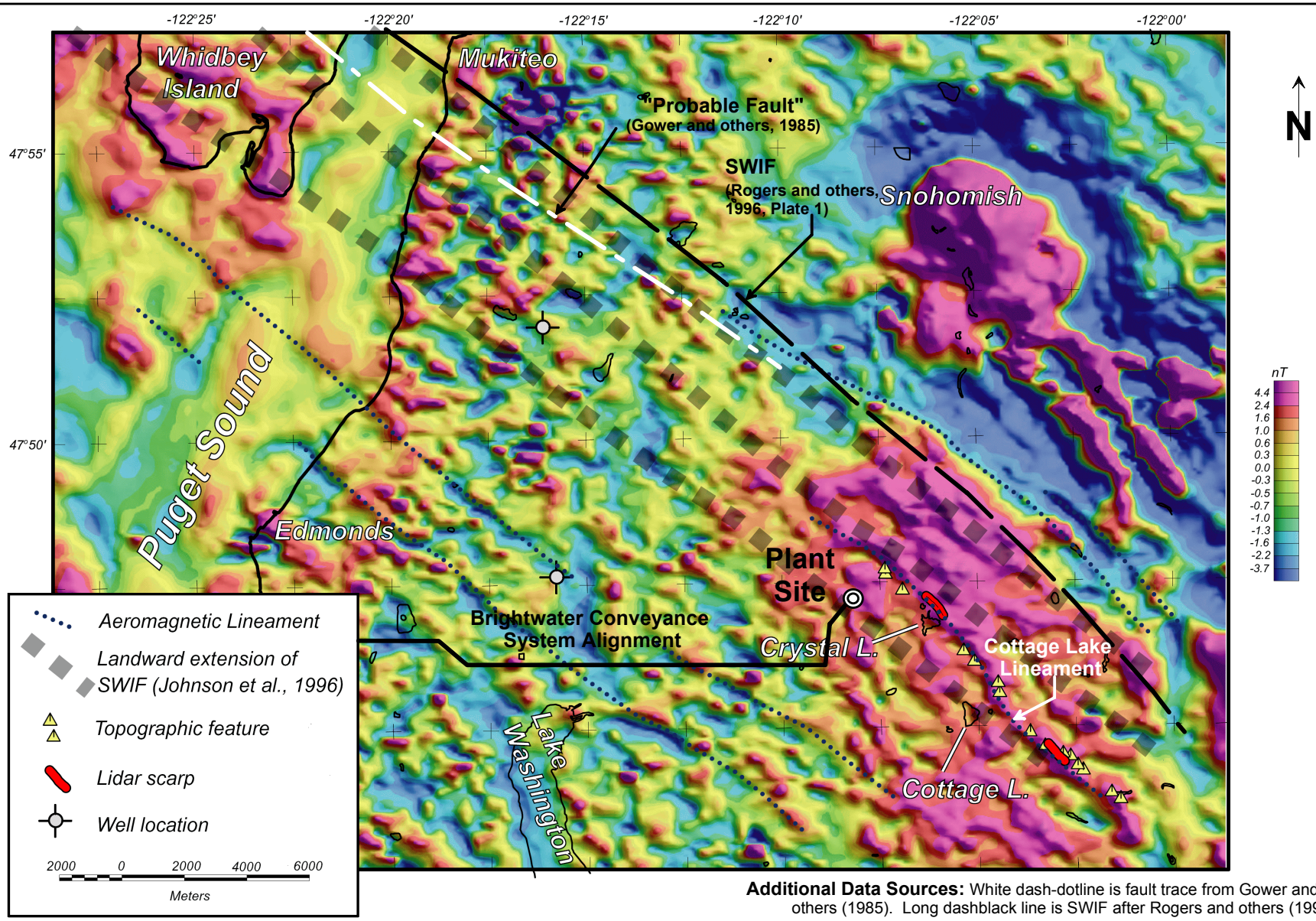
6. In the event that the recently interpreted lineament at the northeast corner of the plant site turns out, upon subsequent calculation, to be associated with an active fault:

    - The USGS inferred LiDAR lineament at the northeast corner of the plant site does not extend beneath any planned new buildings or structures of the treatment plant (Figure 2-3), although it may be located near the northeast corner of the existing StockPot building.

    - The plant site will be designed for ground motions that are consistent with the location of the SWIF near the plant site (i.e., assuming that the Cottage Lake lineament is considered to be an active fault).

7. The current data and site studies support development of the plant as shown in Figure 2-3, and the impacts of this development are consistent with the impacts and mitigation discussed in the Final EIS.

List of Figures



Additional Data Sources: White dash-dotline is fault trace from Gower and others (1985). Long dashblack line is SWIF after Rogers and others (1996).

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Data sources: excerpted from Blakely and others (2003), additional sources listed above
File Name: BrightwaterMagFaultsKC_Fig1-1.grf **Prepared by:** PanGEO, Inc.

Figure 2-1
Residual Magnetic Anomalies and Structural Features Map
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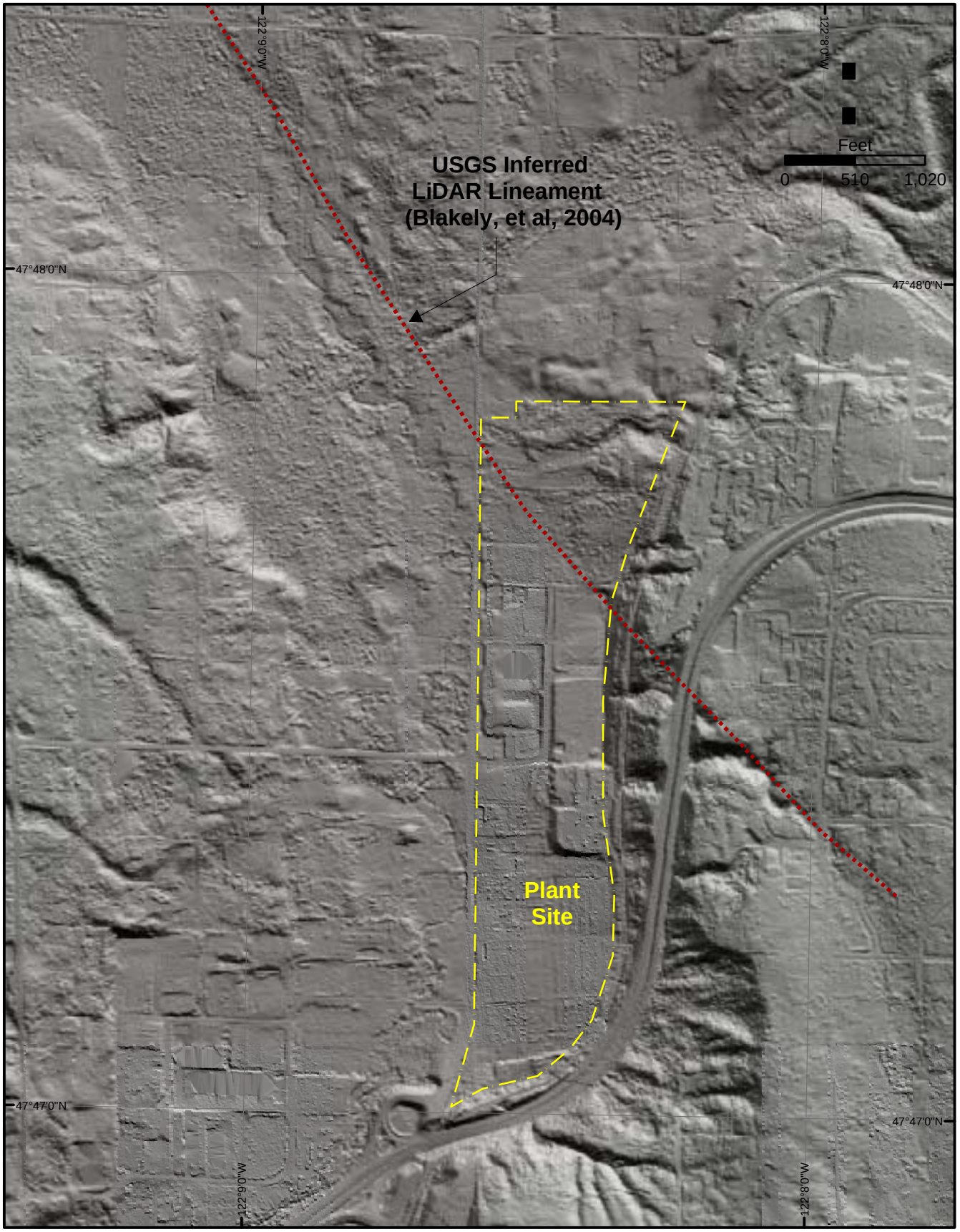

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Data sources: Blakely, et al, 2004; LiDAR DEM data from King County
File Name: PlantSite.mxd **Prepared by:** PanGEO, Inc.

Figure 2-2

USGS Inferred Lineament at Route 9 Treatment Plant Site

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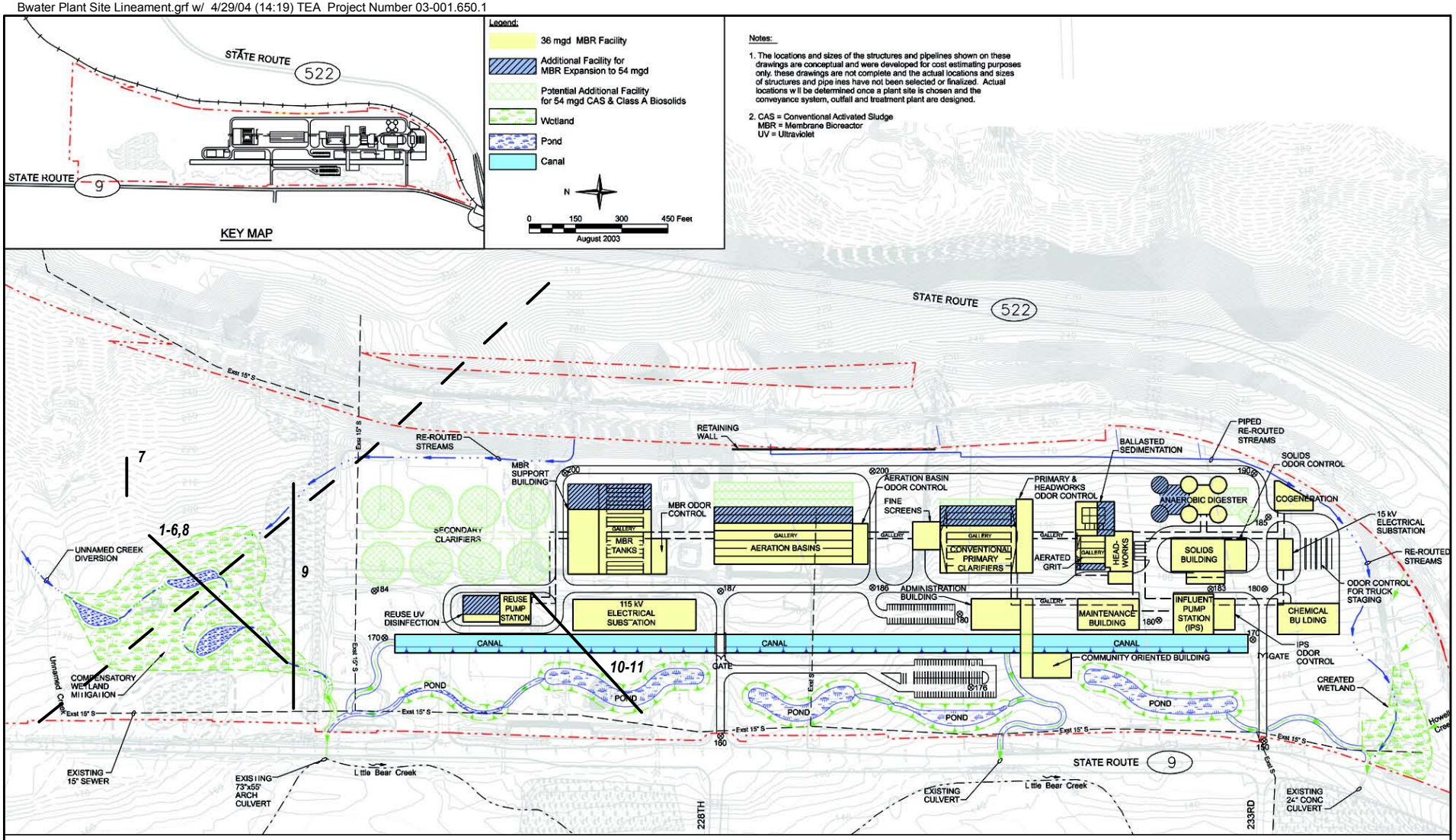
Bwater Plant Site Lineament.grf w/ 4/29/04 (14:19) TEA Project Number 03-001.650.1



7 King County Seismic Refraction Lines

USGS Inferred Lidar Lineament

Note: This basic site plan was Figure C-1 in Appendix 3-A of the Brightwater Final EIS

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Data sources: CH2M HILL, INC. / AMEC 2004 / **Prepared by:** PanGEO, Inc.

File Name: Bwater Plant Site Lineament.grf

Figure 2-3

Route 9 Plant Site Lineament and Seismic Refraction Lines

ADDENDUM 3 TO BRIGHTWATER FINAL EIS

Chapter 3
Geotechnical Data for Design of the Conveyance System and Outfall

3.1 Geotechnical Services for Brightwater Conveyance System

In December 2002, King County authorized a project team to begin providing geotechnical services for the Brightwater conveyance system. Phase 1 covers geotechnical investigations to support predesign, both for the land-based conveyance facilities and for the marine outfall. Geotechnical reporting under Phase 1 included preparation of a Predesign Geotechnical Data Report (GDR) (King County, 2004a) that presented all data obtained in the Phase 1 geotechnical investigation and a Predesign Geotechnical Interpretive Report (GIR) (King County, 2004b) that interpreted the data and presented conclusions and recommendations to support design of the Brightwater conveyance system. The Predesign GDR and GIR are incorporated by reference into this Addendum.

A second phase of geotechnical services (Phase 2) will be performed through 2004 to support the final design. Data from the Phase 2 investigations will be included with the Phase 1 data in a Final Geotechnical Data Report (GDR). Geotechnical data interpretation and expanded conclusions and recommendations for the design will be issued as design memoranda supplementing the Predesign GIR.

3.2 Predesign Geotechnical Data Report

A GDR summarizes all data collected for the design of a project. The Predesign GDR prepared by CDM and issued in February 2004 describes the procedures and presents the results of the geotechnical field exploration and laboratory testing completed for the Brightwater project through January 2004. The data covers the Brightwater conveyance system along the preferred alignment, including the effluent pipeline, influent pipeline, portals, outfall, and connecting pipelines and structures. It includes logs of all explorations performed, field and lab test data, and photographs of the soil cores.

Land-based explorations reported in the Predesign GDR include a total of 157 borings, 21 cone penetrometer tests (CPTs), 46 pressuremeter tests, and preliminary groundwater data consisting of 195 observation wells or piezometers and 16 slug tests. Marine outfall

explorations reported include geophysical surveys (bathymetry, side scan sonar, sub-bottom profiling, and single channel shallow seismic profiles), 39 mini-CPTs, 6 gravity cores, 16 jumbo cores, and 6 borings. The Predesign GDR provides additional data and field information in support of the evaluation in the Final EIS.

3.3 Predesign Geotechnical Interpretive Report

The GIR summarizes the geotechnical data in the Predesign GDR and provides conclusions and recommendations intended to be used throughout design of the Brightwater conveyance system. The Predesign GIR presents the following:

- Interpretations of geological, soil, and groundwater data with a level of detail suitable for design and construction.
- Preliminary interpretation and recommendations for seismic design.
- The methods of analysis used to perform specific calculations and the results of these calculations.
- Conclusions derived from these analyses.
- Geotechnical related design recommendations for the portals, including excavation support systems for temporary and permanent lateral loading systems.
- Evaluation of tunneling conditions.
- Preliminary evaluation of trenchless and open-cut methods of installing the various sewer extensions at portal locations.
- Evaluation of geotechnical conditions for the outfall, including methods of construction, slope stability, pipe bedding, sedimentation rates, and settlement estimates.

As the final design progresses, a series of geotechnical design memoranda will be issued. These design memoranda will be based on the current data and supplemented by the Phase 2 geotechnical exploration and testing program. In general this program is anticipated to include site specific explorations and geotechnical testing at the proposed portal locations, along the alignments of the various sewer connections at portals, and at locations along the tunnel alignment to help address specific design issues.

Chapter 4
Final EIS Worst-Case Analysis of Major Seismic Events—Additional Discussion

In response to the additional information set forth in Chapter 2 regarding the potential for a mainland component of the SWIF in the vicinity of the very northern portion of the proposed Brightwater plant site, King County has reexamined, on a worst-case basis, the possible impacts of a disruption of the Brightwater facility that might result from a major seismic event.

The Final EIS concludes that it is not probable that a fault is located under or in the immediate vicinity of plant facilities. The information and analysis included in this Addendum and the incorporated documents support this analysis and conclusion in the Final EIS. The EIS also contains an evaluation of how serious and major seismic incidents in the vicinity of the Route 9 plant site and conveyance system, though highly unlikely, would be mitigated to protect the environment. As the analysis of seismic conditions is in an area that is a topic of ongoing study by the USGS and other agencies, the EIS conservatively includes a "worst case" discussion of risks and mitigation associated with major seismic events (WAC 197-11-080). The contingency for any major event that could result in a plant shutdown, for example, has been analyzed in several sections of the Final EIS. The most extensive discussion is found in Final EIS, Appendix 3-E entitled *Flow Management and Safety Relief Point.* Summaries of the information in Appendix 3-E can be found at Final EIS Sections 3.2.1.8, 6. 3.1.2, 6.3.3.1, 7.2.1.3, 7.2.1.4, 7.3.1.2, 7.4, 9.3.2.1, and 9.3.2.4, and Appendix 3-B, Project Description: Conveyance (pp. 36-37).

The Final EIS discusses how a variety of possible risks at the plant site would be managed during a serious emergency through system design and operation in order to protect water quality. Accidents that result in the unplanned release of contaminated runoff, for example, are addressed in the Final EIS at Section 6.3.1.4. That same section addresses the design feature of redundant tankage and equipment to allow isolation of individual units for inspection and repair. Process tankage will be designed with water stops at the joints to allow movement and prevent leakage. The Final EIS discusses the development of spill prevention and response plans to prepare for and respond to leaks or spills resulting from a range of possible events, including a major seismic event. Thus, it addresses how meeting the building and mechanical code requirements and additional design features would avoid, mitigate, or reduce the impacts of reasonably possible worst-case conditions such as a major seismic event. SEPA does not require the evaluation of impacts that are "speculative," but requires impact evaluation to focus on "likely" impacts (WAC 157-11-060(4)(2)). The EIS specifically explains in Chapter 4

how the requirements of the International Building Code (IBC) would reduce or eliminate a variety of risks to both plant and conveyance facilities. King County is currently developing specific guidelines for the seismic design of the Brightwater facilities in compliance with IBC standards.

If, as part of a worst-case scenario, the Brightwater facilities were disabled by a major seismic event or other natural disaster, the system would have a combined storage capacity of 11.2 million gallons available for use in an emergency event. The Final EIS also discloses that up to 170 mgd of diluted untreated wastewater could bypass the treatment processes at the Brightwater plant site and flow into the effluent conveyance system for eventual discharge into Puget Sound if specific treatment processes were to fail. The goal of this strategy is to assure maximum emergency response flexibility that directs overflows to occur in a highly mixed marine environment, rather than into an urban freshwater body, thereby lessening the impact of the event.

To protect the public health and environmental quality, King County has developed a five-part emergency flow management system: (1) diverting flows to the West Point and South Treatment Plants, (2) diverting excess flows into the existing Logboom and North Creek Storage Facilities, (3) storing flows in new and existing conveyance pipelines, (4) using emergency generators to keep new and existing pumping stations operational in the event of power outages, and (5) diverting untreated or partially treated wastewater through the effluent system and outfall to Puget Sound. Only if all of these measures were implemented and a threat of uncontrolled overflows still remained would wastewater be discharged from a safety relief point into the lower Sammamish River just above the point where the river flows into Lake Washington in the Kenmore area. Section 3.2.1.8 of the Final EIS recognizes that "emergency wastewater overflows could potentially occur during unusual combinations of extremely high storm-influenced flows and multiple equipment and power failures."

The Final EIS notes the existence of a safety relief point (SRP). The SRP provides a discharge location that minimizes impacts to public health and the environment should a catastrophic event occur, and all other contingency measures failed, including a shutdown in the influent pump station (IPS) and the failure of all five steps listed above. As noted above, the SRP would be used if flow diversions, inline and offline storage, and backup power systems all fail. No additional safety relief structure is proposed or needed on the Route 9 site because flows that reach the plant can flow by gravity through the plant to Puget Sound by way of the effluent pipeline, even if the power has failed.

Finally, the likelihood of a sequence of events that might somehow result in long-term shutdown of the plant is highly speculative and a worst-case scenario. Nevertheless, the Final EIS does, in the context of its evaluation of the No Action alternative, address how the wastewater of the service area and region would be transported and treated without the availability of a third treatment plant. The discussion of the No Action Alternative is set forth at Final EIS Sections 1.8.4, 3.2.5, 6.3.4, 7.3.4, 8.3.4, 9.3.5, 10.3.4, 11.3.4, 12.3.6, and 15.3.4 and Appendix 3-J. The No Action Alternative is also discussed in the Regional Wastewater Service Plan Final EIS issued April 1998 (King County, 1998) at Tables EP 2.9 and 3.15.

In summary, none of the new information identified in or incorporated into this Addendum identifies any probable significant adverse seismic impact which has not already been discussed in the Final EIS. This Addendum sets forth and incorporates environmental information that is relevant to the seismic issues and generally affirms and/or elaborates on the information included in the Final EIS. As explained above, the Final EIS worst-case analysis, which includes the possibility of a major seismic event, along with other natural or man-made disasters, evaluates in numerous ways the possible environmental impacts of a major seismic event and reasonable mitigation measures to address such impacts.

Chapter 5
Documents Incorporated by Reference

The following documents, referenced in Addendum 3, are incorporated by reference into the Final EIS for the Brightwater Regional Wastewater Treatment System and are briefly described below, consistent with WAC 197-11-635.

Blakely, R. J., Sherrod, B.L., Wells, R.E., Weaver, C.S., McCormack, D.H., Troost, K.G., and Haugerud, R.A. 2004. *The Cottage Lake aeromagnetic lineament: A possible onshore extension of the Southern Whidbey Island Fault, Washington.* USGS Open-File Report 2004-1204, April 29, 2004.

The U. S. Geological Survey conducted investigations of the mainland extension of the Southern Whidbey Island Fault to provide a more complete review and documentation of the aeromagnetic data discussed in the 2003 preliminary study by Blakely and others (below). The Open-File Report incorporates recently available LiDAR data on the Brightwater Treatment Plant site and conveyance alignment.

Blakely, R.J., Weaver, C.S., Sherrod, B.L., Troost, K.G., Haugerud, R.A., Wells, R.E., and McCormack, D.H. 2003. The Cottage Lake lineament, Washington: Onshore extension of the Southern Whidbey Island Fault. *EOS, Transactions of the American Geophysical Union 84*(46). (Fall Meeting Supplement, Abstract S42A-0149, San Francisco, CA, December 11, 2003.)

This document provides preliminary interpretations of three northwest trending lineaments that might represent potential structural features associated with the Southern Whidbey Island Fault and presents the residual magnetic data upon which the interpretations are based.

Gower, H.D., Yount, J.D., and Crosson, R.S. 1985. Seismotectonic map of the Puget Sound region, Washington. Scale 1:250,000. (U.S. Geological Survey, Miscellaneous Investigations Series Map I-1613.)

This map interprets the location of the South Whidbey Island Fault and its extension onto the mainland.

Johnson, S., Potter, C., Armentrout, J., Miller, J., Finn, C., and Weaver, C. 1996. The Southern Whidbey Island Fault: An active structure in the Puget Lowland, Washington. *Geological Society of America Bulletin, 108*(3), 335-354.

This document interprets the location of the South Whidbey Island Fault and its extension onto the mainland.

Johnson, S.Y., Dadisman, S.V., Mosher, D.C., Blakely, R.J., and Childs, J.R. 2001. *Active tectonics of the Devils Mountain Fault and related structures, northern Puget Lowland and eastern Strait of Juan de Fuca region, Pacific Northwest.* (U.S. Geological Survey Professional Paper 1643.)

This paper interprets the location of the South Whidbey Island Fault and its extension onto the mainland.

King County. 1998. *Final Environmental Impact Statement for the Regional Wastewater Services Plan*. Seattle, WA: King County Department of Natural Resources, Wastewater Treatment Division.

The Final EIS for the Regional Wastewater Services Plan (RWSP) provides a programmatic analysis of four strategies for providing wastewater services to the King County Service Area. It also discusses a No Action Alternative and the impacts that would result if additional wastewater services are not provided.

King County. 2001. *Brightwater Treatment Plant siting process, Phase 1 engineering and environmental constraints analysis*. Prepared by CH2M HILL for King County Department of Natural Resources and Parks. Seattle, WA.

The Phase 1 constraints analysis applied a broad set of engineering and environmental constraints to 95 potential land areas to identify serious problems that would limit the construction or operation of a wastewater treatment facility. The constraints included not siting a treatment plant within 0.5 km of a documented fault.

King County. 2004a. *Predesign geotechnical data report, conveyance system.* Prepared by Camp Dresser & McKee (CDM) for King County Department of Natural Resources and Parks. Seattle, WA.

This geotechnical data report (GDR) presents data collected for use in designing the Brightwater conveyance system along the preferred alignment, including the influent pipeline, effluent pipeline, portals, outfall, and pipelines and structures that connect to the existing King County wastewater system. The GDR includes logs of all explorations performed, field and lab test data, and photographs of soil cores.

King County. 2004b. *Predesign geotechnical interpretive report, conveyance system.* Prepared by Camp Dresser & McKee (CDM) for King County Department of Natural Resources and Parks. Seattle, WA.

This geotechnical interpretive report (GIR) summarizes the geotechnical data in the Predesign GDR (above) and provides conclusions and recommendations for use in designing the Brightwater conveyance system and outfall.

King County. 2004c. *Seismic refraction evaluation Brightwater Final EIS, Snohomish County*. Prepared by AMEC Earth and Environmental, Inc., for King County Wastewater Treatment Division. Seattle, WA.

This report presents the results of seismic refraction and refraction microtremor surveys conducted at the Brightwater Treatment Plant site in April 2004. The survey results are interpreted and compared to the U.S. Geological Survey interpretation of aeromagnetic and LiDAR data that suggested a southeast-trending lineament on the northern portion of the Brightwater site.

Rogers, A.M., Walsh, T.M., Kockelman, W.J., and Priest, G.R. 1996. *Earthquake hazards in the Pacific Northwest—an overview.* (U.S. Geological Survey Professional Paper 1560, pp. 1-54.)

This paper interprets the location of the South Whidbey Island Fault and its extension onto the mainland.

Shannon and Wilson. 2004. Draft report, probabilistic seismic hazard analyses, Brightwater Treatment Plant SR-9 and Portal 41 sites, Snohomish County, Washington. Prepared by Shannon and Wilson for CH2M HILL. Seattle, WA.

This document presents the results of an analysis conducted to determine the level of ground motion that could occur at the Route 9 Treatment Plant site assuming that the mainland extension of the South Whidbey Island Fault is an active feature.

The referenced documents are available for review at the King County Department of Natural Resources and Parks, Wastewater Treatment Division, 201 South Jackson Street, 5th Floor, Seattle, WA, during regular business hours. To schedule a time to review the documents, please call the Brightwater Project Team at (206) 684-6799 or toll free 1-888-707-8571. For accessible formats, call (206) 684-1280 or 711 (TTY).