

# Final Environmental Impact Statement

## BRIGHTWATER REGIONAL WASTEWATER TREATMENT SYSTEM

November 2003

**Brightwater**  
T R E A T M E N T   S Y S T E M



**King County**

Department of Natural Resources and Parks  
Wastewater Treatment Division



## VOLUME 16

Summary of the  
Brightwater  
Summer 2003  
Technical Seminars,  
Including Comments  
Received

**A large map of the system alternatives evaluated in this Final EIS can be found in the inside back cover of Volume 1.**

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



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**Final Environmental Impact Statement**  
for the  
**Brightwater Regional**  
**Wastewater Treatment System**

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Volume 16

November 2003

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.



**King County**

Department of Natural Resources and Parks

**Wastewater Treatment Division**

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# **Volume 16 Contents**

**Summary of the Brightwater Summer 2003 Technical Seminars Including  
Comments Received**



## **Summary of the Brightwater Summer 2003 Technical Seminars Including Comments Received**

**October 2003**

For more information:  
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# Brightwater Treatment Facilities Technical Seminars

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## Brightwater Treatment Facilities Technical Seminars

### Introduction

In response to increased growth in our region, King County is conducting a siting process for a proposed new regional wastewater treatment plant, called Brightwater. The adopted 1999 Regional Wastewater Services Plan found that our growing region needs added capacity from this new wastewater treatment system by 2010 to protect public health and the environment as well as to meet the wastewater needs for the growth projected in the service area and region.

As part on the on-going Brightwater siting process, three technical seminars were held in the Summer of 2003. Each seminar was based on a set of technical reports that presented additional analysis and scientific studies in areas of concern frequently noted in the comments received on the Brightwater Draft Environmental Impact Statement. Along with making these reports available to the public, the seminars offered people a chance to hear the new information before the final Environmental Impact Statement is issued

A month-long comment period accompanied the publication of each set of technical reports. Comments were accepted on this new information before, during and after each of the technical seminars. The technical seminars go beyond the legal requirements of the environmental impact statement process. The comments received will be considered by the Brightwater project team preparing the Final EIS.

This report summarizes the presentations and question and answers from the three seminars:

- Marine Outfall Update — June 7, 2003
- Treatment Plant and Conveyance Update — July 19, 2003
- Additional Scientific and Engineering Studies — August 16, 2003

This report also includes all the formal comments received on the technical reports. The summaries of the seminars provided in this report are meant to capture the main points presented (with clarification as needed) and are not meant to be a verbatim record.

The seminars were advertised in the following ways:

- Paid advertisements in a number of area newspapers
- Mailing a flyer to approximately 60,000 addresses including people on the project mailing list and all addresses within 500 feet of any facility in any of the Brightwater system alternatives. (In many cases it went beyond the 500 feet minimum.)
- Press releases to the media.
- Some local jurisdictions and interest groups promoted the event.

## Seminar Format

The seminars were held on three Saturdays. Meeting attendees were asked to sign in, and were provided with a packet of information that included a blank comment form and curriculum vitae for the scheduled presenters. People were invited to make comments at the seminar using the court reporter or comment form or to submit them to King County any time within the comment periods.

Several rooms, including a display room, a presentation room, and a public comment area, were used. The display room contained informational boards and exhibits and provided a place for attendees to read information about the Brightwater project and speak with project staff on an informal, one-to-one basis. Participants watched presentations and asked questions in the presentation room. The public comment area had a court reporter ready to record comments. People were also invited to make formal comments in writing.

## First Seminar: Marine Outfall Update

King County staff and consultants conducted technical presentations on the marine outfall. The presentations covered geology, engineering, oceanography, dilution, biology and water quality. The presentations were organized into three sessions, with question and answer periods scheduled after each session. A 'Parking Lot' flipchart was available for capturing questions not related to the day's presentation. Parking lot issues would be provided to the staff and addressed in the upcoming seminars.

Jim Simmonds, King County project manager, provided a brief overview on the schedule and past work done on the outfall.

### ***Marine Geology and Engineering***

Kathy Thompson, of Pharos, Inc. reviewed the siting process for the Brightwater Treatment System. She reported that King County has accelerated identification of a recommended portal site for Portal 19, and is now considering the Chevron property at Point Wells.

John Newby, of CDM, addressed marine geology and engineering. His presentation began with a history of Puget Sound geology, including the glaciations that formed the region and the current sedimentation patterns. John reviewed the technologies used to study the seafloor, and laid out areas for future study.

Tom DeLaat, of Parametrix, spoke to the engineering elements of constructing the outfall. He reviewed outfall sites and technology used at other King County treatment plants, as well as regulator requirements for outfall construction and the established goals for the construction process. Tom then spoke to the challenges of placing outfall pipe in a deepwater location and listed ways in which pipe could be placed and different types of piping materials that could be used. Tom mentioned that construction methodologies are continually improving and continuing to look at all possible construction methods and materials will ensure King County selects the best and most competitive construction technique.

## **Question and Answer Session**

- Participants discussed their expectations for the kind of information they expected to get at the seminar and for opportunities to ask questions and discuss issues with experts.
- The group discussed how the outfall would be monitored once built.
- Participants clarified their understanding of the term “nearshore” environment.
- The outfall team clarified that one reason for identifying the Chevron property as the preferred portal site is that construction staging could occur west of the rail tracks and avoid impacts to them
- The group discussed how the diffuser would be built, and how it would avoid being covered in sediments over time. It is important to weigh down HDPE pipe as it can “float” up. This problem is avoided with steel pipe.

## ***Oceanography and Dilution***

Glenn Cannon, of the University of Washington, gave an overview of the oceanography concerns. Glenn provided information on the currents within Puget Sound and close to the outfall sites, as determined in a King County survey. Glenn listed the tools and methods used in the survey, noted locations and depths of both inflow and outflow currents, and demonstrated that both sites would be good locations for an outfall.

Bruce Nairn, of King County, then addressed how dilution of effluent occurs. Bruce reviewed the mixing process that occurs in a coastal outfall, and provided information on the timeframe and the expected dilution that King County expects to meet for the chronic and acute mixing zones around the outfall. Bruce also addressed expected effluent flow rates, current speeds and direction, seasonal influences, stratification, and other elements, and concluded that the outfall would meet or exceed all regulations designed to protect public health so there is no human health or safety risk from operation of the outfall.

## **Question and Answer Session**

- The group discussed seasonal changes in Puget Sound and how mixing would occur in different times of the year. A deep placement for the diffuser provides the best mixing, and keeps the Sound healthy over the long term.
- The group discussed the average depth of the plume (60-140 meters deep) and the unlikely probability of it rising to the surface. One participant suggested it would be useful to have a probability curve showing the odds of a plume breaching the surface. If the plume were to reach the surface, it would be very dilute -- 100 to 1 or higher instantaneous dilution, which easily meets water quality standards.
- Participants discussed how wastewater treatment is handled at landlocked sites elsewhere in the country and the world. Large treatment plants discharge to a body of water such as a river

or ocean. Puget Sound provides an excellent place for mixing and dilution of effluents, and discharging to a river does not provide such a good level of mixing.

- The group learned that no large temperature swings are expected from the effluent. Effluent temperature is expected to be within 10 degrees of the Sound's temperature, and after dilution there will be almost no temperature shift at all.
- The group asked about the current and tidal monitoring equipment.
- The group discussed the fact that tidal effects could reintroduce previously released and mixed effluent back into the dilution zone and that this was accounted for in the modeling.
- The group clarified long-term dilution ratios including the average across all of Puget Sound and at specific locations.
- The group discussed regulatory standards for diffusion, including Department of Ecology standards and Department of Health standards. Based on the data presented, King County is confident of doing better than required standards.
- Asking about the odds of a system failure, participants learned it would require peak flows in a low stratification period and a failure of the plant's dechlorination system to occur simultaneously. This is not likely to happen, and makes the odds of a failure very low. The Department of Health regulations take this into account, and recognize that a failure is very unlikely, but they take a conservative approach in order to protect public health.
- The group clarified that the diffuser could have a longer design if future analysis showed it was necessary.
- The group considered whether some salmonids could swim through the plume and what effect that could have. King County has partnered with federal agencies looking at this issue.
- The group discussed the standards set by the Department of Ecology and the Department of Health. King County expects to easily meet those standards. One participant asked for clarification of potential health risks identified in a study published as part of the Brightwater draft EIS. The project team agreed to research this question.
- Participants asked about other outfalls in Puget Sound and learned they had been considered in the modeling done for Brightwater.

## ***Water Quality and Biology***

Kim Stark, of King County, reviewed biology survey results for the project area. The survey effort began with a review of existing literature and resources to see if enough data were available for a decision. Six studies by the project team were then conducted to fill in the gaps. Kim commented on the methods used, the species studied, and the survey results. Additional reports and more detailed information are available on request from King County. Kim closed by noting that the results of most of the surveys were satisfactory, but that once a final system is selected, the project would be following up with a more in-depth study of eelgrass density and an intertidal biota survey of the final selected site.

Jim Simmonds, of King County, then addressed water quality issues. Jim described wastewater treatment methods, and then described the new membrane bioreactor method that will be used at Brightwater. This is a newer method for treating wastewater, although it has been used in the drinking water industry. King County has tested the new method at other wastewater treatment plants. This method treats wastewater to a higher standard than conventional treatment methods.

Jim then provided modeling results for adding treated effluent to Puget Sound, looking at metals, bacteria, and organic chemicals. He noted that within Puget Sound, almost all chemicals were unchanged on any measurable scale, the exceptions being nitrogen and dissolved oxygen. Jim listed the possible effects of these exceptions, and concluded that the project still expected potential impacts to be well within state standards. Jim listed the ways in which King County plans to monitor water quality once construction is complete.

### **Question and Answer Session**

- Participants clarified some of the numbers used to show the effectiveness of the membrane bioreactor. Some numbers were based on available literature, some of it dated. The membrane bioreactor at Brightwater would be even more effective than the older numbers.
- Participants asked about the equipment used to measure conductivity, temperature, and depth.
- They learned that the project team has recently started to look at hormones, and is participating in a national study on this issue.
- They learned that the Puget Sound environment is nitrogen-limited, so changes in phosphorus will have no effect on phytoplankton growth. They discussed the potential nitrogen increase and dissolved oxygen.
- Participants discussed the siting process and learned that water quality and biological information have been considered throughout. For the sites currently under consideration, there are no visible differences in water quality or biology. In identifying an outfall site, the team is taking into consideration the length of the crossing through the nearshore area, since this is an area with sensitive habitat. The Point Wells area has a much shorter nearshore area, which is one of the key reasons leading to its selection as the preferred alternative. The group discussed the issues that cause the Chevron site specifically to stand out over the Richmond Beach pump station site in the Point Wells area, including eelgrass in the nearshore area and rail crossing issues.
- Participants discussed monitoring schedules. Offshore water column measurements are taken monthly. The intertidal measurements must be taken on a monthly basis to insure safe swimming. While regulations state that sedimentation should be measured every five years, King County generally measures it every other year.
- The group discussed why an intertidal biological survey is not scheduled until 2004, after the site is selected. The intertidal biological survey is only warranted for the preferred site. It will act as a baseline for the chosen site and affect mitigation, rather than acting as an element for site selection.

- Participants wondered whether some of the monitoring program that is currently voluntary could be made mandatory.
- Participants asked how biological and water quality impacts would be considered in developing mitigation for the engineering and construction work elements for the outfall. This will be an iterative process over the next several years.
- Participants asked that the Final EIS have a list of the species affected by outfall construction techniques for the recommended alternative.
- The group discussed state laws regarding Geoduck harvesting in the footprint of the outfall trench and tunnel before construction starts.

## **Second Seminar: Treatment Plant and Conveyance Update**

King County staff and consultants conducted technical presentations about the history and policies that support the Brightwater facility, technology innovations, odor control, the conveyance system, tunnel construction, and plant layout and design for both the Unocal and the Route 9 sites. The presentations were organized into six sessions, with question and answer periods scheduled after each session. This report summarizes the answers given to questions during each discussion period.

### ***Regional Wastewater Services Plan Policy Overview***

Christie True (King County) began the day with an overview of the existing wastewater system and the drivers for building a new treatment facility. Key drivers include the need to provide wastewater capacity for population growth and economic development, meeting state and federal regulations, and meeting the terms of contracts and agreements. Christie also presented an overview of the Regional Wastewater Services Plan (RWSP).

### **Question and Answer Session**

- Regarding reclaimed water production, initially Brightwater will produce up to 5 mgd of reclaimed water for on-site processes and irrigation. As demand increases, more reclaimed water could be produced for off-site customers.
- It was noted that population growth is a key driver for Brightwater. Last year there were 13,000 new residential hook-ups, which was much higher than the anticipated 7-8,000 new hook-ups.
- Regarding costs and cost containment, under the RWSP financing system, in large part, growth pays for growth. New customers throughout King County's wastewater service area will pay a capacity charge to pay for new facilities needed to serve growth.

- People on septic systems who live outside the Urban Growth Area (UGA) will not be required to hook up to the regional wastewater treatment system. Within the UGA, the decision of where and when to build or extend service lines rests with the local wastewater districts and agencies, not King County, though the county does have an obligation to provide service to these districts.
- Participants asked if alternative technologies and systems have been considered. In developing the RWSP, a number of alternatives were looked at, including alternative technologies and the building of smaller plants. It was determined that building a third regional plant was the best option. A membrane bioreactor (MBR) system—an innovative technology for treating wastewater—has been selected for Brightwater.

## ***Wastewater Treatment Technology***

Steve Krugel (of Brown and Caldwell) gave a presentation on the technology innovations planned for the Brightwater treatment plant. He spoke about treatment criteria and flows, process flow, liquid treatment technologies, effluent reuse, solids treatment technologies, digester gas use/energy recovery and beneficial uses of biosolids. He also discussed membrane bioreactors (MBR), the wastewater treatment technology that has been selected for Brightwater. ballasted flocculation

### **Question and Answer Session**

- It was noted that King County is confident in the MBR technology, however, because it is a relatively new technology it is prudent to reserve space should it be necessary to convert to a conventional secondary treatment process.
- The group learned that an advanced primary treatment known as ballasted sedimentation will be used to treat peak flows in the system. The advanced primary effluent will be combined with the high quality MBR effluent to meet discharge standards for secondary treatment.
- The area served by Brightwater is a separated system; there will be no combined flows (wastewater and stormwater) treated at Brightwater.
- The group discussed the disinfection process proposed for the Route 9 site. Sodium hypochlorite, which is a stronger form of household bleach, would be used for disinfection.
- A participant asked about the possibility of the influent pump station being at Portal 41. The current proposal is to have the influent pump station at the plant. If it were to be built at Portal 41, it will be designed to handle pressure in the system.
- The group discussed the emerging issue of residual estrogen in the wastewater. There is little research available at this time on this issue, and King County is participating with other agencies to study it.

## **Plant Layout and Design – Two Concurrent Sessions**

Two concurrent sessions were held on the plant layout and design for both the Route 9 and the Unocal Site.

### ***Route 9 Plant Layout and Design***

Mary Margaret Jones (of Hargreaves Associates) presented design guidelines and the conceptual plans for the Route 9 site. She talked about site characteristics including environmentally sensitive areas. She discussed how the topography at the site, in addition to water features and vegetation, would be used as much as possible to screen the plant and minimize impacts on views in the area. Mary Margaret also asked seminar participants to fill out a questionnaire designed to gather information about priorities for design and features at the site.

### **Question and Answer Session**

- One participant encouraged the Brightwater team to maintain a dialogue with the Audubon Society about birds on-site at Route 9.
- The Route 9 site plans already take WSDOT plans to expand Route 9 into account, including the vegetative buffers, wetlands and stormwater treatment facilities as shown in the current design.
- The north portion of the site will include trails, benches, and other public uses. Areas on the northern portion of the site will be used for regulatory mitigation such as wetland creation. Any future expansion of the plant facilities will occur at the south end of the site, not at the north end.
- Regarding plant security, a security system will be built into the plant. Topographic and water features are being used along with standard security features so security will not be obvious or unattractive. After selection of a plant site the county will work with local emergency response agencies to meet their requirements, both during construction and operation.
- King County will work with the City of Woodinville and other local jurisdictions to ensure that design plans are coordinated with their planning guidelines and long-range plans.
- In response to questions about grading on the Route 9 site, cut and fill will be minimized as much as possible during the construction, with the goal of using as much of the material on site as possible.
- Landscaping and topography will be used to screen the plant. A variety of trees will be planted. Some of them will be fast-growing in order to provide screening early on. Reclaimed water will be used for irrigation.

## ***Unocal Plant Layout and Design***

Sian Roberts, Miller Hull Architects, and Jim Goetz, CH2M Hill, presented the proposed design and layout for the Unocal site. Jim's presentation focused on site characteristics, plant impacts to the local environment, site grading and construction phasing, landscaping plans, visual impacts, and the construction of retaining walls on the site. Sian Roberts discussed three design options, based on the different treatment capacities at the plant. The Unocal presentation also included an overview of the lid design that would have to be built if the site were to be used as an multi-modal transportation hub. Sian also asked participants to fill out a questionnaire designed to gather information about priorities for design features at the site.

### **Question and Answer Session**

- In response to a question on view impacts, the plant at Unocal has been designed to minimize impacts on views.
- It was noted that the 72 mgd sub-alternative would only be built if the cities of Lynnwood and Edmonds choose to have their wastewater treated at the Brightwater facility. Currently both cities operate their own wastewater treatment plants.
- The group discussed potential impacts to Willow Creek. If secondary clarifiers are needed, they would be located close to Willow Creek. In the 72 mgd sub-alternative, there is the potential that a portion of the creek would be relocated; however, the county would work to maintain or improve its function.
- A question was asked regarding a small wetland shown on the site plan. This is a small area of groundwater discharge on the site. A buffer, or wetland, area would be designed around it. Wetland mitigation would be required if this area were displaced.
- What is the cost for the structural lid? The current estimated cost for a structural lid at the Unocal site (as described in the Draft EIS) is \$239 million. New construction and mitigation estimates will be published along with the FEIS.
- What would happen to the proposed condominium project at the Unocal site if it is selected for Brightwater? King County is aware that permitting is underway for a condominium development at the south end of the Unocal property. This development would not be built in this location if the Unocal site is selected for Brightwater. Therefore the combined impacts of Brightwater and this condo development have not been evaluated.
- It was noted that stormwater from the structural lid would be channeled off, collected and treated through the stormwater system at the plant site.
- The group learned that the preferred landscaping trees would be either natives or species that are known to grow well in our area.
- The group discussed the possibility of an educational or interpretive building at the Unocal site. If it were built, it is more likely that it would be off-site because the plant site is so constrained.

- There were questions about the challenges of building Brightwater at the Unocal site, including the design and function of the dewatering system during construction, what would be necessary to make certain that water levels in the nearby marsh are not significantly affected, and the pilings that would be needed because of liquefaction in the area.

## ***Air Quality and Odor Control at the Plant Sites***

Jay Witherspoon (of CH2MHill) presented information on odor control and air quality at the two proposed Brightwater sites. Jay discussed King County's commitment that Brightwater will have no odors at the property line 24 hours per day, 365 days per year. Jay talked about the compounds that create odors, and the process for scrubbing them from the air. He also discussed the tools that will be used to measure air quality emissions and prevention.

### **Question and Answer Session**

- There were a number of questions about controlling odors during power outages and during maintenance. The treatment plant will have multiple power sources and about 20% of the electricity for the plant will be generated on-site, so odor control facilities may still be operating during power outages. There will be multiple odor control units to handle these situations. All operations will be enclosed to prevent odors from escaping.
- Regarding biosolids handling, the trucks are fully enclosed in buildings during loading. Doors are only opened after the trucks are loaded and covered so no odors escape. If an accident were to occur King County would respond according to a well-established contingency plan and clean up the area quickly.
- Regarding handling of chemicals used at the plant, there will be a site safety plan in place and the county will meet all safety measures required by local permits.
- There were questions related to development of the odor control system. The county's odor control modeling has been based on "worst case" conditions that include times of highest odor generation combined with times of little air movement. The Brightwater odor control system will be designed so that it is not depending on winds to disperse odors. The modeling also takes into account a range of processes and odor compounds that could be emitted.
- In response to questions about a possible odor control reserve fund, King County is evaluating the cost of establishing additional odor controls. The county will set up an advisory committee that could make recommendations for action if established odor control goals are not met.
- The participants learned that digester gas will be used to generate power at the plant. Enclosed flares with high burn efficiencies will be used for any gas not otherwise used at the plant.
- The group discussed King County's newly adopted odor control policy for all new wastewater facilities which states that new facilities can not release odor more than fifty times per year. For Brightwater, the county is proposing to go beyond this, preventing odors from leaving the property 365 days per year.

## ***Conveyance System Update***

Edith Hadler (of HDR Engineering) presented an update of the Brightwater conveyance system. Edith began the presentation with an overview of the project refinements put in place since the Draft EIS, including extended tunnel drive lengths, fewer portals and maximizing the use of the public right-of-way. She then discussed the permanent conveyance facilities, including their size and appearance, the locations of portals and tunnels, odor control, and long-term maintenance. Edith concluded with a discussion of the potential impacts and mitigation associated with the conveyance system.

## **Question and Answer Session**

- More details about the Route 9 conveyance system odor control were provided. Sodium hypochlorite, a strong version of household bleach, would be added in the influent line (before untreated wastewater reaches the plant) to prevent odors. This is the same compound that would be used at the plant for disinfection.
- There were a number of questions about property appraisal, acquisition and relocation for properties needed for the project. King County must follow federal laws covering property acquisition and relocation. In some cases assistance can be provided for relocating residences, businesses or tenants. Detailed information on this acquisition process is available from the county.
- In response to questions about the tunnel alignment and structures at Portal 19, the county is currently refining the conveyance alignment for the preferred alternative; it appears that the tunnel will come into the southern tip of the Chevron facility and will not run through the City of Woodway. There are two underground facilities proposed for this portal: a sampling facility and transition structure.
- There were questions concerning the impact of the pipeline when it has to cross streams and if the drilling will occur under parks and schools. The conveyance system will cross under several creeks, but the tunnel will be deep enough that it will not affect water quality in those creeks. Wherever, possible, the conveyance system will follow public rights-of-way (streets) and avoid private property. The county has extensive data on the geology and groundwater throughout the study area and is designing the tunnel depths to avoid any significant impacts to groundwater resources.
- There were questions about conveyance system odor control. King County is committing to the same odor control standards in the conveyance system as at the plant site. The county will use the best possible technology to achieve this.
- There were questions about stormwater entering the conveyance system and what storage would be needed to handle this. In general, stormwater will not be conveyed in the Brightwater system. However, some stormwater and groundwater can enter the system through leaks found mainly in local sewer systems. This can cause high flows during storms. The influent tunnel is designed to provide storage capacity for high flows. The effluent line discharges to Puget Sound and is not designed to provide storage.

- Regarding earthquakes, the Brightwater conveyance system does not cross any known earthquake faults.
- In response to a question about the Richmond Beach treatment plant, it has been turned into a pump station. The wastewater that used to flow there now goes to the Edmonds plant.

## ***Building the Brightwater Tunnels***

Dan Adams (of Jacobs Associates) presented information on the construction of portals and tunnels for the Brightwater project. Dan began the presentation with a brief overview of tunnel segments and a definition of terms. He then discussed use of the tunnel boring machine (TBM) and the three stages of portal construction – initial support/ground improvement, excavation/depressurization, and placement of invert slab and lining. He also discussed the major steps of tunnel construction including excavation, initial lining, soils removal, and annulus grouting. He also discussed when secondary lining was appropriate. Throughout the presentation he commented on the groundwater control technology that will be applied both in portal and tunnel construction.

## **Question and Answer Session**

- A tunnel boring machine (TBM) will move approximately 250 feet per week.
- Approximately 6 trucks per day will be needed to remove spoils during slurry wall excavation. Up to 20 trucks per day will remove spoils during the portal excavation.
- Details were provided about how the TBM slurry mix is kept from entering surrounding groundwater at the face of the boring machine. When the TBM goes through clay or impervious soil hydrostatic pressure keeps the slurry in place. In more pervious areas (sand and gravel), the slurry goes through mild compression, fills the voids in the surrounding earth and becomes self-sealing.
- Regarding repairs to the TBM, digging equipment bolted to the front of the machine can be accessed from behind the front of the machine. In stable ground conditions, the cutter head can be retracted slightly so it can be accessed for repairs. In pervious material, compressed air is used to stabilize the earth at the front of the machine so it can be accessed for repairs.
- There were questions about the portal site, including size and working in storm conditions. Working portals are about two acres and receiving portals are a bit less than one acre. The actual footprint of the portals will typically be about 50 feet in diameter for working portals and 25 feet in diameter for receiving portals. Regarding working in heavy rains, stormwater runoff has been calculated for typical portal sites and working conditions.
- How do you guide the TBM? A laser is set up at the launch site. As the TBM advances, a laser beam and computer keep the TBM on track. The laser is moved and reset as the machine advance. The position is also checked manually.

- The group discussed secondary portals. These have been identified, but are not expected to be used for construction of the conveyance system. However, if future analysis shows that one is needed, activity at a secondary portal would be much less than at a primary portal. It is unlikely there would be any permanent structures except for manholes.
- After construction, when and how will tunnel inspections be done? It is expected that inspections will be done in 10 or 30 year intervals, most likely using remote operated vehicles. If necessary, the tunnel could be de-watered for manual inspection.

## **Third Seminar: Scientific and Engineering Studies**

King County staff and consultants conducted technical presentations on the Scientific and Engineering studies that have been conducted for the Brightwater facility, including geologic and hydrologic studies, construction techniques and options, groundwater and stream flow monitoring studies, soil analyses, and site design/layout studies, for both proposed plant locations and the sites and facilities along the conveyance corridor. The presentations were organized into five sessions, with question and answer periods scheduled after each session. The questions and answers provided in this report are meant to capture the main points presented (with clarification as needed) and are not meant to be a verbatim record.

### ***Overview of what it will take to design and build Brightwater***

Don Davis (of URS) provided a summary of the project process and schedule for the next eight years. He covered the design and construction phases and explained the project delivery process including design services, procurement, construction, testing and operation. He reviewed the project design, including engineering and architectural services, design and safety standards, codes, ordinances and permitting, and value engineering. Don explained the contractor procurement method of General Contractor/Construction Manager (GCCM), and covered construction elements, alternatives, and impacts at the two proposed sites, along the conveyance corridor, and at the outfall location.

### **Question and Answer Session**

- The group learned more details of the bidding and contracting processes the county is considering and about cost estimates for different conveyance alternatives.
- There was discussion about the selection and use of membrane bioreactor (MBR) technology.
- There were questions about the influent pump station options for Route 9. The county clarified that an influent pump station at the treatment plant site is being considered in the FEIS, but the county is also looking at an alternative for a pump station at Portal 41.
- More details about the permitting timeline were provided. The county is working with permitting agencies and jurisdictions to facilitate the permitting process.

- Details were provided about how Brightwater and the regional system would operate during a power outage.

### ***Geology and Groundwater Analysis***

Doug Hillman (of Aspect Consulting) provided an overview of regional groundwater and geology conditions, and the work that has been completed to address comments made on the DEIS. He reviewed conveyance explorations, soil boring results, and the upcoming work for the geo-technical design phase of the conveyance corridor facilities. Doug also reviewed the history of regional geology and clarified the terminology used in the scientific studies. He provided an overview of the area's hydrogeologic conditions, mapped water supply districts, aquifer protection areas, and groundwater balances.

Joan Stoupa (of CH2M Hill) followed up with an overview of the proposed treatment plant layouts based on groundwater research that has been conducted since the Draft EIS. She highlighted where facilities will be located for both least impact and the best surface and groundwater management. She reviewed soil removal needs, excavation depth, and structural elevations. Joan also provided the results of on-site borings.

### **Question and Answer Session**

- Regarding the geotechnical information that is being collected, an additional 109 geotechnical test borings have been completed since the DEIS was issued, providing geotechnical information for the Final EIS. Analysis will continue through design and construction.
- There was discussion about well head and water supply protection. The county noted that it has been working with water districts to protect wells and aquifers. It is carefully studying groundwater and aquifers throughout the region in the FEIS. More specific work analyzing shallower wells along Little Bear Creek will continue.
- The county clarified that it will be building only one treatment plant, which will serve the region through 2040. Only one of the two sites now being looked at will be used.

### ***Groundwater Control and Protection***

Larry West (of SLR) talked about groundwater issues at Unocal and Route 9 sites, and explained the dewatering needs and mechanisms that would be required at each site during construction. He outlined potential impacts to aquifers, under-drains required once the plant is in operation, anticipated dewatering flows, and potential draw-down impacts to surrounding wells. He also explained aquifer protection during construction and operation.

John Newby (of CDM) presented the dewatering needs for the conveyance system. He discussed the options to minimize impacts, system needs, inflows at portals and tunnels, and expected dewatering impacts to groundwater quality and levels as well as to stream flows.

## **Question and Answer Session**

- There were a number of questions related to dewatering and potable water supply. King County does not anticipate any significant impacts on groundwater, water supply, or future drinking water wells. King County will provide potable water if necessary. No one will be without water as a result of this project.
- More details were provided regarding tunnel construction and reliability. The tunnel liners are designed and constructed to withstand earthquake impacts. The design life of the tunnels and liner is 100 years. Seepage into the pipes is expected to be insignificant.
- Presenters described the seals that would be built to keep large quantities of groundwater from entering the construction areas.
- There were questions about the affects of dewatering and draw-downs at the Route 9 site on wetlands and Little Bear Creek. Any groundwater pumped at the Route 9 site would be put back into Little Bear Creek and could also be used to augment wetlands. As a result no adverse impacts to creek flow from dewatering are expected.
- It was clarified that groundwater encountered during construction will be continually monitored and treated.
- It was clarified that the Intercity aquifer is mentioned in the technical reports. It's referred to as a QVA Aquifer which denotes the geologic makeup of the aquifer.

## ***Streams and Wetlands***

Pete Sturtevant (of CH2M Hill) reviewed impacts to streams, wetlands and surface water from the proposed treatment plant sites. He talked about potential impacts from construction and stormwater runoff, stream relocation, and approaches to reduce, mitigate, and treat stormwater. He explained water quality and source control, and best management practices including water diversion, erosion and sedimentation plans, and discharge monitoring. He also explained efforts to reduce turbidity and contamination, and he reviewed dewatering options.

Edith Hadler (HDR) presented information about stormwater management along the conveyance corridor and at the portal sites. Edith also covered groundwater control for the tunnels and other conveyance facilities, potential discharge options, impacts to surface water, and mitigation options for these potential impacts.

## **Question and Answer Session**

- There was discussion about how the project could affect stormwater and groundwater flows to Little Bear Creek. The presenters noted that hydrologic modeling has shown that the proposed stream diversions around the project site would have minimal flow impact. The additional stormwater detention and treatment provided by the project would reduce peak stormwater flows to the creek.

- Details were provided on how runoff will be handled during construction. Stream diversions will be installed to address direct surface runoff. Erosion control systems will be in place before any construction activities begin. Runoff will be handled by erosion control fences, sediment ponds and other practices.
- There were a number of questions concerning potential impacts of tunnel construction on groundwater and surface water flows. The portals and tunnels will be constructed so there is intimate contact with the soil, so that there is no water running down the sides or laterally along the tunnel.

### ***Traffic Impacts and Mitigation***

Tim Bevan (of CH2M Hill) reviewed traffic impacts at the proposed plant sites, explaining the methodologies used and new analyses completed since the DEIS. He provided additional traffic data, including traffic impacts during plant construction and operation. Tim outlined proposed mitigation measures for intersection locations, alternative parking and truck holding facilities, and development and implementation of traffic management plans in coordination with local jurisdictions. Finally, he talked about coordination between WSDOT and King County regarding the phasing of construction of Brightwater and the proposed SR 9 widening project.

### **Question and Answer Session**

- In response to questions about Unocal truck haul routes, it was noted that trucks will follow SR 104 heading east, avoiding Admiral Way. The county will include summer and weekend ferry traffic when analyzing the three truck holding area options.
- Details of the SR 9 widening project were discussed. The project is funded and scheduled to be completed by the end of 2006. The county is meeting with the state to reduce overlap in construction schedules. Snohomish County has asked that King County not assume the completion of the Route 9 project when doing traffic analyses. Therefore, traffic calculations are based on current conditions.
- There were questions and discussion about traffic impacts and analyses for the Route 9 alternative. Regional growth figures provided by the Puget Sound Regional Council traffic forecast model have been used in the analyses. Transportation improvements proposed by Kenmore and Bothell have been included. For the Route 9 alternative, biosolids trucks would take SR 522 to I-405 south, then I-90 to eastern Washington.
- In response to using rail and barges for construction, it was noted that both of these options have their own environmental impacts and may require more storage area on-site. The county analyzed these options and determined that it is better to use truck hauling for construction.

**A**  
**COMMENTS RECEIVED ON**  
**TECHNICAL REPORTS**

**FINAL**  
**ENVIRONMENTAL**  
**IMPACT STATEMENT**

**Brightwater**  
**Regional Wastewater**  
**Treatment System**

**TECHNICAL SEMINARS**

# **Attachment A: Comments Received on Technical Reports**

## **Comments received on marine outfall update technical reports**

- Washington State Department of Health
- Snohomish County Planning and Development Services
- Port of Edmonds
- Comments of Al Rutledge from June 7, 2003 technical seminar

## **Comments received on treatment plant & conveyance update technical reports**

- Snohomish County Planning and Development Services
- City of Woodinville
- Town of Woodway
- Port of Edmonds
- Davis Wright Tremaine LLP
- John Pearson
- K.L. Thompson
- Jerry Tiberio

## **Comments received on additional scientific & engineering studies technical reports**

- Snohomish County Planning and Development Services
- City of Woodinville
- Cross Valley Water District, including Robinson & Noble memoranda
- Olympic View Water & Sewer District, including Robinson & Noble memoranda
- Port of Edmonds
- Little Bear Creek Protective Association (email)
- Philip Grega
- Comments of Eric Teegarden and Philip Grega from August 16, 2003 technical seminar

**Brightwater Technical Seminars and Reports**  
**Comments received on marine outfall update technical reports**

## Grothe, Ann

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**From:** david.freed@metrokc.gov  
**Sent:** Friday, June 20, 2003 9:24 AM  
**To:** ntfbw.eis2002@metrokc.gov  
**Cc:** david.freed@metrokc.gov  
**Subject:** Comment on Marine Outfall technical information

Date: Jun-20-2003  
Time: 09:24AM  
IP Address: 192.230.14.31

Name and Address:  
Frank Meriwether  
DOH Shellfish, PO Box 47824  
Olympia, WA  
98504-7824

Email (optional): frank.meriwether@doh.wa.gov

Subject or Report Title:  
DOH Shellfish Closure Zone Assessment

**Comment:**

I have three comments from the Shellfish Program of the WA Dept. of Health (DOH) for your consideration and use, as follows:

1. DOH will need to complete a shellfish closure zone evaluation for the proposed Brightwater WWTP outfall. Bruce Nairn has been instrumental to date in providing data to DOH for this purpose. However, a final closure zone evaluation has not yet been completed by DOH. We expect to complete this evaluation in the near future when further decisions on the outfall location, diffuser configuration and (maximum monthly) plant design flows are determined by King County.
2. We (DOH) would like to receive further information on the predicted effluent concentrations on the shoreline predicted by the Princeton Ocean Model (Section 3.1.2.3 of the Diffuser Predesign report), including when the effluent is predicted to reach the shoreline during the projected ten-day period.
3. DOH will incorporate performance data from Membrane Bioreactor (MBR) Treatment in the shellfish closure zone analysis if this component is consistently used in treatment plant operations. Therefore DOH will need to obtain information on removal efficiencies of TSS, bacteria and viruses by the MBR process selected by King County, as achieved at higher design treatment flows in the proposed WWTP.

Thank you.



Snohomish County

Planning and Development Services

Robert J. Drewel  
County Executive

June 30, 2003

**RECEIVED**

JUL 1 2003

ENVIRONMENTAL  
PLANNING DIVISION

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Environmental Planning  
King County Wastewater Treatment Division  
201 South Jackson Street  
KCS-NR-0505  
Seattle, WA 98104

Re: **Brightwater Marine Outfall-Technical Reports for Seminar #1-Marine Outfall  
Snohomish County Response**

Dear Sir or Madam:

This letter and the attached memorandum prepared by DMJM Harris constitutes Snohomish County's response to the *Brightwater Marine Outfall Technical Reports* document issued May 30, 2003. Please note that these comments do not constitute an acceptance or approval of the Brightwater proposal, substitute for a supplemental EIS, or preclude Snohomish County from raising new issues or requiring additional information in the environmental review and permitting process.

Although there is a great deal of information contained in both the DEIS and the technical report, the *Brightwater Marine Outfall Technical Report* lists numerous supporting technical references which, if not already available, should be made available on-line in a single location.

**Project Description: Marine Outfall**

1. The purpose of the document (section 2.0) should also include impact assessment, impact analysis, and probable mitigative actions to address impacts. There is a significant lack of discussion of impacts, expected or potential, to assist in guiding alternative selection and mitigation needs.
2. Section 6.1.1.1, page 9, states that trench sheeting, if selected would be placed either above or below the water surface at the contractor's discretion. Please provide analysis of potential impacts from turbidity and explain how sheeting below the water surface would not create additional impacts greater than sheeting placed above all water surface elevations. Is there a reason or benefit other than cost savings to support using this option? If turbidity or other impacts are not expected to violate water quality regulations, it would be helpful to substantiate these claims based on water-quality construction monitoring for other major Wastewater Treatment Division projects in the marine nearshore.

3. Section 6.1.1.2, page 10, please elaborate on the "damage" to the sea floor that would be caused by spuds, and what type of Best Management Practices or mitigation would be required.
4. Section 7.1, page 13, for Zone 7S, states the conveyance tunnel portal would be placed at Point Wells and reach a depth of 40 feet below the ground surface. Please confirm that design, engineering, and construction of this portal addresses hydrostatic pressure from Puget Sound and upwelling that would occur. Has this been accounted for in analysis of potential portal locations nearest to the outfall that are under consideration as alternatives? How will you address the potential for generation of significant surface water discharge given the expected hydrostatic pressures?
5. Section 8.2, page 15, here and in other cases "on-going investigations" are alluded to. Please provide which additional investigations are underway, what the objectives are and how new information will be incorporated into design, engineering, or siting decision-making.
6. Please confirm from the Washington State Departments of Fish and Wildlife and the Department of Natural Resources, local and appropriate federal authorities that no species related "work-windows" exist for Puget Sound shorelines and nearshore areas that would prohibit non-stop construction activities, especially open-trench construction.
7. King County proposes to conduct monitoring based on its NPDES permit. The outfall diffusers appear to be within Snohomish County. Please clarify what jurisdiction's NPDES permit would apply. Please provide more detail as to what monitoring is required and what is strictly voluntary and could be terminated.
8. Since the Surface Water Management (SWM) water quality investigations team will most likely be contacted should any water quality problems or compliance questions arise at the outfall, SWM's water quality section should be involved in (or at the very least informed of) the negotiated NPDES permit as it pertains to the water quality monitoring plan.
9. The document that discusses planned monitoring activities is the *Proposed Routine Monitoring Plan for the Receiving Environment in the Vicinity of the Brightwater Treatment System Marine Outfall*. This document is pending and should be made available as soon as it is out for review.
10. The Brightwater Marine Outfall Technical Report discusses potential soil and groundwater contamination as it affects the project and how construction methods may be chosen/alterd if contamination exists—it does not address how (or if) the project is expected to affect soils and groundwater.
11. Section 6.1.1 (page 8) states that, if required, trench shoring (sheeting) could also be installed ahead of the trench excavation and that sheeted trench construction could be used to minimize environmental impacts in areas of sensitive nearshore habitat. The allowed chronic mixing zone is 200 feet plus depth. The acute mixing zone is only 10% of the chronic mixing zone. Either explain how turbidity standards will be met at the margin of the chronic

mixing zone with water depths less than 80 feet or stipulate that sheet piling will be used to minimize impacts to the benthic environment and minimize the suspended sediments.

12. The section appears to assume that the sensitive nearshore habitat, such as *Zostera* beds, are the only environment to be protected. Please provide analysis of impacts to all species and habitats.

#### **Nearshore Alignment and Construction Method Alternatives**

13. Recommendations, #1, footnote 1, states that, "other factors...will be analyzed and taken into account before any final portal site alternative is selected." Please specify what these "factors" are and if selection is still dependent upon generation of additional data or information.
14. Section 1.2, Objective. Given the dearth of environmental information and analysis provided in the DEIS and in the Technical Memos, it is inappropriate to assume (given the lack of data provided other than for eelgrass and sandy beaches) that the condition or value of the range of habitat types and functions provided in nearshore are not environmentally sensitive without providing a definition of such based on regulatory statutes. Information provided by Kim Stark on June 7 was reassuring in that it appears King County is making a comprehensive inventory and assessment effort to characterize the distribution, condition and value of aquatic resources. It is still unclear how the available information will be used in a transparent impact analysis process to evaluate alternatives proposed.
15. Section 1.3, page 6, paragraph 4 indicates sparse if any sensitive marine habitat exists based on Figure 3, which depicts MOSS vegetation and sediment survey information. MOSS surveys did not collect data from the area north of the Unocal oil dock. We suggest that King County or its consultants review and document other resource information including WDNR shorezone information, WDFW sandlance, herring and surfsmelt spawning, WDNR shoreline oblique aerial photos, Pentec Environmental Tidal Habitat Model reporting for City of Edmonds and City of Mukilteo, and any other potential sources of information.
16. Section 3.6 (pages 15-16) states that open trench construction probably would use a clamshell dredge for excavation and identifies Turbidity Impacts as a potential adverse impact. Sections 3.7 and 3.71 (on page 16) indicate that excavated materials probably would be stockpiled on barges for disposal either on land, as backfill, or in open water. Please provide specific BMPs that would be used to contain turbid water from migrating beyond the allowed mixing zone (200 feet plus water depth), especially at shallow water depths.

#### **Diffuser Predesign**

17. Please provide clarification that Diffuser Design Goals are design criteria and not performance criteria, especially with regard to trapping depth. It is very clear that the trapping depth design criteria will not provide a corresponding level of performance. As it is recognized by all that trapping depth performance will not be met 100% of the time, please provide an estimate based on the modeling described by Dr. Nairn as to how often this would

occur (once a year? once every 20 years?), what likelihood would exist for effluent plume to contact nearshore habitat and shorelines and how this would alter the accumulation dilution ratios after these occurrences. Provide this evaluation for each diffuser length alternative.

18. Please show the King/Snohomish County line extending westerly to the administrative boundary on all figures. Show both alternative outfall alignments and diffusers for Zone 7S relative to the county line.
19. Please include all available and relevant habitat or species information for all figures depicting Marine outfall zones, alternative alignments or potential construction areas (footprint). It would be helpful to include reproductions of WSDOE shoreline aerial oblique photos. Please include information from MOSS or other King County projects (including documented forage fish occurrences, geoduck transects, algae, eelgrass and sediment), WDNS shorezone inventory data (available in GIS format) and SDFW PHS distribution data, such as forage fish distribution information.
20. Section 3.1.2 (pages 4-6) states that the model used to evaluate the discharge plume indicated that current speed, plant discharge, and density stratification were the primary factors that impacted the size of the effluent plume, and that the model predicted the required length of the diffuser. Analysis for Near-Field Dilution (Table 1) and for Effluent Plume Submergence (Table 2) included results based upon AWWF (average wet weather flow). Under what regulatory purview were the analyses conducted under average conditions as opposed to peak flow conditions?
21. Please provide the analysis for the reported peak flows of 83 mgd at plant startup (in 2010), of 129 mgd at plant expansion (in 2040), of 170 mgd (at saturation in 2050), and of 235 mgd (for Brightwater and Edmonds and Lynwood in 2050). The peak flow data is found in Table 4 on page 17.
22. Table 1 includes data for 72-mgd while Table 2 only includes data for 54-mgd. Since the design should be for the maximum anticipated flow, why were the plume analyses only reported for the 54-mgd discharge level? Please provide the Minimum Submergence depth for 72-mgd.
23. Table 1 and Table 2 indicate that the diffuser depth at Zone 7S will be 660-feet (MLLW). However, the bathometry chart provided in Figure 11 indicates the diffuser depths will be 605-615 feet. What is the computed diffuser length necessary to meet the -70-foot "ceiling" with the conditions indicated in items 2-4 (above) and item # 16.
24. What changes in the Effluent Plume Submergence results occur when the Spring and Fall conditions are apparent?
25. Section 3.1.2.2 (page 6) identifies arsenic as a component of the discharge and states that the potential human health risk is minimal. However, the report indicates that there will be an increase of approximately 1% in human cancer risks and 7% in non-cancer health risks.

Clarify the text to reflect information presented at the June 7, 2003 technical seminar that seemed to clearly describe and show a risk that was far below accepted health standards.

26. Section 3.1.2.2 (pages 6 and 7) states that levels of chemical contamination were below the MDL (method detection limit) of the analytical equipment used to measure water quality parameters, and that the future potential risk to benthic aquatic life was negligible. However, paragraph 3 of this section states that the monitoring equipment was not sensitive enough to measure concentrations at the required toxicity threshold. Please provide more detailed analysis of the three chemicals (chlorpyrifos, 4,4'-DDT, and 2,4-dichlorophenol) by using equipment that is designed to measure concentrations below the regulatory threshold.
27. The next to last paragraph of Section 3.1.2.2 (page 7) is unclear. The measured concentration of organisms was divided by the lowest modeled dilution at the margin of the acute mixing zone. The next sentence states that the comparison at the edge of the mixing zone should pose no significant risk to people in the intertidal area. The paragraph concludes that the risks from other microorganisms are expected to be low. Please re-write the paragraph so that there is only one subject, either microorganisms or people. Please explain what is meant by the concentration of organisms divided by the modeled initial dilution. If this is an attempt to address red tide and PSP, then develop that discussion.
28. To date, the benthic community associated with the outfall and diffuser locations has not been evaluated for potential short-term (construction phase) and long-term (operation phase) impacts. Please provide a benthic community analysis that includes a list of organisms and their abundances in the existing benthic communities at the proposed diffuser sites and a discussion of the changes in the benthic community that are anticipated.
29. Provide an evaluation of the sensitivity of the planktonic larvae of the identified benthic invertebrates. Include a coherent analysis and explanation of the chemical and physical factors associated with the effluent plume at the acute mixing zone and at the chronic mixing zone boundaries to which these organisms have been demonstrated to be sensitive.
30. Include an analysis of thermal impacts. Appendix A appears to indicate that the effluent water will have a temperature of approximately 15.5°C. What is the ambient temperature during winter and what is the predicted temperature at the chronic and acute mixing boundaries?
31. Section 3.1.2.3 (page 7) reports the use of a POM model. The paragraph concludes by stating that a number of modifications were made to the model to simulate processes that are important within Puget Sound. Since this model was used to evaluate diffuser length and depth, the model and the parameters are important; Please describe the parameters and components of the model, including the design assumptions.
32. Please state each of the parameters that were modified and explain the direction and magnitude of the modification.

33. Section 4.3 (pages 9 and 10) addresses the recommendation for a safety factor in the design of the effluent mixing zones for regions that experience tidal currents. The conclusion is that there is no need to include a safety factor because the -70 foot ceiling for mixing is a part of the design criteria for the effluent pipe length and that the area exhibits strong ambient density stratification. The paragraph concludes by stating that the dilution is sufficient to provide human safety. The rationale to eliminate the safety factor is not supported. The occurrence and strength of vertical stratification is seasonally variable. As specified in items # 12, 13 and 14, the potential impact to aquatic life and habitats has not been reported. The peak flows were not used in the analyses. The model was modified to specific conditions in Puget Sound, but the changes to the model were neither identified nor quantified. Consequently, the recommended safety factor (dilution ratio of 0.5) will be a design requirement.

Thank you for this opportunity to comment on the Draft EIS for the Brightwater Sewage Treatment Plant. Snohomish County looks forward to working with King County's Department of Natural Resources to address all issues regarding the Brightwater sewer treatment plant, conveyance and outfall.

Sincerely,



Faith L. Lumsden, Director  
Planning and Development Services

cc. Robert Drewel, County Executive  
Snohomish County Council  
Peter Hahn, Director, DPW  
Rick Bart, Snohomish County Sheriff  
Ron Martin, Director, Parks and Recreation  
Barbara Dykes, Chief Civil Prosecuting Attorney  
Shawn Aronow, Deputy Prosecuting Attorney  
Shelley Kneip, Deputy Prosecuting Attorney  
Randy Sleight, Chief Engineering Officer  
Stephen Dickson, Assistant to the Director, DPW  
Susan Scanlan, Principal Planner

# Technical Memorandum

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**To:** Steve Dickson – Snohomish County

**Subject:** Brightwater Technical Document Review; Seminar 1 Outfall

**From:** Aaron Silver, PE – DMJM+HARRIS

**Date:** June 27, 2003

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## General

We have reviewed the technical documents for the Outfall Group as issued by King County and have presented all of our comments including observations and questions in this technical memorandum. The Outfall Group consist of the May 2003 “*Brightwater Marine Outfall Technical Reports*”, prepared by Parametrix, Inc. for King County. This document comprises three technical memoranda that summarize information contained in the DEIS and its appendices, as well as limited additional analyses. These memoranda do not address the specific comments provided in the January 2003 DMJM+HARRIS review document.

## Project Description: Marine Outfall. May 2003

- This first technical memorandum summarizes DEIS information, as well as additional analyses and recommendations contained in the other two technical memoranda.

## Nearshore Alignment and Construction Method Alternatives. May 2003

- This technical memorandum discusses the different construction techniques available for the onshore and nearshore portions of the outfall, and recommends use of open-trench methods for all alternatives except for the outfall in Zone 7S with staging at Richmond Beach, for which microtunneling is recommended. Nevertheless, the option of microtunneling at the other sites is retained, pending additional pre-design investigations.
- The conclusions presented in this memorandum are reasonable. They are, however, based on general considerations, and the memorandum could be improved by reducing the repetitions and providing more specifics. For example:
  - The possibility of impassable barriers is given as one of the main reasons against microtunneling. However, the likelihood of such barriers is not clear at all and it could be resolved with exploration. Thus, this reason may disappear. Would microtunneling then become a desirable approach? What exploration would be needed? Are such explorations recommended?
  - Cost is an important element in the decision, and should be discussed in this memorandum.

- Conventional tunneling appears to be rejected primarily because: *“Impacts both during construction and during permanent operation of the conveyance line and outfall would be increased within the nearshore (at the vertical riser) and at the other upland conveyance portal sites. These increased impacts outweigh any advantages to the conventional tunnel terminating at the nearshore (p. 10, §2).”* What are those *impacts*? Compared to what are they *increased*? Also, a comparison is needed of the impacts of the various construction techniques such as open trenching with or without shoring, which can be completed in general and tied to the discussion of pipe profile (the last bullet below under this subject).
- Some of the implications of using the conventional tunnel approach should be mentioned. For example, a conventional tunnel would have a diameter of 14 to 16 ft (p.7, footnote 3) while the preferred diameter of the outfall is 5 ft. Would this require placing a 5-ft pipe within the tunnel and backfilling? Also, would there be a potential for solids deposition at the offshore shaft?
- What is next? What explorations are recommended? How and when will final decision be made?
- Need to state how the construction methods impact (or will impact) the environment (for example, silt or turbidity generation, bottom disturbance, others).
- Need to state how the off-shore pipe installation is to be accomplished in terms of impact on the bottom (i.e., it will simply rest on the bottom, without any anchoring)
- Need to confirm hydraulics of outfall (the effluent piping is approximately 12 to 14 feet in diameter and then the outfall is 5 feet in diameter).
- Need to provide a pipe profile to show how deep the construction is expected to be and delineate between near-shore and off-shore to confirm selection of the type of construction and to relate to the types of biology present in the outfall zones.

### **Diffuser Predesign. May 2003**

- This memorandum recommends use of a single 60-inch outfall pipe and a 500-ft long diffuser based on analyses and results presented in the DEIS. These dimensions appear appropriate, although they are individual dimensions with minimal impacts on the rest of the projects, and adjustments during final design are possible.
- Dissolved oxygen. Dissolved oxygen impacts are summarized based on the DEIS (p. 7, §3). A previous comment by DMJM Harris/ M&E/CTE suggested that these impacts may have been underestimated because they did not account for i) nitrogenous BOD, ii) sediment oxygen demand and iii) cumulative impacts.
- Flow Range. A flow range of 18 to 170 MGD (and up to 235 mgd) is indicated (p. 16, bullet 3). The low flow of 18 MGD is the estimated initial average dry weather flow. Because of diurnal variations, considerably lower flows will occur at night and those need to be taken into consideration in the outfall design.

- It is understood that the diffuser design described in this report is preliminary and will likely change. However, the following issues are noted.
  - Total Port Area. As stated on page 12, the total port area should be between 50 and 75 percent of the diffuser pipe area. For the design presented in Appendix A, this ratio is **96%**.
  - Diffuser diameter. The diameter of the diffuser presented in Appendix A remains equal to 60 inches over the entire length of the diffuser. As a result velocities near the end will be very low, promoting sedimentation. A decreasing diffuser diameter is typically used to avoid this problem and to maintain equal flow distribution among the ports. Need to state that this issue has either been considered and is not a negative impact (need to support such a statement) or state that this will be assessed during predesign or design.
  - Froude number. It is stated that the discharge densimetric Froude number for the proposed diffuser design varies from 3 to 37 (p. 17, §1). At the initial average dry weather flow of 18 MGD, for the diffuser design presented in Appendix A, the discharge densimetric Froude number is about 2.1. This is assuming uniform flow distribution among the ports. A flow discrepancy of 10% would reduce this Froude number to 1.9. But, as mentioned above, the average dry weather flow is not the minimum flow that will be experienced by the diffuser. Assuming a low flow factor of 50%, the Froude number decreases to less than 0.95, which implies sea water intrusion. Need to state that this issue has either been considered and is not a negative impact (need to support such a statement) or state that this will be assessed during predesign or design.
  - Port Spacing. A port spacing of 0.15 to 0.20 times the maximum height of rise is typically considered sufficient to achieve a line source. Here, the smallest height of rise (largest submergence) is about 240 ft (per Table 2), requiring a port spacing of 36 to 48 ft. Therefore, the proposed port spacing of 3 ft could be increased considerably without detriment. Need to state that this issue has either been considered and is not a negative impact (need to support such a statement) or state that this will be assessed during predesign or design.
- Need to state that the current modeling of the plume involves three levels of modeling (near-field, far-field, combination that addresses background concentrations and impact of discharged material flowing back through the plume).
- Should provide cumulative probability charts for both plume rise and dilution to show the likelihood of impacting the surface or -70 feet for shellfish and the likelihood of not diluting to the prescribed level. Need to provide a discussion of what a given level of dilution means and the impact on environmental and human health. This particular point ties together with the first bullet presented below under the subject “Water Quality and Biology”.
- Should state design criteria or requirement (e.g., 100:1 dilution for average dry weather flow rate) for dilution or plume rise, then state the calculated or estimated values for the design condition (e.g., average dry weather flow rate = 50 mgd for 2050), and then show how the design meets the design criteria (circle the plume rise or dilution data point corresponding to the

design condition). For plume rise, a particular probability value needs to be calculated for reaching the surface and for reaching -70 feet. These are both critical rise positions related to environmental and human health. For dilution, need to state whether the 100:1 dilution guidance, taken from the Orange Book, is an instantaneous value for a particular design condition and then show that this met for both the Acute and Chronic mixing zones.

- Should provide a Section 3.2 that states how the previous diffuser design information has been modified.

### **Water Quality and Biology**

- Should select a particular set of parameters and then list their regulated concentrations, then list the end-of-pipe concentrations, and then list their estimated acute and chronic zone concentrations. Although dilution factors have been focused on because that is the typical parameter utilized to analyze diffuser systems, the actual concentrations are more understandable and will aid in showing that water quality is not compromised.
- In terms of the site selection process, need to show how the information on site-specific biology is to be used to select/evaluate/mitigate a particular outfall site.



336 Admiral Way · Edmonds, WA 98020-7214 · (425) 774-0549 · (425) 774-7837 FAX

June 27, 2003

Mr. Don Theiler  
Manager and SEPA Responsible Official  
Environmental Planning  
King County Wastewater Treatment Division  
King Street Center: KFC-NR-0505  
201 South Jackson Street  
Seattle, WA 98104-9972

Dear Mr. Theiler:

The enclosed document from our environmental consultants, Blumen Consulting Group, Inc., has prepared a response on behalf of the Port of Edmonds to the first Technical Seminar concerning the Brightwater Wastewater Treatment Plant. The seminar included the topics surrounding geology and outfall engineering, oceanography and dilution, water quality and biology.

The Blumen Consulting Group provided the environmental and technical review of the draft Environmental Impact Statement (DEIS) which was submitted to your office in January of this year. I am confident that they have addressed the appropriate issues of concern, especially those concerns that affect the Port of Edmonds and its constituents.

Thank you for the opportunity to provide comments on the first Technical Seminar regarding the wastewater treatment facility.

Sincerely Yours,

A handwritten signature in black ink, appearing to read "C. Keuss", written over a horizontal line.

Christopher W. Keuss CMM  
Executive Director

Attachments

cc: Port Commissioners  
Mayor Haakenson  
Mayor Nichols



June 25, 2003

Christopher W. Keuss, Executive Director  
Port of Edmonds  
336 Admiral Way  
Edmonds, WA 98020

**RE: Comments on the Supplemental Brightwater Regional Wastewater Treatment System June 7<sup>th</sup> Seminar Presentations and Technical Reports**

At the request of the Port of Edmonds, Blumen Consulting Group, Inc and The Watershed Company attended the Outfall Update Seminar on June 7<sup>th</sup>, 2003 and reviewed the attendant supplemental technical reports prepared by King County as part of its ongoing response to comments on the Brightwater Regional Wastewater Treatment System Draft EIS. A public comment period extends from May 30<sup>th</sup> to June 30<sup>th</sup>, 2003.

Six PowerPoint presentations were given that addressed the following topics:

- Puget Sound Geology and Outfall Engineering
- Oceanography and Dilution
- Water Quality and Biology

Three technical reports that provided more detailed information on design considerations and construction-related factors of the outfall, diffuser, and alignment included: *Project Description: Marine Outfall* (Parametrix, 2003), *Nearshore Alignment and Construction Method Alternatives* (Parametrix 2003), and *Diffuser Predesign* (Parametrix 2003).

As stated in the Scope of Services dated June 3<sup>rd</sup>, 2003, this letter provides a summary report of the findings included in the technical reports and disseminated to the public at the June 7<sup>th</sup> Seminar presentations and identifies issues from the presentations and reports that may be pertinent to Port of Edmonds operations and interests.

Overall, the Unocal System Alternative has significant potential to impact Port operations and properties, including the waterfront and marina, resident businesses, Harbor Square, and adjacent recreation and natural resources, including the Edmonds saltwater marsh interpretive trail and the Edmonds fishing pier. In addition, the Port supports community and environmental programs based along the Edmonds waterfront

and is an active participant with the City of Edmonds in the planning process for the Edmonds Crossing multi-modal project, which could also be affected by the Unocal Alternative.

### **Puget Sound Geology and Outfall Engineering**

#### Puget Sound Geology (John E. Newby, P. E., CDM)

This presentation on Puget Sound geology provided background information on the geologic characteristics, bathymetry, and physical dimensions (e.g., slope) of the marine outfall zones at the Unocal and Point Wells locations, upon which the outfall alignments and design are based.

#### Outfall Seminar Construction Segment (Tom Delaat, Parametrix, Inc.)

This presentation was a summary of technical engineering studies on outfall predesign considerations and possible outfall construction methods for nearshore and offshore outfall pipeline placement. Information was presented from three supporting technical reports summarized as follows:

#### *Project Description: Marine Outfall (Parametrix, 2003)*

This Technical Memorandum updates the project description (contained in the Draft EIS) for the two alternative outfall zones based on the current level of engineering design. The two outfall zones identified as potential locations for the placement of the Brightwater outfall include Outfall Zone 6, which extends off Point Edwards, and Outfall Zone 7S, which extends off Point Wells. Each outfall zone extends about 7,500 feet in Puget Sound from the shoreline. In general, a relatively flat shelf area extends about 500 to 2,000 feet offshore along the potential outfall alignments. Beyond the shelf, the seafloor slopes to up to 35 percent before reaching the main channel area of Puget Sound, approximately 5,000 feet offshore. For purposes of outfall discussion, the flat shelf area is called the "nearshore" and the area west of the nearshore is called "offshore."

The alignment of Outfall Zone 6 would originate from the proposed effluent pump station (which would be located at the west end of the Unocal site, across from the Edmonds Marina) and extend about 1,000 feet to the shoreline just north of the existing Unocal pier. From the shoreline, the outfall would extend about 850 feet through the nearshore and between 3,900 and 4,400 feet offshore. As stated in the report, a combination of open trench and/or microtunnel construction methods could be utilized that would minimize disturbance to areas of contaminated soil and/or groundwater and to recreational and/or commercial uses along the alignment. King County's current preferred method is open-trench construction both onshore and through the nearshore area based on the relatively minor amount of eelgrass (within Zone 6, see attached figure) and the potential for subsurface barriers to tunneling, such as piers or boulders. The pipeline would be jacked under the BNSF rail line west of the Unocal site.

Microtunnel construction could be used onshore if "ongoing" investigations indicate that subsurface conditions were favorable.

Three methods of offshore pipeline placement are also described: "segmental lay," "controlled submergence" and "bottom pull." Segmental lay methods require the use of divers and/or robotics to make underwater connections between pipeline segments. Controlled submergence involves floating and towing the entire pipeline into place and lowering it in a controlled manner. Bottom pull involves pulling pipeline segments offshore. King County's current preferred method for offshore pipeline placement is "controlled submergence."

#### *Nearshore Alignment and Construction Method Alternatives (Parametrix, 2003)*

This Technical Memorandum presents an engineering evaluation of nearshore construction methods and potential marine outfall alignments. The outfall construction alternatives evaluated include open-trench and trenchless methods. In nearshore areas, two main methods are used to bury the pipeline: open trench construction ("cut and cover") and trenchless construction technology, including conventional tunneling, microtunneling, and Horizontal Directional Drilling (HDD). These methods are described, along with comparisons of their advantages and disadvantages. Of the three trenchless technologies, only microtunneling is considered a viable alternative as to open trenching. The current preferred method for nearshore construction at both the Unocal and Point Wells (Chevron Beach) sites would be sheeted trench construction. For the Unocal site, this is based on a minimal amount of "sensitive nearshore habitat" (see attached figure of marine outfall zones) and concern about subsurface barriers and soils.

#### *Diffuser Predesign (Parametrix, 2003)*

This Technical Memorandum evaluates diffuser design criteria and outfall analyses in order to recommend diffuser characteristics such as length and location that would meet outfall design goals per Ecology's *Criteria for Sewage Works Design*. Diffuser design analyses include those related to effluent plume dilution and trapping depth, diffuser hydraulic performance, and methods to protect the diffuser segment during potential seismic events and submarine slides. Potential diffuser sites for the Outfall Zone 6 are located beyond 4,500 feet offshore (where the slope flattens) at depths of approximately -600 feet mean lower low water (MLLW). Based on modeling of effluent trapping depth, dilution rates and hydraulic performance, a diffuser length of 500 feet is recommended.

### **Issues Pertinent to the Port of Edmonds**

#### Outfall Pipeline Construction

As stated in the Port's Draft EIS comment letter, the overall issue remains that implementation of the Unocal System Alternative, including construction of an outfall, would occur in a populated urban setting, adjacent to the Port of Edmonds Marina and

would constitute unnecessary impacts to Port facilities and users, given the viability of the Point Wells site. Updated information and additional detail presented in the June 7<sup>th</sup> Seminar regarding outfall construction further supports the position in the Port's Draft EIS comment letter that implementation of the Unocal System Alternative would result in a significantly greater number of adverse environmental impacts compared to the Route 9 alternatives.

Based on information presented in the seminar, King County has revised statements made in the Draft EIS that they would "utilize underground boring techniques to carry the effluent pipeline beneath nearshore areas if at all feasible" (Chapter 7 of the Draft EIS). Instead, the issue of feasibility is acknowledged in the technical reports as still under investigation, open-trench construction is the current stated preferred method for installation of the onshore and nearshore outfall segments.

The outfall would have to be buried through a "nearshore" area that is almost double the length of that of Zone 7S at the Point Wells location (850 feet vs. 450 feet) and would also require almost double the amount of estimated pipeline armor material (4,100 cubic yards vs. 2,000 cubic yards). Armoring would be necessary to protect the pipeline from wave action, erosion, and anchor damage.

Open-trench construction through the onshore and/or nearshore areas would generate noise impacts on surrounding businesses and properties, closures on Admiral Way, could disrupt ongoing Marina operations and/or boaters using the Marina, and could also discourage recreational use of the Edmonds shoreline. Based on estimates for outfall construction duration, these impacts could occur in the area for up to a year (estimated outfall construction duration).

The 1,000 feet of onshore construction would require tunneling under the BNSF rail line, crossing the Edmonds Marina Beach area, and coordination with the proposed Edmonds Crossing project.

Outfall construction (originating from the Unocal site) could encounter existing soil and groundwater contamination, which could potentially release contaminants in the vicinity of Port facilities and activities.

Microtunnel construction should continue to be investigated as a possibility based on the following advantages discussed in the technical memorandums: reduced construction impacts to nearshore biota and habitats; minimized disturbance to areas of contaminated soils and sediments; minimized impacts to groundwater; reduced impacts to recreational users along the Edmonds shoreline (beach) area; and reduced length of the onshore segment.

## **Oceanography and Dilution**

### Outfall Update – Puget Sound Oceanography (Glenn Cannon, Univ. of Washington)

This presentation provided a detailed description and analysis of the water currents in Puget Sound at various depths, tidal conditions, wind conditions, and times of year, focusing on the vicinity of Outfall Zone 6 and Outfall Zone 7S. The presentation concluded that, while both sites provided good locations for outfalls, the Point Wells location may be a little better from a current and water mixing perspective than the Edwards Point location because the northward flow is closer to the shore.

### Outfall Update – Dilution Segment (Bruce Nairn, King County Department of Natural Resources)

This presentation provided an overview of the mixing and exchange of Puget Sound waters with Pacific Ocean waters, average residence times within the Sound, and stratification due to the density effects of salinity and temperature. Based on the depth and location of effluent discharge and the proposed length of the diffuser (500 feet), dilution rates were predicted under various weather conditions and at various discharge flow rates, depths, distances from the outfall, and times of year. Anticipated trapping depth was anticipated under various conditions. The presentation concluded that both of the proposed outfall locations would provide for excellent mixing and dilution of the effluent. Incidences of the effluent plume reaching shore would be very unlikely because it would be trapped well below the surface and because currents generally run parallel to the shore rather than towards the shore.

## **Water Quality and Biology**

### Outfall Seminar – Biological Studies (Kimberle Stark, King County Department of Natural Resources & Parks)

This presentation reviewed and summarized a wide variety of biological studies and inventories that were done to support selection of the outfall zones. These studies and inventories included an eelgrass survey, surf smelt and sand lance spawning surveys, a geoduck distribution and abundance survey, and beach seining surveys for fish species presence, temporal and spatial distribution, and abundance. One of the data gaps is the Underwater Park north of the Marina, where dense eelgrass is known to exist. Outfall zones were limited to areas with lower density in eelgrass; only minor eelgrass exists within the Outfall Zone 6 (refer to attached figure). Results from the geoduck survey did not confirm that one zone would be better than another.

### Outfall Update – Water Quality (Jim Simmonds, King County Department of Natural Resources & Parks)

This presentation provided an overview of the proposed membrane bioreactor treatment process and the quality of the effluent water that could be expected to result from its

use. Summaries were provided for a host of water quality monitoring programs, parameters, and locations throughout Puget Sound, including demonstrations of the stratification of the waters of Puget Sound as depicted by depth vs. value or concentration graphs for dissolved oxygen, temperature, chlorophyll, and salinity. The results of the studies lead to a conclusion that the predicted, calculated changes in all of the many water quality parameters considered, except possibly dissolved oxygen and nitrogen, would be too low to measure. Nitrogen levels would increase by less than 3 percent. All water quality requirements were predicted to be met at the edges of both the acute and chronic mixing zones. Beyond the mixing zone, no human health risks or risks to aquatic life would be anticipated.

### **Issues Pertinent to the Port of Edmonds**

#### Dilution and Oceanography, Water Quality and Biology

Based on the favorable mixing conditions in Puget Sound and on the technical studies and proposed treatment processes, normal operation of a wastewater treatment plant would not generate any significant biological impacts or impacts to water quality.

However, as stated in the Draft EIS comment letter to the County, only the Unocal System Alternative includes construction of an emergency relief outfall into Outfall Zone 6. While the likelihood of emergency sewage overflows into Puget Sound would be rare, this Alternative presents additional and unnecessary water quality risks to recreational shellfishing opportunities along the Edmonds waterfront.

### **Conclusion**

For reasons outlined in this letter report, implementation of the Unocal System Alternative, including construction of an outfall could result in unnecessary impacts to Port facilities and users, given the viability of the Point Wells site and the Route 9 Alternatives.

Thank you for the continuing opportunity to provide assistance to the Port of Edmonds regarding the proposed Brightwater Wastewater Treatment System and please contact us with any questions or comments.

Sincerely,

Michael Blumen  
President

Denise Evans  
Senior Associate

Blumen Consulting Group, Inc.



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TRANSCRIPT OF PROCEEDINGS

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**BRIGHTWATER TREATMENT SYSTEM**

**OUTFALL UPDATE**

**Saturday, June 7, 2003**

BRAD HOFF - Facilitator

SHORELINE COMMUNITY CENTER

18560 First Avenue Northeast  
Shoreline, WA

**COPY**

Reported by:

Jeanne' E. Cole, CCR, CSR

WA CCR No. CO-LE\*J-E367LM

CA CSR No. 08970

I N D E X

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ORAL TESTIMONY OF:

PAGE

Al Rutledge - 7101 Lake Valenger Way, Edmonds

2

*in Filmmaker as Alvin Rutledge*

1 PROCEEDINGS

2 ORAL TESTIMONY

3  
4 AL RUTLIDGE: My name is Al Rutlidge; 7101 Lake  
5 Valenger Way, Edmonds.

6 I'm here for two reasons. One is, I went through  
7 your brochure, and I sent in some letters, and I don't  
8 see any changes. Basically, what I'm saying on this is  
9 all letters that are sent in letting to the areas,  
10 faxes, emails or mailed in, should be recorded and it  
11 should be in the book to pass out. It doesn't make any  
12 difference if you're talking 100, 500, 600 or 1,000.  
13 This project cost thousands of dollars and citizens like  
14 today sitting in this room over here should have the  
15 area people if anybody sent anything in. And this would  
16 eliminate some faxes, emails or letters that are not  
17 residents and they don't live in the area where the  
18 process is done. That's the first thing that should be  
19 done.

20 Secondly, I live across the street from where the  
21 cemetery is and I didn't seeing anything on that in here  
22 today. This is right down the street. This is  
23 Shoreline. And they indicated they wanted \$10-million  
24 to take their property on this one across the light.  
25 The cemetery said they wanted \$10-million, they wanted

1 \$10-million for property to put this pipeline on their  
2 property. And I live across the street there. And  
3 basically you should have property local, public hearing  
4 on that, if they decide to use that pipeline for  
5 Port Wells, Edmonds. That should be just a local area  
6 of residents in there. And I just sent all this in down  
7 to the county already. But basically that should be --  
8 any area should be on the form, people should send stuff  
9 saying their addresses where they're at and should be  
10 recorded, which they are. But basically that's what  
11 they wanted, was \$10-million, and the only thing would  
12 be that should be the whole area that should be involved  
13 with that situation. So basically what I'm saying is  
14 you don't have anything here at all, no faxes, no  
15 letters, no nothing here today, so I presume nobody sent  
16 anything in, because you don't have anything. When you  
17 go to your city meetings, when you have processes and  
18 that, you have complaints, you have designs in that,  
19 when people send things in they're all recorded and  
20 they're all there. And this happens to be the City of  
21 Shoreline where you're at today, so I don't see anything  
22 here at all of people putting anything in. So, that's  
23 what I wanted to see. I wanted to see who the people  
24 who are complaining. And you do have people in Edmonds  
25 in this room here besides me. I know who they are.

1 They are there. So, that's basically what I'm saying is  
2 I think you're spending thousands of dollars on this  
3 project and if you do have another hearing in this area,  
4 anything for the cemetery, I'd like to see their letter  
5 in and would like to see all the information they sent  
6 in and anybody in the area that sent anything in,  
7 because that's the process of the project. So, that's  
8 basically what I'm saying.

9 But, basically, the public is going to come  
10 unglued on you here when this thing gets done.

11 **THE FACILITATOR:** Okay. Thank you, sir.

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13 [CONFERENCE ADJOURNED AT 2:14 P.M.]

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IN RE:  
The Brightwater Project - Outfall Update Public Meeting  
June 7, 2003

A F F I D A V I T

I, Jeanne' E. Cole, Certified Court Reporter, do  
hereby certify that the foregoing transcript prepared  
under my direction is a true and accurate record of the  
proceedings taken on June 7, 2003, Shoreline,  
Washington.



*Jeanne' E. Cole*

Jeanne' E. Cole, CSR, CCR

WA CCR: CO-LE\*JE367LM

CA CSR: 08970

**Brightwater Technical Seminars and Reports**  
**Comments received on treatment plant &**  
**conveyance update technical reports**



Planning and Development Services

Robert J. Drewel  
County Executive

August 8, 2003

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Environmental Planning  
King County Wastewater Treatment Division  
201 South Jackson Street  
KCS-NR-0505  
Seattle, WA 98104

Re: Brightwater Treatment Plant and Conveyance Update Volumes 2a and 2b  
**Snohomish County Response**

Dear Sir or Madam:

This letter and the attached memorandum prepared by DMJM Harris constitutes Snohomish County's response to the *Brightwater Treatment Plan and Conveyance Update, Volumes 2a and 2b*, issued June, 2003. Please note that these comments do not constitute an acceptance or approval of the Brightwater proposal, substitute for a supplemental EIS, or preclude Snohomish County from raising new issues or requiring additional information in the environmental review and permitting process.

**General Comments**

Snohomish County staff found the technical documents difficult to navigate. An overall table of contents for all the chapters/sections and attachments at the beginning of the first volume are needed. Tabs between chapters and attachments are also needed.

A list of acronyms, also at the beginning of the first volume would be helpful; it took some time to become familiar with some of them again.

No discussion was found relating to reduction of I&I in the overall system. This should be discussed. A section emphasizing a significant commitment to I&I reduction should be included, showing funds allocated, and goals and a timeline set for reduction although this issue may come forward in the third series of technical reports on groundwater.

This technical memorandum did not address the potential impacts to sensitive areas.

In any drainage basin in which more than 5,000 square feet of new impervious area is proposed or is concentrated and collected, a full drainage plan is required, including storm water detention, water quality treatment for vehicle or other pollution causing surfaces, and infiltration if site conditions allow. Major development sites should include provisions for detention, water quality and infiltration facilities. [SCC 30.63A.210]

Existing drainage patterns may not be altered and must remain the same after construction. This means drainage that enters or leaves any particular construction site must remain the same before, during and after construction.

In the future, when technical reports are submitted for drainage or grading review, they should include more information on the likely drainage systems and grading operations that will occur, and include information demonstrating how the drainage and grading codes found in Snohomish County Code Titles 30.63A and 30.63B will be met.

A map of locations of known artesian groundwater conditions would also be useful for the areas of proposed construction. For such locations, specific information should be provided that demonstrates why the proposed construction and methods would not have any impact. There should also be a discussion regarding the experience(s) King County's had with springs already encountered in exploratory testing, again this may show up in the next round of technical memos. The correlation of groundwater levels to the more detailed portal and plant layout elevations would be helpful in assessing the nature and extent of potential impact.

## **VOLUME 2a**

### Specific comments

Pages 4 and 5 - the discussion of Solids Treatment and Reclaimed Water should include a discussion of hormones and the effect currently proposed treatment has on their breakdown. Are hormones present in class B biosolids, and if so will they be migrating to areas where those biosolids are used? Does the Thermophilic anaerobic treatment proposed for the future to produce Class A biosolids break down the hormones, and if so, should that treatment be used sooner? The topic of Digestion on page 11, where the choice of Class A or B is depicted as an "evaluation still in process" should include discussion of hormones.

Pages 8 and 9 - the words "enclosed" and "covered", and on page 12 "fully enclosed" are used to describe odor control. The technical seminar clarified that the whole system would have negative pressure so all odors would be controlled. This concept should be addressed in more detail in the Technical Report to avoid confusion and reassure citizens who might not interpret "covered" as being fully enclosed. The seminar explained this very well.

Page 10 - Effluent Reuse. A "distribution system" is mentioned, however, King County indicated that no off-site distribution system for reclaimed water would be part of the proposal. Discuss how off-site distribution could occur. Is there currently any local interest in reusing this water at local parks?

Page 10 - It is indicated that stream flow augmentation is not being considered. Discuss the reasons why and clarify, if possible what level of treatment (including temperature) is required for stream flow augmentation by infiltration as a use for reclaimed water. At the Technical Seminar it was mentioned that the use of reclaimed water for stream low-flow summer augmentation was not included in the report because it is opposed by the Muckleshoot Indians who do not want to see that used as a justification for increased withdrawals. Did they specifically include North, Swamp and Little Bear in their opposition? South Snohomish County creeks are totally dependant on groundwater, wetlands, and precipitation for summer flow, and are drying up as development brings increased impervious surfaces. Use of reclaimed water for low-flow augmentation is appropriate for South County watersheds.

Page 19 - The text states that the total plant footprint is 43 acres, with an additional 4 acres reserved for expansion to full CAS. The plant and stormwater management facilities would total

80.6 acres. The text references Attachment F, titled "Plant Site Areas" which does not show any of these figures. It is difficult to tell where the expansion area is located. This could lead one to suppose it is in the un-developed area to the north. Attachment F should support the discussion on page 19 to avoid confusion.

Page 19 - In terms of groundwater, the public concern to be addressed is that of groundwater quality and its discharge into Little Bear Creek. One way to address this concern is to take into account that Snohomish County's Surface Water Management Investigations staff has a permanent ambient monitoring outfall site located just downstream of where Brightwater plans to discharge into Little Bear Creek. This site is monitored on a monthly basis at the Little Bear Creek sample station (LBLD) located at 228<sup>th</sup> St. SE., and gives a record of pre-Brightwater conditions. Water quality measurements currently being taken every month include: temperature, dissolved oxygen, specific conductance, pH, turbidity, and general field observations. Laboratory tests include: total suspended solids, NO<sub>2</sub>-NO<sub>3</sub>, total phosphorous, total lead, total zinc, total copper, and fecal coliforms.

Page 20 - King County has expressed an excellent commitment to Low Impact Development (LID), but in the discussion of water resource management, the discussion is about a centralized system of pipes, collection points, conveyance, and detention. A thorough discussion of the potential implementation of LID Best Management Practices should be in a separate appendix, and a brief overview included in the water resource management section. A canal 60 feet wide by 2,800 feet long to detain clean runoff indicates that runoff is not being minimized by implementing LID. Mention is made of conveying runoff from plant roads, and parking areas for treatment; more specific LID proposals to reduce impervious surfaces should be included.

Page 13 - There are potential benefits, and it may be a community preference, to locate the community oriented building at the far northern edge of the site layout adjacent to the fish rearing pond, nearby wetlands, with access from SR9 north of 228<sup>th</sup>. In this location more potential exists to provide on-site habitat and wetland enhancement, education, low impact circuit trails, and provide low impact demonstration design (green roofs) and workshops or other events completely separate from the Brightwater administration and operations. It should best reflect the needs of the community, which may or may not have a keen interest in wastewater treatment processes. The EIS states that a community center "may" be provided. We understand this is because it would be funded by discretionary or "community" mitigation funds. The EIS should explain this by stating that its inclusion in the facility is subject to selection by a public process to be conducted in 2004.

The community building or center is not depicted for the Unocal alternative. This gives the impression that more flexibility is offered at the Unocal site for placement of a community facility or that decision-making regarding community mitigation for SR 9 is advanced relative to Unocal. More explanation is needed.

Page 17 - Handling Emergency Overflows. Please indicate whether as part of option (5), only partial treatment allows for greater flow per process rate and therefore greater peak flow rate (MGD), over and above those evaluated). Please provide documentation of static storage capacity (in influent, effluent lines, log boom, other storage facilities, treatment plant, etc.) for each site, conveyance and outfall alternative.

Page 20 - Route 9 Treatment Plant Features - Site Layout. It is stated that stormwater generation would be minimized by creating forested conditions similar to that of a pre-developed condition. This would likely not occur until the life of the plant had expired. Given the level of previous

excavation, fill, and soil contamination the soil conditions and size and age of hydrologically mature forest would preclude any expectation that stormwater attenuation and treatment would occur similar to that of a pre-developed condition. It is stated that amended soils would be incorporated into landscaped areas. There is risk that constructed stormwater facilities would be inundated with groundwater discharge in this area. It appears from the layout that stormwater would be routed through the existing fish rearing pond. This area is described in the chapter titled, "Sensitive Areas Technical Report - SR 9", as a designated Native Growth Protection Area (NGPA) under Snohomish County Code and this layout may not be possible. Please review. Additionally, this layout for stormwater control during construction may also not be possible.

## **Attachment A**

Project description summary outline, page 1, 2.2.4 "Area of Impervious surface" should show how much impervious is being reduced by LID.

Section 4.1.4. – Stream and Fishpond Relocation. This project element should be discussed in the narrative, and if proposed, should be evaluated as part of the Sensitive Areas Chapter as an impact (pond removal and relocation to new area) and potential enhancement (mitigation). As mitigation for previous development it should be determined whether this mitigation is still required if Stockpot Soup or other development triggering the mitigation is removed. If mitigation must be maintained, this proposal for relocation should not be considered as mitigation for the site or as an element of "community mitigation."

Section 4.6.5 - Stormwater Treatment Facilities - Please be specific about the difference in function between the "canal" and the other wet pond areas that are also depicted. The canal is described as receiving non-polluted drainage whereas the wet ponds would receive "dirty" runoff. Although the canal would receive the cleanest drainage it appears to provide the least potential habitat benefits over the 8 acres of storage. This facility (the canal) may contribute to stormwater heating. The amount of new forest (stated as 22 acres) should not be evaluated in aggregate in terms of stormwater benefits as the forest would be dispersed.

4.6.5 "Stormwater Treatment Facilities" makes no mention of LID.

4.6.5.6, "Reduction of Stormwater Generated" does not mention pervious pavements for roads, parking lots, or sidewalks. These alternatives to impervious surfaces should be included.

4.6.7 - Internal Roads and parking - No parking spaces are indicated for a community oriented building at the Unocal site. Does the current overall design maintain any area for an onsite community center?

Section 4.6.8. - Community Oriented Building - Location options should include the northeast undeveloped portion of the site. Indications that it will be a state-of-the-art LID demonstration building should also be included. Location indicated, appears to be behind a berm constructed to obscure the plant from view. This would also obscure most of the community building and isolate it as a community enhancement.

Section 5.4.5. - Employees - It seems premature to identify the number of FTEs that would staff a community oriented building, how funding would be secured for these positions and what their responsibilities would be. If 3-7 FTEs are based on assumptions by King County that use of the community building would support outreach and education specific to the wastewater treatment facility and process, this should be stated. Many other goals, objectives and uses of the

community oriented building may be based on community interests other than for support of WTD facilities. Therefore, staffing requirements may ultimately be very different.

### **Figure C-1 SR 9 Layout**

A compensatory wetland area is shown north of the canal and existing fish rearing pond. What is the mitigation proposed for? This is not described in this chapter nor is impact assessment provided in the sensitive areas chapter. If part of the area is for relocation of the fish rearing pond please show.

Figure F-1 Property Boundary Areas - The title, "Urban Growth Area=37.3 Acres" should be moved south of the UGA boundary. The area as currently shown is not part of the UGA.

Figure F-2 Property Boundary Areas - It is unclear why 4.5 acres of nearshore parcel is a required element of property ownership. This parcel is currently owned by the City of Edmonds, is a city park, an off-leash area, and provides pedestrian access to a marina and recreation access to the nearshore. Outfall construction and mitigation associated with relocating Willow Creek seemingly could be accomplished without title purchase.

### **Sensitive Areas Technical Report - SR 9 site**

#### General

This sensitive areas report should include an evaluation based on available data of water quality conditions associated with the site as a whole as well as specific existing drainage features. Data are available from Snohomish County Surface Water Management Division Water Quality Program. The Brightwater DEIS concluded that existing drainage features and habitat conditions would be improved as a result of eliminating existing site uses. The protection of on site and downstream sensitive areas and associated species depends critically on water quality conditions, many of which are documented to exceed standards or species-specific tolerances. Page 5 says that small trees dominate most areas, but some areas are dominated by large cedars and Douglas fir. These large trees should be located and mapped.

#### Findings

This section should include documentation for all species of concern including salmonids, which are currently included. NOTE: This sentence does not make sense.

If known, please indicate if the fish rearing pond and fish ladder were constructed as mitigation for the Woodinville North Business Park, and also if any other enhancements were constructed as mitigation. If so, the SR 9 design should not displace or eliminate the mitigation value from past degradation.

This section should include a review of water quality data and appropriate interpretation.

Table 1. This table is helpful in documenting the observed difference between mapped soil types and observed soils. Please provide documentation of observed buffer widths relative to the Snohomish County buffer width standards provided.

For Wetlands A and B, please provide a clear discussion of factors limiting wetland values and functions. It appears the developed portion between Wetlands A and B, where the channel is piped may have connected the wetlands in the past and currently limits the functions and values of both wetlands given the reference to access limitations for fish and degraded or absent buffers.

For Wetland C, it's stated functions include water quality improvement (are upstream conditions impaired?), erosion control (are there active sediment sources?), production and export of organic material (is this good? - most species are invasive), habitat for aquatic invertebrates (is community representative of natural conditions or altered in terms of its composition or functions?). If wetland is primarily groundwater-fed, how does it achieve the function of "trapping sediments and other potential pollutants?" If reed canary grass and other herbaceous vegetation provide organic export to the fish rearing pond, what risk from BOD and higher temperatures exists that creates an impediment to wetland functions and values?

For Wetland C and D, there is no mention of functions and values that may be impaired from the gravel or paved driveway clearly visible in the aerial photo. Is there potential mitigation value from removing the driveway and fill, if it exists?

Special Species Status - It should be noted that observations of chinook salmon spawning based on WDFW surveys are limited to those that occur during the surveys which typically, since 1979, occur later in the spawning season (better to enumerate coho salmon) and farther upstream (RM 4.4-5.5) from lower Little Bear Creek.

No analysis is provided to determine what actual or likely impacts would occur to sensitive areas and species as a result of siting, constructing and operating Brightwater. Additionally no assessment is provided to determine how sensitive area functions, values and area might be enhanced or improved as a result of Brightwater, although this claim was made repeatedly in the DEIS.

## **Volume 2b**

Page 7- in the discussion on groundwater control, please provide more clarification on what "localized soil conditioning" consists of.

Page 10, will the permanent sampling facilities be measuring anything else besides chlorine?

Page 3 – The first sentence under the heading "Safety Relief Point," it is unclear as to what type of sewer (storm or sanitary) untreated wastewater could overflow into.

Page 7 – It is stated in the last sentence that storm water runoff from construction sites would be treated and discharged offsite. To meet pollution standards, runoff leaving the site may not exceed 5 NTU's over background. It should be demonstrated how this level of treatment will be achieved.

Page 8 – Second paragraph: Would CDF (controlled density fill) be used for backfilling any open-cut excavations? If used for any significant length, would such use of CDF impact existing groundwater migration patterns?

Who would comprise the bond committee? Which agency would be in charge?

On page 7 of Appendix B, there is discussion regarding frozen earth walls, to be used deeper than 200 feet in relatively unstable soils (loose or soft). It is presumed that the decision to use them would be made prior to excavation. If unforeseen conditions are encountered while excavating using a more conventional method, could frozen earth wall construction alternatively be

employed at that stage? What contingency plan would be in place for dealing with such unforeseen field conditions?

What minimum vertical separation would be maintained between permanent treatment plant structures and the groundwater table? Underground fuel and oil tanks routinely leak over the years. Discuss how much risk there is of groundwater contamination due to sewage leakages, and what protections you would employ to reduce such risks.

Will any of the underground sewage tunnels be below the groundwater table? If yes, and if a groundwater intrusion leak developed in the tunnel, how would the event be dealt with and how would groundwater contamination be prevented? Would small groundwater leaks be tolerated within the tunnel lining? If yes, how much leakage would be tolerated, and what impacts to the groundwater table would that have, if any? What methods would be employed to stop intolerable groundwater leakage into the tunnel? The above comment again may be better understood once groundwater elevations are known and hydrostatic forces on the tunnel lining are known.

### **Construction Approach and Schedule Report**

Vehicle trips are discussed as round-trips. In the traffic report that will be issued with Seminar 3 documents, all construction phase and operational phase trips need to be discussed as 1-way trips. Traffic generation, distribution, impacts and mitigation need to be discussed for trips generated by plant sites, portals, outfall and any other construction sites proposed as part of the project.

Page 6 – What contamination tests would be performed on groundwater from dewatering operations, and what threshold would be employed for determining necessary treatment?

Page 7 – How would major earthmoving operations be conducted at the Route 9 site, while at the same time protecting water quality of existing streams that cross the site? Would the major earthmoving operations be conducted in winter? What monitoring system would be used for testing water quality leaving the site, and how much time would it take to stop silty water from leaving the site, once discovered?

Page 11 – Will there be any excavation into or at the toe of the east hillside of the Route 9 site? If yes, how would it be accomplished without impacting groundwater and slope stability? How would artesian groundwater be dealt with if encountered?

Page 26 – Please clarify whether construction dewatering is temporary or permanent. Please state whether or not drains would be placed in the vicinity of the tunnel, and whether existing groundwater levels would be protected.

Page 27 – How much effort will there be to protect existing groundwater lenses, migration patterns, levels and quality?

Page 30 – Please state whether or not the dewatering wells are temporary or permanent. If temporary, what will KC do to ensure no interruption of water services to residents and businesses? If permanent, what is KC prepared to do to address loss?

## Appendix B, Construction Methods

Page 14 – What impacts if any would the fluids used to lubricate the jacked casing have on groundwater quality?

When pipe installation is completed, the launch and retrieval pits would be backfilled and returned to their original condition. Will the original earth material be used for backfilling? What protections would be instituted to prevent different horizontal groundwater lenses from mixing or draining, thereby protecting existing patterns of groundwater migration?

Thank you for this opportunity to comment on the Technical Memoranda for the Brightwater Sewage Treatment Plant. Snohomish County looks forward to working with King County's Department of Natural Resources to address all issues regarding the Brightwater sewer treatment plant, conveyance, and outfall.

Sincerely,



Faith L. Lumsden, Director  
Planning and Development Services

cc. Robert Drewel, County Executive  
Snohomish County Council  
Peter Hahn, Director, DPW  
Rick Bart, Snohomish County Sheriff  
Ron Martin, Director, Parks and Recreation  
Barbara Dykes, Chief Civil Prosecuting Attorney  
Shawn Aronow, Deputy Prosecuting Attorney  
Shelley Kneip, Deputy Prosecuting Attorney  
Randy Sleight, Chief Engineering Officer  
Stephen Dickson, Assistant to the Director, DPW  
Susan Scanlan, Principal Planner

# Technical Memorandum

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**To:** Steve Dickson – Snohomish County

**Subject:** **Brightwater Technical Document Review; Seminar 2, Treatment Plant And Conveyance**

**From:** Aaron Silver, PE – DMJM+HARRIS

**Date:** August 6, 2003

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This technical memorandum summarizes our comments including observations and questions pertaining to our review of Technical Reports 2A and 2B for Treatment Plant and Conveyance issued by King County in July 2003. These two reports were issued as support information to technical documentation issued by King County during the DEIS phase. Note that these reports do not address the specific comments provided in the January 2003 DMJM+HARRIS review of DEIS documentation. Also, we did not present geotechnical commentary for Seminar 2 material since Seminar 3 focuses on geotechnical issues.

## **Technical Report Vol. 2a dated June 2003**

There are five topics in this volume as follows:

- Project Description: Treatment Plant
- Odor and Air Quality: Treatment Plant
- Treatment Plant Disinfection Alternatives
- Route 9 Site Sensitive Areas
- Unocal Site Sensitive Areas

## **Project Description: Treatment Plant**

- **Edmonds Unocal Site**

The sub-alternatives applicable to the Unocal site only include 1) the option of constructing a structural cover over the plant to allow for alternative uses on the cover and to completely hide the plant, and 2) the option of shutting down two other plants and diverting the flows to the Unocal plant. The two plants that may be closed are the plants now serving the cities of Edmonds and Lynwood. The impact of this latter alternative is to increase the average wet weather daily flow design during Phase 2 from 54 mgd up to 72 mgd. This potential increase in flow impacts the site planning because the additional area must be reserved for the larger facilities. However, there is very little explanation provided as to why this consolidation would have a good or bad impact on the environment. There is much discussion about what it will require in the way of additional space and facilities at the Unocal Site.

- **Membrane Bio-Reactor Process Alternative for Unocal Site**

The consideration of an alternative other than conventional activated sludge (CAS) is a good option, in our opinion. The use of MBR as one of the options is particularly applicable to the Unocal Site because of the smaller foot print of the overall process.

The design of MBR plants often includes a range of peak to average dry weather flows of from 1.5 to 2.0. The allowable maximum threshold flows in this alternative are limited to 1.22, compared to average dry weather flow (38 mgd/31 mgd). Does this mean that the membrane units are already planned to be operated at values above the normal average flux? Or, does it mean that the design is somewhat conservative because of the application to such a large plant? Or does this mean that the bypassing of the MBR train to ballasted settling is manually operated; thereby forcing the MBR to accommodate the 1.5 diurnal peaking factor during dry weather conditions? These questions may not be answerable now, but are items that should be addressed before Preliminary Design is completed. They may affect the plant cost budget and the operating scenario.

One of the advantages of the MBR process is that it can carry much higher mixed liquor suspended solids (MLSS) than a conventional activated sludge process. The higher MLSS provides the advantage of less aeration tank volume and less effort in thickening of the waste solids to acceptable levels before feeding into the anaerobic digesters. The fine screens that are recommended by the manufacturer are also an advantage in digester maintenance. These advantages appear to be incorporated in the conceptual design criteria provided in the memorandum.

In our experience with major wastewater treatment facilities, the MBR technology has advanced sufficiently to the point where plant owners are implementing MBR upgrade in place of construction of plant expansions or new facilities. We did not find sufficient discussion on this topic.

Generally, the consideration of the MBR process for Brightwater may be advantageous to the project.

- **Micro-sand Ballasted Settling for the Unocal Site**

The use of Ballasted Settling appears to be a good fit with the MBR process. The process has been proven to be easily and quickly stopped and later restarted; hence fitting well into the conceptual plan. The process has been further demonstrated to remove as much as 80 percent of the influent suspended solids and up to 50 percent or more of the BOD. Generally, this alternative process is considered good for the Brightwater Treatment Project.

The overall treatment plant process train includes grit removal at the headworks. This unit process is normal and recommended. However, the operation of the ballasted settling system will re-introduce sand into the solids processing train prior to thickening and feeding into the digesters. Our experience suggests that as much as 3 grams of sand per cubic meter of water processed may be lost into the waste solids stream. On a wet day this rate of sand loss could introduce 1000 lbs of sand into the solids train that could potentially settle in the digesters and require early cleaning. Some type of additional sand removal from the solids stream prior to digestion should be considered. This issue should be addressed before the preliminary Design is completed.

In reviewing the introduction of ballasted settling into the treatment train, the question must be asked, now that it is included in the design, why not operate the system all the time? This question is not so germane at Route 9 Site; but appears to be applicable to the Unocal site. One or two additional units would completely remove the construction of primary clarifiers, saving some capital cost and the space associated with them. The energy is significantly higher for ballasted settling and it requires the addition of chemicals and the replacement of lost sand, but these costs may be offset by the savings in capital and reduced site requirements. This issue should be addressed by the concept design team before a final decision is made on the treatment plant configuration, certainly no later than during the preliminary design.

- **Membrane Bio-Reactor for Route 9 Site**

The comments on the Unocal Site are generally applicable to the Route 9 Site, although the site is not so constrained in area as that of the Unocal Site.

- **Micro-sand Ballasted Settling for Route 9 Site**

The comments on ballasted settling made for the Unocal Site are also applicable to the Route 9 Site.

In general, we agree with the option of MBR and Split-flow Ballasted Settling as an alternative process to CAS.

### **Odor and Air Quality: Treatment Plant**

We have reviewed the Technical memorandum on Odor and Air Quality, particularly in view of the comments made in our Engineering Review of the DEIS, dated January 2003. We found the TM to be much more relevant, detailed and comprehensive than the work reviewed previously. The work is more relevant because it includes wind data that is site specific, although short in duration. The study is more detailed because it includes short term odor events as well as average long term conditions. And comprehensive because it discusses the sources, the source emissions, the treatment technology and the expected treated and untreated air quality at the selected boundaries.

In keeping with our previous comments the following points are raised:

#### **Goals**

The goals stated in the TM are stated in unequivocal terms of dilutions, percent reduction in odor intensity, and in concentrations of key odor and other pollutant parameters per unit volume of air.

Goals stated in measurable concentrations below which it is assumed that a normal receptor will not detect the specific odor is referred to as the threshold concentration. Previously the goal for hydrogen sulfide was defined as 2.4 parts per billion by volume (ppbV). This TM establishes the following:

Hydrogen sulfide	0.8 ppbV
Ammonia	28,000 ppbV

In addition to the concentration values, the TM indicates the number of air dilutions required to prevent a normal receptor from detecting an odor at the property line shall be zero. Further, it is clarified that the intent is that no odor event will occur at anytime.

### **Objectives**

In our Engineering Review of the DEIS, the following list of objectives was offered.

- Use best available control technology
- Satisfy community/neighbors
- Optimize balance between corrosion control and odor control
- Address specific odor causing compounds
- Address disposal of removed odor-causing materials (oxidized materials, spent AC, and biofilter materials)

In this TM, the authors investigated and addressed each of these objectives, with the exception of the disposal issue. The BACT is addressed by proposing a three stage liquid scrubber system followed by activated carbon. The more conventional process is a two stage liquid scrubber system followed by activated carbon. The three stage system provides a higher level of odor removal.

The specific objective of satisfying the neighbors is met by the rigid declaration and design for not only the average conditions but the “puff” condition (short term odor presence). The values for design appear to be sufficiently robust to satisfy all of the goals and objectives.

The issue of managing corrosive conditions in conjunction with odor control has also been addressed by the air change considerations (p.35). This may not be optimization but it does consider the selection of air exchange rates in view of preventing corrosion.

This TM also considered the specific odor producing compounds that would be treated. Those for odor generation included hydrogen sulfide, ammonia and carbon compounds that are also known for odor impacts. Other parameters for air quality impacts included particulates, oxides of sulfur, oxides of nitrogen, carbon monoxide and volatile organic compounds (VOC). Each of these parameters was discussed in sufficient detail to understand the intent of King County, and the likelihood that all parameters will be successfully treated.

The management of spent chemicals and other products of the odor control treatment processes was not discussed in the text but is indicated graphically to be sent to liquids treatment. There is no discussion of this treatment process. Does ‘liquids treatment’ simply mean returned to the headworks.

### **Disinfection Alternatives: Treatment Plant**

The analyses of disinfection were sufficiently complete and adequately discussed so as to invoke no comments.

## Summary of Questions and Issues Requiring Response

### Policy Overview Comments

1. Need to provide a flow rate figure or table that tracks influent wastewater flow rates (average annual dry weather) for Brightwater through 2050. It would be helpful to see how the other King County WWTPs are impacted by Brightwater in terms of changes in their influent wastewater flow rates.
2. Need to define design flow rates for each “trigger” date through 2050 at each key location in the Brightwater system. For example, for 2010, what is the average annual flow rate to Brightwater, what is the peak hour/peak instantaneous in both the influent and effluent conveyance systems? Other design flow rates would include peak month (for solids processes), wet weather peak month flow rate (instantaneous or peak hour or peak day) – in all cases, what is the flow rate used for design.

### Route 9 Plant Layout and Design

1. Has the cost of economic loss from removal of the property from possible revenue generating industries or commercial businesses been calculated?
2. How will the stormwater canal eliminate or prevent mosquitoes?
3. How will natural organic material growth in the stormwater canal be prevented or limited?
4. With respect to safety issues, need to mention satisfaction of EPCRA (Emergency Planning and Community Right-to-Know Act), which specifies required actions to be enacted to provide for community safety, especially with respect to fire protection and other emergency services.

### Odor Control

1. Need to have a more thorough discussion of “failure” scenarios. For example:
  - Power Failure (although emergency generators are present that will “power” the co-gen facilities and that there are two grid feeds to the site – need to discuss if these all fail, describe how odors will still be contained, and also discuss how unlikely this type of failure is).
  - Odor Control Process Failure (discuss redundancy and interconnections of the venting for each system – also, need to discuss if these all fail, describe how odors will still be contained, and also discuss how unlikely this type of failure is).
  - Structural Failure (discuss what would happen if a tank cover collapsed – need to describe how odors will still be contained in other tankage, and also discuss how unlikely this type of failure is).
  - Operations Failure (discuss what would happen if a tank cover or process building door or something similar were left open – will the doors be alarmed or any other system of checks)

2. Need to reconcile the “goal” of no odors versus actuality. There may be occasional odors, i.e., a goal of no odors does not necessarily equate to absolutely no odors, ever.

### **Brightwater Conveyance System**

1. Need to explain the different pipe configurations. For example:

- Portal 44 to 41 Influent: one, 11-foot diameter pipe  
Portal 41 to Route 9 Site Influent: two, 8-foot diameter pipes

These two configurations provide basically the same equivalent conveyance area, but why 2 pipes in one case and not the other?

- Route 9 Site to Portal 41 to Portal 44 Effluent: two, 5-foot diameter pipes  
Portal 44 to Portal 5 Effluent: 1, 10-foot diameter pipe

These two configurations do not provide the same equivalent conveyance area, why 2 pipes in one case and not in the other?

2. What is the tunnel width surface easement for? It was mentioned that surface construction (by the property owners) would not be limited by the tunnel?
3. Would any type of repairs to the tunnels (or any type of catastrophic failure) ever be conducted by open trenching?
4. Need to describe any processes that would be followed to repair a catastrophic failure, and/or provide a discussion of the probability of such a failure?
5. With the number of conveyance alignments narrowed to three alternatives, will any sizing optimization analyses be conducted for influent flow equalization or effluent sizing?
6. Need to attach a cost to the use of a Safety Relief Point and also quantify or describe the environmental impact from its use. A total cost, including fines, would be modified by the probability of such an occurrence.
7. Need to add the use of a Safety Relief Point to the list of “Conveyance System Potential Impacts”.

### **Tunnel Construction**

1. Need to describe the expected ground settlement at a Portal site or along the tunnel (describe in terms of magnitude and distribution away from the site, i.e., how far away would settlement occur).

### **Treatment Plant**

1. **Edmonds Unocal Site:** Is there an environmental advantage to the Sound by eliminating the existing plants and their outfalls? Is the near shore aquatic environment enhanced? Is the design of the new outfall such that it is better than the old ones, providing better mixing or dilution such that there are quantifiable benefits to eliminating the older outfalls?
2. **Both Sites:** Has ballasted settling into the treatment train been considered? There may be significant cost savings due to elimination of primary clarifiers leading to more efficient land use (Refer to discussion on Page 5). This issue is more pronounced at the Unocal site.
3. Is there a separated treatment system for these return flows from the odor control treatment processes.

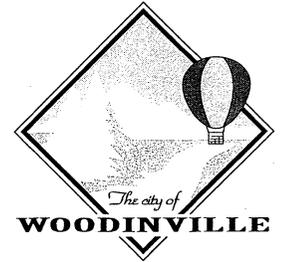
### **Wastewater Treatment MBR Technology**

1. Need to discuss net impact of MBR treatment technology on solids mass balance, i.e., does the amount of solids that need disposal increase or decrease?
2. Need to apply the better effluent quality derived from MBR to the diffuser design.
3. Need to determine if MBR technology is explicitly approved by Ecology for either water reuse or marine discharge. It is apparent that the technology provides greater levels of treatment than probably required by permit; however, need Ecology approval.
4. Need to determine if flow split/flow blending concept is explicitly approved by Ecology. It would be prudent to obtain explicit direction from Ecology as to frequencies and quantities of flow blending.
5. Why hasn't MBR upgrade been considered for other King County wastewater treatment plants? If applied to one or more other plants, would it provide sufficient additional treatment capacity to avoid constructing any of the Brightwater system? Or, is the existing interceptor sewer system the dominant constraint to expanding the existing plants?
6. Need to define the reuse market to provide a further basis for selecting MBR. It may be prudent to add a positive line item to the overall present value cost of the MBR facility to account for the avoided cost of potable water purchases.

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August 4, 2003

Mr. Don Theiler, SEPA Official  
Brightwater Wastewater Treatment Plant Siting Project  
201 South Jackson Street, Suite 503  
Seattle, WA 98104-3855



*"Citizens, business and local government;  
a community commitment to our future."*

Re: Brightwater Treatment Plant and Conveyance Update  
City of Woodinville Comments

Dear Mr. Theiler:

General Comments: Thank you for the opportunity to comment on the latest draft technical document release. With the addition of detail we find some things moving in a positive direction and other things that are of concern.

The City's Brightwater DEIS comment letter dated January 21, 2003, contains numerous questions and concerns regarding this project. These issues include growth management and annexation policy, as well as specific comments on construction and operation impacts in the areas of land use, surface and groundwater, air, plants and animals, environmental health, noise and vibration, aesthetics, recreation, cultural resources, public services and transportation.

However, the technical seminars do not address most of these topics included in the City's DEIS comment letter, and the County has stated that "individual comments will not get a specific response in the FEIS....". The questions the City has raised are of vital interest to the City's future wellbeing and they should be answered.

Although SEPA does not require that each comment received be responded to individually, the lead agency is required to "indicate an appropriate response to comments" (WAC 197-11-560 (3)). The County should clearly address the City of Woodinville's issues and questions in the FEIS, in order to meet the purpose statement of a SEPA EIS: "This process is intended to assist the agencies and applicants to improve their plans and decisions, and to encourage the resolution of potential concerns or problems prior to issuing a final statement." (WAC 197-11-400 (4)).

- Impacted Jurisdiction: For sake of completeness of the public record, I incorporate by reference the comment from the draft EIS that noted that Woodinville meets the SEPA definition of an impacted jurisdiction if the Route 9 site is selected for the treatment plant. If the Route 9 site is selected, Woodinville will be the most impacted local jurisdiction. With the

new proposed route of conveyance lines through Woodinville, that impact increases. At a minimum a right-of-way permit will be required.

- Treatment Options; Membrane Bio-Reactor: We are supportive of this selection for the great efficiency in reduction of measured wastewater constituents, for its direct production of re-use water, but mostly for the apparent flexibility it provides to reach the highest odor control standard. More information should be shared regarding the status and reliability of the 10MGD pilot project at the West Point facility.
- Treatment Options; Ballasted Sedimentation: While this option for heavy wet weather flows enables cost-effective sizing of the MBR for average wet weather flows, it is still primary treatment being discharged to the Puget Sound by way of mixing with other wastewater and averaging of the discharge numbers. More information should be shared about the waste removal efficiency of this process and the effluent quality after ballasted sedimentation and before flow blending.
- Treatment Options; Split flow: The split flow occurs in the line before the primary clarifiers. Does this mean that the primary clarifiers will only be sized to provide AWWF and not for maximum peak or maximum instantaneous flows? The approach to secondary treatment also raises some questions about redundancy at time of secondary treatment failure. If there was a system failure of the MBR, would the ballasted sedimentation system be sized to handle all flows?
- Treatment Options; Split Flow: More information is needed about how the split flow process will be managed and proposed to DOE in the design. Data should be shared on the estimated frequency, length and gallonage of split flow. It needs to be shown to be the rarity that was described. The split flow must be managed to split at the first gallon of overflow of MBR capacity and only treated with lesser technology if there is excess flow. The goal should be only the best treatment of wastewater. The goal should never be averaging to achieve less than the 30 BOD/ 30 TSS standard to provide the least cost treatment that meets permit minimums.
- Treatment Options; Evaluate Covered Equalization Basin: A covered and odor-controlled equalization basin similar to the tank at North Creek Pump Station should be evaluated as another method to reduce the number of exceedences of the split flow threshold.
- Treatment Options; 54 MGD Upgrade: This should be done with additional MBR or the best available technology of that time. If there is a change in the ballasted sedimentation relationship, it should decrease the amount of split flow. As implied above, "split flow" should only be treated with lesser technology only if there is excess flow.

- Odor Control; Cover All Treatment Processes: The City of Woodinville applauds the decision to cover all treatment processes. This gives the proponent full control over the odor control. The promise of no detectable odors on a 24 hour/365 day standard is outstanding and there should be no backing off of this standard even if it is more stringent than the standard identified in the County Council ordinance.
- Odor Control; CAS Retrofit Option: You have left an alternative option for a later retrofitting of activated sludge as a secondary treatment. If this is done, it should be covered as all other treatment process buildings. Also, upgrade the odor control as needed to manage the difference in treatment efficiency as compared to MBR.
- Odor Control; Maintenance Air: We support your decision to design the plant with negative pressure systems that overcome door and hatch opening, and that anticipates operating odor control when equipment is down or drained for maintenance.
- Odor Control; Transport Trucks: The data given was not clear on this point, but screening and biosolids trucks should be water-tight and covered at all times when outside process buildings.
- Odor Control; Bond Reserve: The discussion at the workshop implied that the bond reserve will be in place and retrofit discussions and planning will be triggered by a community advisory group. The FEIS needs to clearly describe this process.
- Final Treatment; Ultraviolet Disinfection: The Route 9 site opts for a chlorinate/dechlorinate regimen for some final treatment due to the length of conveyance. All efforts should be made to minimize chemical disinfection.
- Treatment Plant Features; Community-Oriented Building: Please provide the data that results in a pre-design finding of eight tour busses per day to the plant. Community-related services brought to the site should be done in harmony with the community services provided by the City of Woodinville and Snohomish County and result in no redundancy of services. Efforts to create a tourism or education destination at this site should be planned in conjunction with other agencies.
- Treatment Plant Features; Reforestation Theme: The plan for 300 feet of buffer with linear stormwater treatment on the western side of the plant is an excellent feature. It should go a long way to hiding the process buildings and shielding the site from the neighboring highway, rural and residential zones. The forestation around the eastern perimeter and

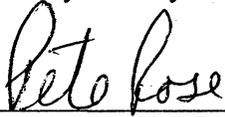
between the buildings should help to hide it from the eastern neighborhoods. The operative question is, "When?". The proposal should include information as to what the site will look like on opening day, and each five years until a reasonable level of tree maturity. Construction plans should take into account getting these buffer and perimeter trees propagated and in the ground as soon as possible, as well as planting trees as mature as is reasonably possible in order to provide optimum screening.

- Treatment Plant Features; Site Views: The Draft EIS demonstrated that the plant building will be visible from key points around the site. Planning should continue to give special emphasis to these areas so that the "gateway" to Woodinville is attractive and the treatment buildings are properly screened from view. Rooflines and building modulations should follow City of Woodinville Design Guidelines when unrestricted by technical requirements.
- Treatment Plant Features; Community Oriented Building: The Community Oriented Building design should be based on principles of basic programming for community recreation centers, allowing a full range of educational and cultural use.
- Treatment Plant Features; Community Oriented Building: Buses used to transport groups to and from the community oriented building should be available to transport groups to additional sites along the Little Bear Creek Corridor, such as the headwaters in Snohomish County and the outdoor educational facilities at Rotary Community Park in Woodinville. The educational effort should be concentrated at the Community Oriented Building, but take a watershed approach to education and community access.
- Treatment Plant Features; Site Design: The signage and interpretive facilities should be coordinated with City of Woodinville and Snohomish County to promote the visual integrity and ecological continuity of the Little Bear Creek watershed and the trail and open space linkages.
- Treatment Plant Features; Recreation Amenities: Planning should include onsite trail system and capitalize on opportunities to connect to trails planned by the City of Woodinville for future access to the Sammamish River Trail for the benefit of employees and residents in the area as well as trail users in general.
- Treatment Plant Features; Maintenance Building: The plant should be planned to accommodate the possibility of future interlocal agreements for contract maintenance with neighboring jurisdictions.

- Treatment Plant Features; Plant construction and Startup: With a peak workforce during construction of 300 workers and 250 vehicles, future planning should include detailed route and parking planning to be coordinated with City of Woodinville.
- Treatment Plant Features; Site demolition: Care should be taken to salvage and stockpile and reuse stumps, logs, and root wads that may be used to restore or enhance areas along the entire Little Bear Creek Corridor. These items should be stockpiled for use by Snohomish County or City of Woodinville if not needed at the plant site.
- Treatment Plant Features; Route 9 Expansion: The workshop indicated confusion as to whether widening of Route 9 would impact the buffer width. That should be cleared up prior to finalizing the FEIS.
- Treatment Plant Features; Employees: These are wage-earner level jobs. Brightwater should work with Metro and Community Transit to assure that mass transit busses serve this facility and that internal roads are efficiently designed to accommodate busses.
- Treatment Plant Features; Solid Waste: The largest single line solid waste recovery facility in the western US just opened about 1 ½ miles south of the Route 9 site. Brightwater should contact Waste Management to see how it can maximize recyclables and use of this site.
- Treatment Plant Features; Fish Rearing Pond: It was clear in the workshop but not as clear in the documentation that the fish rearing pond on the north end of the document would remain and possibly be enhanced. The documentation simply states it will be protected with silt fencing. The FEIS should be clear on the fate of the pond and the opportunities you are exercising to be a good steward of an endangered species.
- Treatment Plant Features; Community Building: Parking on the west side of the Community Building should be sized to accommodate not only the scheduled Community Building use, but day use of trails and open space for regional visitors and local residents. Treatment Plant Features; Community Building: Local artists should be sought out for inclusion in the development of site and building art.
- Treatment Plant Construction; Storm Water: Volume 2a, pg. 22 discusses water resource management, but it does not indicate the design methodology that will be used in the project.
- Treatment Plant Construction; Approach to Construction: Volume 2b includes a lengthy section describing your refinements in approach to

construction. While this is an improvement by way of narrowing the options stated in the DEIS, much of the discussion is cursory and should be improved in the FEIS. One area that specifically needs improved discussion is how you are going to manage increased groundwater flows during construction on the Route 9 site. Your prior geo-technical information indicates the Route 9 site is in an aquifer discharge area. Little Bear Creek is an important ecosystem for spawning salmon and City of Woodinville DEIS comments noted the investments being made by multiple agencies in recovering the species and improving Little Bear Creek habitat. Therefore, the City is concerned about how you will manage significant increases in flows from the site to the stream during construction and how you will treat the water.

Thank you for your consideration,



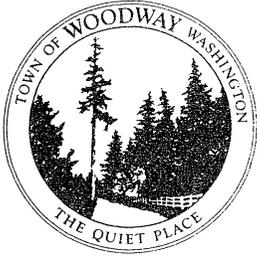
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Pete Rose, City Manager



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Ray Sturtz, SEPA Official



## Town of Woodway

23920 113th Place West  
Woodway, Washington 98020-5299  
(206) 542-4443 Fax (206) 546-9453

July 29, 2003

Debra Ross  
King County Department of Natural Resources  
Wastewater Treatment Division  
201 South Jackson Street, Suite 503  
Seattle, WA 98104-3855

RE: Town of Woodway Comments on the Brightwater Treatment Plant and Conveyance Update Technical Reports Volumes 2a and 2b-June 2003

Dear Ms. Ross,

As you know, the Town of Woodway is very concerned about the impacts that Brightwater may have on our community and is committed to continuing to be engaged in the ongoing environmental review process. The Town submitted its comments on the Draft EIS last December and has recently been attending the summer Seminar Technical Series. Upon receipt of the Technical Reports Volume 2a and 2b earlier this month, the Town commissioned our consultant team to conduct a review of the documents and report their findings to the Council.

The Town Council received a briefing from our consultants earlier this month. As a result of that briefing and further concerns of the Town Council, we are forwarding the following comments to King County for your consideration and response in the Final Environmental Impact Statement. The comments are reflective of concerns that the Town has had in previous rounds of comments, and represent what we believe are items that are inadequately represented in the current documentation of the plant and conveyance routes.

### **Comment No. 1: Portal 19**

Despite the extensive engineering work done to date, there is still no clear idea of precisely where Portal 19 will be located, and what existing land uses will be impacted. Candidate sites E19A, C, and E are identified in Table 7 of the Conveyance Project Description (Vol 2B), but the reviewers were unable to find graphics that could identify those sites. The technical documentation should include a layout of the conveyance route onto an ortho-photoquad, clearly illustrating potential property impacts, as has been done for Portal 44 (shown in Figure 11 of Volume 2B). It is the Town's expectation that this level of detail will be shown in the FEIS, at a similar scale. At a recent Technical Seminar, it was stated that Portal 19 will be located at Point Wells. The specific location of the portal site and attendant planned buildings at Point Wells should be depicted on an aerial photo.

**Comment No. 2: Portal 19**

Woodway appreciates the level of detail shown describing the function of the individual portal sites and types. As Portal 19 is to be a Launch Portal, it is assumed that approximately 2 acres of land will be required for construction. This raises a number of questions regarding the disposition of that 2 acres following the construction period, as presumably it will not all be needed for conveyance operations. Will the County retain title to all of that land, or only the immediate area around the Transition Structure? How will surplus land be disposed of? Will preferences be given to Open Space or other public uses? Will beach access be granted to the public if Point Wells is selected as the portal site?

Further, if Point Wells is the eventual site of Portal 19, the FEIS should address the method and routes for the removal of spoils from tunnel construction. Will removal be by barge, rail or overland and what quantities of material will be removed and in how many trips? Also, what will the access routes be during the 3-½ year construction period of the portal? During construction, what limits will be placed on hours of construction and noise levels? Will direct lighting be confined to the construction site?

**Comment No. 3: Unocal Site**

The conceptual site plan for the Unocal site appears sufficiently complete to enable development of photo-realistic visual simulations to be developed, enabling citizens to better visualize the impacts of Brightwater construction. The Town of Woodway requests that the FEIS include photorealistic visual simulations from at least 2 of the viewpoints identified in our official comments to the DEIS.

**Comment No. 4: Pine Street Relocation**

If the top of the retaining wall exposed on the north side of the relocated Pine Street is only 2 feet high, and a drop of up to 50 is present on the other side, will a fence be placed on that wall as a safety barrier? If so, what type of fence would be placed there? If a fence is placed in that location, it is our opinion that it should be a high quality fence with vertical painted steel or iron pickets, possibly with non-breakable glass panels reflective of the civic design values warranted on this project. It should not be a wire mesh fabric fence or a similar low cost equivalent. Further, the Town is very concerned about the safety aspects of the retaining wall and the preservation of Puget Sound views from the Town. In addition to the fence mentioned above, what other elements will be incorporated into the retaining wall to enhance safety while preserving the existing views from Woodway to Puget Sound?

**Comment No. 5: Unocal Site**

The Town of Woodway hopes that there will be a future design phase where there will be an opportunity to comment on issues related to character, image, materials, landscaping, architecture, color, and other elements related to aesthetics and community character. These are serious matters and serious effort to involve the community and invite community comment should be made.

**Comment No. 6: Unocal Site**

Mention is made of a Community Oriented Building in the Technical Memo, but this facility does not appear on the Unocal Site plan. Where will this building go, and will the program be the same as for the Route 9 site?

**Comment No. 7: Odor Control**

King County officials have stated at recent technical seminars that full and complete odor treatment will occur at each portal opening (or any other portion of the treatment plant or conveyance system) that may have the potential for odor release. The Town appreciates this commitment and recommends that King County establish a citizen group in Woodway to monitor odors of any Brightwater facilities located at the Point Wells or Unocal site with direct communications to King County for immediate odor response and correction.

Thank you for this opportunity to comment. The Town looks forward to receiving a response in the Final EIS to the above comments and the previous comments submitted as part of the DEIS review process.

Sincerely,

  
Robert E. Schillberg,  
Mayor Pro Tem

CC: Mayor Nichols  
Town Council Members  
Point Wells/Unocal Advisory Committee

August 1, 2003

Mr. Don Theiler  
Manager and SEPA Responsible Official  
Environmental Planning  
King County Wastewater Treatment Division  
King Street Center: KFC-NR-0505  
201 South Jackson Street  
Seattle, WA 98104-9972

Dear Mr. Theiler:

The enclosed document from our environmental consultants, Blumen Consulting Group, Inc., has prepared a response on behalf of the Port of Edmonds to the second Technical Seminar concerning the Brightwater Wastewater Treatment Plant. The seminar addressed the following:

- Brightwater Policy Overview
- Unocal Plant Layout and Design
- Wastewater Treatment Technology
- Odor Control and Air Quality
- Conveyance System Update
- Portal and Tunnel Construction

The Blumen Consulting Group provided the environmental and technical review of the draft Environmental Impact Statement (DEIS) which was submitted to your office in January of this year. I am confident that they have addressed the appropriate issues of concern, especially those concerns that affect the Port of Edmonds and its constituents.

Thank you for the opportunity to provide comments on the second Technical Seminar regarding the wastewater treatment facility.

Sincerely Yours,



Christopher W. Keuss CMM  
Executive Director

Attachments

cc: Port Commissioners  
Mayor Haakenson  
Mayor Nichols



July 29, 2003

Christopher W. Keuss, Executive Director  
Port of Edmonds  
336 Admiral Way  
Edmonds, WA 98020

RE: Comments on the Supplemental Brightwater Regional Wastewater Treatment System July 19th Seminar Presentations and Technical Reports

At the request of the Port of Edmonds, Blumen Consulting Group, Inc. attended the Treatment Plant and Conveyance Seminar on July 19<sup>th</sup>, 2003 and reviewed the attendant supplemental technical reports prepared by King County as part of its ongoing response to comments on the Brightwater Regional Wastewater Treatment System Draft EIS. A public comment period on this Seminar extends from July 3<sup>rd</sup> to August 4<sup>th</sup>, 2003.

Seminar presentations addressed the following topics:

- Brightwater Policy Overview
- Unocal Plant Layout and Design
- Wastewater Treatment Technology
- Odor Control and Air Quality
- Conveyance System Update
- Portal and Tunnel Construction

Updated project descriptions for the treatment plants and conveyance systems were provided for this Seminar along with technical reports addressing: odor and air quality; treatment plant disinfection alternatives; Route 9 and Unocal Site sensitive areas; influent tunnel connections; and, construction approach and schedule for the treatment plants, conveyance systems and outfalls.

The first presentation on Brightwater policies provided background information on the planning process for regional wastewater treatment including a summary of alternatives evaluated in the Regional Wastewater Services Plan (RWSP) and the policy basis for the RWSP as stated in Ordinance 13680. Ordinance 13680 identifies policies for the different major components of wastewater treatment (e.g., treatment plants, conveyance, combined sewer overflows) and adopts changes to King County's

Comprehensive Water Pollution Abatement Plan, codified in the King County Code, Title 28, Metropolitan Functions.

King County's purpose in holding these Technical Seminars is to answer questions raised during the Draft EIS process. As such, this letter focuses primarily on Unocal site issues that were initially raised in the Port of Edmond's Draft EIS comment letter to King County. Information related to the conveyance system and portal and tunnel connection/construction topics are not addressed in this letter, as these elements of the Brightwater treatment system would not impact Port operations, property or activities. Below is a brief summary of the applicable information from the updated descriptions of the project, treatment process, odor control analysis, Unocal site sensitive areas and construction approach and schedule. The topic summaries are followed by a discussion of issues that could affect and/or may be pertinent to Port operations, properties, and interests.

## **Topic Summaries**

### Updated Project Description

Aspects of the Brightwater project description that have been updated include treatment plant layouts, treatment plant features, and treatment processes. The updated project description includes technical memoranda providing additional information on cut and fill quantities, numbers of truck trips, relocating Pine Street and energy consumption and generation. An expanded description of the Multi-Modal Lid Sub-Alternative for the Unocal site is also provided, as well as a conceptual foundation design for structures that would be constructed on the lower yard of the Unocal site.

### *Treatment Plant Layout*

The total footprint of the treatment plant and support facilities at the Unocal site would encompass between 24 and 39 acres of the total 52.6-acre site, depending on the size of the treatment plant (i.e. 36 mgd, 54 mgd, or 72 mgd) and what treatment process is utilized (see discussion below). For the 36 mgd and 54 mgd treatment plants, a buffer zone of 50 feet would extend around the facility. Construction of a 72 mgd plant that utilizes a conventional treatment system (requiring 6.6 acres more than the proposed membrane filter system) would extend into the wetlands/Willows Creek buffer along the east edge of the property; construction of this size plant with a multi-modal lid would also impact the wetlands/creek buffer.

### *Multi-Modal Lid*

The Brightwater Treatment Plant facilities would occupy the majority of the useable area of the site and as such, co-location of the Edmonds Crossing project would require construction of a lid on top of the portion of the treatment plan to accommodate traffic to and from the ferry terminal. The conceptual design for the lid incorporates tollbooths, ferry holding and exit lanes, a bus terminal, rail terminal (below lid), vehicle parking, and

a people mover. The lid would accommodate bus stops and a bus turn around on Admiral Way and pedestrian access to adjacent roads, the hatchery, and treatment facility would be provided. The lid would be a concrete structure constructed on piles that would cover about 20 acres of the Unocal site and would be elevated about 30 feet above the treatment plant units for the majority of secondary processes.

### *Lower Yard Foundation System*

Construction of treatment plant facilities on the lower yard with or without the multi-modal lid would require a deep foundation system. For the treatment facilities alone, a deep foundation system would be required on the Unocal site on the lower yard in order to resist "buoyancy" due to the high groundwater table and to provide support in liquefiable soils. Support for the multi-modal lid would require a system of deep piles and support columns, beams and girders. Piles would be integrated into walls and footings to coincide with the treatment plant tank and building dimensions. An estimated 5,400 piles would be needed for support of both the lid and treatment structures. Piles would be driven.

### *Earthwork Quantities*

Earthwork quantities for construction of the initial 36 mgd treatment plant (2010) at the Unocal site would total about 1,280,000 cubic yards of excavation and structural fill. In comparison, construction of a 36 mgd treatment plant at the Route 9 site would require a total of about 790,000 cubic yards of excavation and structural fill.

### Wastewater Treatment Technology

Subsequent to publication of the Draft EIS, King County evaluated alternative treatment technologies for processing wastewater. Wastewater is treated in two stages: primary treatment, which removes solids in the wastewater by settling; and secondary treatment, which removes remaining solids using a biological process. In the Draft EIS, secondary treatment was proposed through a conventional activated sludge (CAS) process, where oxygen is added to wastewater to activate organisms that "eat" the dissolved organic material prior to disinfection. King County is currently proposing that secondary treatment at the Brightwater treatment plant be achieved through a split flow membrane bioreactor (MBR) process. MBRs separate the solids from the effluent by passing the wastewater through a membrane filter that allows water molecules to pass through but screens out particulates, including individual bacteria and most viruses. The MBR process filters effluent and would replace secondary clarifiers that are the large round settling tanks used in conventional plants. According to information presented by King County, MBR treated wastewater is significantly cleaner and results in a tertiary quality of effluent that meets Class A reuse standards. The membrane filters out all bacteria and a significant "fraction" of viruses, results in very low turbidity, removes almost all soluble biochemical oxygen demand (BOD), all ammonia, and a high level of trace organics. In addition, the MBR process utilizes less space than conventional treatment systems.

Although the MBR process is currently proposed, this technology is new and hasn't been tested with a facility of Brightwater's size. As such, the plant layout was developed to allow for a full flow CAS process, which would require about 6.6 additional acres.

### Odor Control and Air Quality

A technical report on odor control and air quality provided an expanded description and discussion of the regulatory requirements, methodology, and analysis of air and odor impacts at the Unocal and Route 9 sites. Based on community concerns regarding odor, King County has modified the design of its proposed odor control system to meet standards that would be the most stringent in the United States and would feature an advanced odor control technology with a goal of completely eliminating odors. The updated design covers or encloses all odor sources, captures them, and treats them prior to release to the atmosphere. Odors are treated using a multi-stage "scrubber." In each stage, different solutions would target and remove specific odor compounds; remaining trace odors would be "polished" and removed with a final carbon-scrubber before release; there would be no reliance on winds to disperse odor. Back-up systems would be included in the design. Regular monitoring would be performed.

### Unocal Site Sensitive Areas

This technical report documents existing habitat, stream, and wetland conditions on, and adjacent to, the Unocal site. Fifty-three percent of the site (28 acres) is considered "developed area", comprised primarily of former tank sites. Thirty-three percent of the site (about 18 acres) is upland forest and shrub, providing habitat to a variety of native wildlife species. The remaining area (7 acres) is comprised of wetlands, saltwater marsh, marine nearshore, and streams. Approximately 2.85 acres of the adjacent Edmonds Marsh extends on to the Unocal site. Willow Creek and Shelleberger Creek flow through the Edmonds Marsh on the site. The lower portions of these creeks provide fish habitat for coho salmon, chum salmon, cutthroat trout, stickleback, and sculpin. The Deer Creek Hatchery is located on Willow Creek within the east site boundary. The adjacent Edmonds Marsh is designated by the City as a Wildlife Habitat and Natural Resource Sanctuary and is characterized by a wide diversity of habitat types (salt marsh, fresh water emergent, forested vegetation communities) that support many wildlife species, including several designated as "special status" species by the federal or state government agencies.

### Construction Approach and Schedule

#### *MBR Treatment Plant (36 mgd)*

This technical report describes the construction phases of the 36 mgd MBR plant required by 2010. The Unocal site's location is adjacent to Edmonds Marsh and Willow Creek; Best Management Practices (BMPs) to control erosion would be implemented

through all site work. A stormwater treatment facility is planned for the northwest area of the site; the wetpond system would discharge treated stormwater to Puget Sound beyond the "nearshore" shelf through an outfall that would be constructed in the same trench as the marine outfall for the plant effluent.

The Unocal site does not have significant area available for stockpiling soils; most excavated material would need to be hauled away. The Unocal site has a significantly greater amount of debris removal that would be required, comparative to the Route 9 site. Total debris (including paving, trees and shrubs, wooden dock, underground pipelines) would be over 80,000 tons and would require about 1,430 truck trips (round-trip) or 33 truck trips per day over a two-month period. The estimate of total debris for the Route 9 site is 25,000 tons, corresponding to 10 truck trips per day over a two-month period.

As described above, construction of the treatment plant at the Unocal site will require a significantly greater amount of earthwork than for the Route 9 site (about 1.2 million cubic yards versus 790,000 cubic yards). In contrast to the Route 9 site, the majority of material would not be able to be used as fill material for other areas of the site, nor would there be room to stockpile materials onsite. As a result, initial earthwork would require between 250 and 300 truck trips per day during the first year (depending on whether a 5 or 6-day per week schedule is implemented) and between 69 and 95 trucks per day the second and third years. With the multi-modal lid, an additional 94,000 cubic yards of material would need to be hauled offsite.

With respect to other aspects of construction, a treatment plant at the Unocal site would require significantly greater number of retaining walls than the Route 9 site, installation of dewatering systems, a cutoff wall to isolate the Edmonds Marsh and Willow Creek to help minimize passage of groundwater or drawdown, and significantly more concrete, assuming a multi-modal lid.

The majority of construction operations are scheduled to take place over a four and a half year period from mid-2005 through the end of 2009. Based on the limited area at the Unocal site, offsite parking would be required and workers would be bussed to the site. Peak truck traffic for the Unocal site, assuming construction of the multi-modal lid would occur between May 2006 and February 2007 and would range between 250 and 270 trucks. Under the Route 9 Alternative, peak truck traffic of between 90 and 105 trucks would occur between December 2006 and July 2007.

Construction of the MBR Plant with a lid would require 5,400 pilings. Based on a concept of four rigs working simultaneously, 12 hours a day, the total duration of installation would be 450 days, or nearly 18 months, assuming 26 work days per month.

## **Issues Pertinent to the Port of Edmonds**

As stated in the Port's Draft EIS comment letter, the overall issue continues to be that implementation of the Unocal System Alternative would occur in a populated urban setting, adjacent to the Port of Edmonds Marina and would generate significant and unnecessary impacts to Port facilities and users over the estimated four and a half year construction duration, given the viability of the Point Wells site and the Route 9 Alternative.

Although construction of a multi-modal lid at the Unocal site continues to be addressed as a separate sub-alternative, the likelihood that the Edmonds Crossing project will occur is high. Co-location of the two facilities greatly increases the complexity and cost of the project, creates timing issues that must be identified and addressed with WSDOT and the Washington State Ferry system, and significantly increases the magnitude of construction-related impacts, particularly in comparison to the Route 9 Alternative.

Updated information and additional detail presented in the July 19<sup>th</sup> Seminar reinforces the conclusion that construction of a treatment plant at the Unocal site would generate a magnitude of environmental impacts that are significantly higher than for the Route 9 Alternative and that would require extensive mitigation. The Final EIS should include an updated evaluation of impacts and mitigation requirements associated with the changes in the project and the new information included in these new and/or more detailed studies.

Although the MBR treatment process is currently proposed to replace a conventional system and would improve both the quality of effluent and require less area, this technology is new and hasn't been tested with a facility of Brightwater's size or treatment capacity. As such, it is still experimental. Should a conventional system be required, impacts to the Edmonds Marsh and Willows Creek would increase significantly based on the proximity of treatment facilities to these resources.

The Unocal site sensitive areas report documents the presence of significant and diverse habitats and wildlife, however no additional or updated information on potential impacts or mitigation resulting from the updated detail in the site plan layouts is provided. Based on the drawings provided, treatment facilities would impact wetlands and encroach into the stream buffers. Construction of a 72 mgd plant that assumes a CAS system could require relocating Willow Creek and could also potentially affect the Deer Creek Hatchery operations. An updated and detailed discussion of sensitive area impacts, permitting requirements, and mitigation should be included in the Final EIS. The surface/groundwater connection should also be clearly documented.

Numbers of daily truck trips to and from the Unocal site range into the several hundreds for several years. The Construction Approach Technical Report assumes that all material would be hauled by truck; this differs from the Draft EIS where the possibility of barge transport was identified. Haul routes are not identified; parking for employees and other vehicles is also not discussed specifically. A discussion of haul routes,

parking locations and potential impacts to travel patterns, level of service, and emergency vehicle access to the marina and surrounding properties should be included in the Final EIS. Based on the limited available area at the Unocal site, the location of staging areas for construction equipment and activities should also be identified in the Final EIS and potential impacts to surrounding uses evaluated.

Construction of treatment plant with multi-modal lid would require 5,400 driven pilings. Four rigs would be working simultaneously. Significant noise impacts in this urban setting could be experienced for the duration of pile driving, estimated at 18 months. An evaluation of potential noise levels and impacts on the surrounding properties should be included in the Final EIS.

Based on the level of odor controls proposed in combination with the County's commitment to implementing a system that would completely contain and treat all odor prior to release, odor impacts would not likely be significant, assuming successful implementation of the odor control system.

In conclusion, the residential development proposed on the site is currently in the building permit review stage. The Final EIS should include a discussion of the costs associated with potential condemnation of what will likely be a new, approved residential project.

Thank you for the continuing opportunity to provide assistance to the Port of Edmonds regarding the proposed Brightwater Wastewater Treatment System and please contact us with any questions or comments.

Sincerely,

Michael Blumen  
President

Denise Evans  
Senior Associate

Blumen Consulting Group, Inc.



## Davis Wright Tremaine LLP

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August 4, 2003

King County Brightwater Siting Project  
201 S. Jackson St., Suite 503  
Seattle, Washington 98104-3855

Re: StockPot and Campbell Soup – Comment on Brightwater Sewage Treatment Facility –  
Treatment Plant and Conveyance Update

Ladies and Gentlemen:

We represent StockPot, Inc. and its parent, Campbell Soup Company, (collectively, “StockPot”) with respect to the siting, environmental review and acquisition of property for King County Metro’s proposed Brightwater Sewage Treatment Facility. On behalf of StockPot, we offer these comments on the Treatment Plant and Conveyance Update (the “Update”). These comments supplement the comments we submitted earlier this year on the Draft Environmental Impact Statement for the Brightwater Sewage Treatment Facility.

1. Relocation of StockPot Campus. While StockPot’s strong preference is for King County not to construct the Brightwater Treatment Facility at the Route 9 site, StockPot is pleased that the Update indicates that, if King County selects the Route 9 site, it now would acquire the StockPot Campus property for the project and move the StockPot Campus offsite. StockPot understands, however, that it is possible although highly unlikely without additional major changes, that King County could elect not to acquire the Stockpot Campus property for the project. The balance of these comments address the significant adverse impacts to StockPot that would result from the construction of the Sewage Treatment Facility with these new design elements in the highly unlikely event that the StockPot Campus property and StockPot remains in its present location.

2. Odor and Other Air Quality, Environmental Health, Transportation and Noise and Vibration Impacts Remain. Even with the changes in the design of the Sewage Treatment Facility described in the Update, the impacts StockPot described in its comments to the DEIS

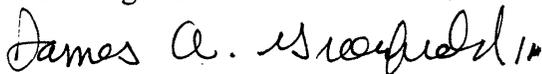
will remain. For example, the sections of the Update related to odors describe levels at the property line which are virtually identical to those in the DEIS. In the July 19, 2003 technical seminar, when discussing odor control, King County emphasized its continued commitment to not having detectable odors at the property line. Figure C-1 of the Update (Route 9 - 36 and 54 mgd Plant) clearly shows the StockPot Campus Property now well within the Brightwater project site and, as such, within an area where King County is not making the same "guarantees" regarding detectable odor levels. We can only assume that odor levels within this area will be at least typical of that experienced on or near a wastewater treatment system. If, for some reason, King County does not acquire the StockPot Campus property and constructs the Sewage Treatment Facility surrounding the StockPot Campus, the StockPot Campus will surely suffer severe odor impacts.

3. Membrane Bioreactors. The Update also outlines King County's proposal to use membrane bioreactors (MBRs) as part of the secondary treatment process. While pilot scale testing on the use of MBRs shows excellent treatment capability, MBRs are an emerging technology and from our investigation there are no MBR systems in existence that are being used to treat this quantity of sanitary wastewater on a daily basis. While there are many pilot scale and small scale MBR systems in operation, utilizing an emerging technology such as MBRs is a significant leap of faith to propose its application to a project of this size. The Update indicates that King County now plans to include secondary clarifiers in the design of the system, but delay construction until it is determined that the MBRs will not provide effluent quality to meet discharge limitations for a system of this size. The proposed location of the secondary clarifiers is the current location of the StockPot Campus. StockPot strongly urges King County not to defer acquisition of the StockPot Campus property until completion of this experimental program.

Thank you for this opportunity to comment upon the Brightwater Treatment Plant and Conveyance Update. Please do not hesitate to contact me if I or representatives of StockPot can provide you with additional information.

Very truly yours,

Davis Wright Tremaine LLP



James A. Greenfield

Cc: Bart Freedman, Preston, Gates & Ellis, counsel to King County  
David Nash, Vice President, Finance and Supply Chain, Campbell Soup Company  
Robert Zane, Group Director, Real Estate Operation, Campbell Soup Company



## Technical Memoranda Comment Form

We invite you to comment on the Treatment Plant and Conveyance Technical Reports during the comment period from July 3<sup>rd</sup> - August 4<sup>th</sup>. Although each comment will not receive a specific response, the comments will be considered by the Brightwater project team preparing the Final EIS. Remarks received after that time can be revisited during the design process.

To be considered in preparing the Final EIS,  
comments must be postmarked no later than August 4<sup>th</sup>, 2003.

Anaerobic digestion: 7/19/03 - Steve Krugel,  
responding to my question, explained the digestion  
will utilize natural-body bacteria. I'd like to see  
further study of enhancers. Dr. James Gaddy's  
sludge-eating bacteria was an enhancer, which he  
claimed to be highly efficient, consuming so much of  
sludge that the remainder could be landfill-dumped or  
processed into fertilizer. Gaddy was a biotech professor  
at U. Arkansas, & owned Engineering Resources, Fayetteville.  
Don't know if he's still in business or who has patent  
now, on his "bugs." Probably many new ideas &  
players have entered this field.

Route 9 site Design - For inspiration, see the  
Amoco Refinery, Mondon, N.D., whose environmental  
design, esp. creek/wildlife mgmt., has won many awards.  
I knew the manager there when I was journalist in early 80's.

Amenities for public use beyond tours aren't important  
to me. I want a safe, secure, odorless plant with safeguards

against catastrophic failure & spills.

How many small electrical  
devices could you solar-panel?

Example - small cooling fans  
& lights

Name: John Pearson

Address: 20215 Holly Hills Dr. NE.

City, Zip: Bothell 98011

K. L. THOMPSON

July 22, 2003

Re: Treatment Plant and Conveyance Technical Reports

Dear Friend,

Having just attended the July 19th Technical conference on BrightWater, I have to say I was more than a little disappointed that there has apparently been little, if any, consideration given to the prospect of utilizing the Rail Road for movement of materials to and from the proposed sewage treatment facility.

Since the proposed sites are both located immediately adjacent to a rail line, why not take full advantage of the opportunity to utilize that mode of transportation? The advantages are many when compared to trucking large quantities of material over long distances. (this is especially true given the long term nature of the facility)

Shipping by rail is the second least expensive method per ton mile. (only shipping by sea costs less)

Railroad fuel efficiency has increased 68% since 1980, when a gallon of diesel fuel moved a ton of freight an average of 235 miles. In 2000, railroads moved a ton of freight an average of 396 miles per gallon. If just 10% of the freight moved by truck were diverted to rail, the nation could save as much as 200 million gallons of fuel each year. How about helping to wean US from foreign oil dependency?

Shipping by rail requires far fewer trips to and from the facility. ( three trucks each day compared to one(?) train per week or month. Which would you prefer?) A single inter-modal train can take as many as 280 trucks from our highways. That's 279 fewer chances for an accident.

Shipping by rail has a well established safety record and it operates in all weather conditions. (no delays due to snowy roads or avalanche control)

Per ton mile, shipping by rail puts only a fraction of the pollutants into the atmosphere that are generated by trucks. (The EPA estimates that for every ton-mile, a typical truck emits roughly three times more nitrogen oxide and particulates than a locomotive) At a time when air pollution is a major concern, we should be looking at ways to minimize any impact.

Shipping by rail avoids additional strain on an already over stressed highway system. (24,000 tons per year over the roads and bridges has got to be doing damage that the tax payer will have to pay for)

Shipping by rail avoids placing other traffic on our highways at risk of accident or injury. Why add more traffic to an already congested highway system? Even when taking into account additional costs, such as demurrage, I'd venture to say that over the long haul (and in the bigger picture) rail is the way to go. (if the county bought it's own railcars, couldn't demurrage be avoided and the cost be amortized over time?)

Sincerely,

Signature



# Brightwater

King County TREATMENT SYSTEM

## Technical Memoranda Comment Form

We invite you to comment on the Treatment Plant and Conveyance Technical Reports during the comment period from July 3<sup>rd</sup> - August 4<sup>th</sup>. Although each comment will not receive a specific response, the comments will be considered by the Brightwater project team preparing the Final EIS. Remarks received after that time can be revisited during the design process.

To be considered in preparing the Final EIS,  
comments must be postmarked no later than August 4<sup>th</sup>, 2003.

THANK YOU VERY MUCH FOR THE SEMINAR ON JULY 19TH. IT WAS VERY INFORMATIVE AND WELL DONE. MY MAJOR CONCERN IS THAT THE AREA TO THE NORTH OF THE NODDINVILLE SITE MUST BE IMPROVED AND MAINTAINED AS THE BRIGHTWATER TEAM HAS SHOWN TO THE PUBLIC. REMOVING ANY OF THOSE PROPERTIES WOULD HAVE A VERY DETRIMENTAL EFFECT ON THE COMMUNITY AS A WHOLE. PLEASE PROCEED WITH YOUR EXISTING PLANS SO THAT YOU CAN DELIVER TO THE PUBLIC WHAT YOU HAVE REPRESENTED IN ALL OF YOUR PUBLIC MEETINGS AND DISCUSSIONS.

THANK YOU!

Name: JERRY TIBERIO

Address: 10900 NE 8TH ST.  
SUITE 900 BELLEVUE, WA

City, Zip: 98004

**Brightwater Technical Seminars and Reports**  
**Comments received on additional scientific &**  
**engineering studies technical reports**

**RECEIVED**

SEP 10 2003



**Snohomish County**

ENVIRONMENTAL  
PLANNING DIVISION

**Planning and Development Services**

September 5, 2003

**Robert J. Drewel**  
County Executive

Environmental Planning  
King County Wastewater Treatment Division  
ATTN: Meredith Redmon  
201 South Jackson Street  
KCS-NR-0505  
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(425) 388-3311  
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Re: **Brightwater Scientific and Engineering Studies**  
**Technical Reports; Volumes 3a-3c**  
**Snohomish County Response**

Dear Ms. Redmon:

This letter and the attached memorandum prepared by DMJM Harris constitutes Snohomish County's response to the *Brightwater Scientific and Engineering Studies, Volumes 3a- 3c* issued in July, 2003. Please note that these comments do not constitute an acceptance or approval of the Brightwater proposal, substitute for a supplemental EIS, or preclude Snohomish County from raising new issues or requiring additional information in the environmental review and permitting process.

**Volume 3a – Transportation Impacts**

**Construction Phase**

The transportation analysis indicates that there would be no deterioration of LOS during the construction phase on segments of 228<sup>th</sup> St SE and SR 9. The analysis also indicates no deterioration of LOS at the intersections of SR 9 and 522 and SR 9 and 228<sup>th</sup> St. SE. It is stated that in these calculations, special considerations have been made to capture the impact of truck traffic. For mitigation of these impacts, temporary signal adjustments and temporary re-stripping of lanes is proposed. The transportation analysis further indicates that rail transportation and off-site worker parking would be unnecessary.

Snohomish County does not concur with this analysis for the following reasons:

1. The analysis done for the "Concurrency Memo" (provided separately) for the operation phase was deficient for the reasons below, and there is no evidence that the analysis of the construction phase was done differently:
  - The Synchro model was not calibrated to simulate or match existing field-measured conditions such as travel time and average signal delay.
  - The signal timing for the intersection of 228<sup>th</sup> St SE and SR 9 is not realistic. An optimized 85-second cycle length would be a best-case scenario. WSDOT typically

- uses 150-200 second cycle lengths. The analysis should consider a worst-case scenario which can make a significant difference.
- Temporary signal timing adjustments as proposed may not be a solution because adding more green time to a cycle length that is too long (consider downstream queuing) would make the LOS worse. (Also on Pages 122-123 of Traffic Impacts report)
  - Traffic analyses for the intersections of SR524/SR-9 and 180th St SE/SR-9 on 180th St SE west of SR 9 were not completed as requested.
  - The information is not complete as to how the truck/auto mix was determined. For example the Synchro report for the intersection of SR 9/228<sup>th</sup> St SE projects truck traffic as 2% of total traffic. What factors were used to determine this percentage?
2. Snohomish County does not agree with the LOS calculations. Comments on the Draft EIS requested a traffic impact analysis using the Snohomish County's methodology for determining LOS. An example of a discrepancy between Snohomish County and the technical report is one where the technical report indicates that 228<sup>th</sup> St SE currently operates at an LOS of "C" and would continue to operate at LOS "C" during construction. Snohomish County data records that 228<sup>th</sup> St SE currently operates at LOS "E". The LOS definitions in the technical report differ from Snohomish County's definitions. Snohomish County defines an LOS of "C" as being 77% of free flow; the technical report submitted defines "C" as 50% to 69% of free flow. This is a significant difference.
  3. The report states that the impacts to SR 9 (without the improvements) during the construction phase are not significant because analysis shows that the LOS will not change. Because the LOS for SR 9 is currently "F" and cannot go down any further, it is necessary to know the increase in delay to judge the true impacts. Any construction impacts to SR 9 without or before WSDOT's improvements need to be aggressively mitigated. Under these circumstances, King County may want to re-evaluate its decision regarding off-site parking and rail service.
  4. A trip distribution must be provided which covers a wider area and analysis performed using Snohomish County's methodology for determining LOS where more than 3 peak hour trips will impact an arterial roadway.

An overlap between the construction of the SR 9 improvements and the construction of the plant represents the most significant potential for construction phase traffic impacts. The preferred option is for the two projects to be separated with WSDOT going first. If this is not possible or if some overlap still exists King County will need to reevaluate traffic impacts during the construction phase. This scenario is not addressed in the DEIS or in the technical paper on transportation impacts and must be addressed in the FEIS. Impacts that would occur to alternate transportation routes for trips that are diverted from SR 9 must be addressed. Under these circumstances, King County may have to reevaluate its decision on using off-site parking and rail service.

A potential mitigation measure which should be included in the Final EIS is that during permitting, a haul route agreement be entered into with Snohomish County in accordance with Section 13.40.080 SCC, at which time mitigation of impacts caused by transportation of materials would be addressed.

## **Operation Phase**

The information in the Transportation Impacts technical memo and King County's "Concurrency Memo" was insufficient to judge the validity of the net trip calculations. Information should be attached to substantiate the conclusions reached.

Improvements to SR 9 from SR522 to 176<sup>th</sup> Street SE are now funded, however, Snohomish County agrees that the traffic analysis should assume these improvements not constructed, as a worst-case analysis.

Traffic analyses for the intersections of SR524/SR-9 and 180th St SE/SR-9 on 180th St SE west of SR 9 were not completed as requested. Although trips would likely be reduced at these locations, a trip distribution for these facilities is necessary to clarify the with and without development conditions.

Trip distributions provided as Figures 10 and 11 do not reflect the net reduction in trips, giving the appearance that impacts may occur beyond the area shown. Distribution showing where reductions in trips occur should be provided, consistent with discussion in the text, should be provided.

### **Other Specific Comments:**

Page 10. Indicate whether WSDOT concurs with proposed site access.

Page 15/16, 67/68, 73/74. Snohomish County does not concur with the 228<sup>th</sup> Street SE west of SR 9 Corridor LOS of C. Does intersection LOS reflect PM peak queues from Maltby Road/SR-9 intersection?

Page 65. Update SR 9 planned improvements discussion.

Page 121. 4.1.1. List these mitigation measures clearly in the Final EIS. 4.1.3. Include that Temporary Traffic Control Plans are subject to permitting jurisdiction review and approval. 4.1.7. Change to "construction of temporary or permanent facilities for no-motorized traffic."

### **Bike/Pedestrian Facilities.**

Snohomish County, in commenting on the Draft EIS, requested that the Final EIS list and discuss the area bicycle and pedestrian facilities that are listed in the County's Comprehensive Plan and in the Mill Creek UGA plan. These include the pathways along SR 9, SR 524, 228<sup>th</sup> St SE, and Broadway Ave in addition to the North Creek Trail.

There may be opportunities for some planned improvements to be identified as mitigation of construction traffic impacts, particularly those area walkways included in the County's Transportation Needs Report (TNR) and the paved shoulder bike/pedestrian way along SR 9.

The section on mitigation lists providing safe access for bicyclists and pedestrians during construction with the possibility of constructing temporary facilities as a mitigation measure. Opportunities for permanent rather than temporary facilities should be considered.

Page 11. 228<sup>th</sup> Street SE does not have sidewalks at the east end.

### **Transportation Concurrency report (provided separately)**

The only Snohomish County arterial unit analyzed was **Unit #272** – 228<sup>th</sup> St SE from 45<sup>th</sup> Ave SE to SR-9. Snohomish County's comments regarding this analysis are as follows:

1. No analyses could be found for existing conditions or a calibrated Synchro model.
2. Consultant's Synchro signal timing for the intersection of 228<sup>th</sup> St SE @ SR-9 did not coincide with WSDOT timing and phasing. Simultaneous lagging left-turns are not used and it is doubtful that the state would approve an optimized 85-second cycle length as indicated in the study.
3. Results of the level-of-service analyses of other studies have indicated that this arterial unit will be below Snohomish County standards in both the am and pm.
4. The Synchro analysis did not reflect proposed State sponsored improvements along SR-9 at 228<sup>th</sup> St SE.

Snohomish County requests that Synchro be set up to reflect existing field conditions. The model should be calibrated to match as closely as possible to the travel times and average signal delay as measured in the field, to ensure more realistic future level-of-service analyses.

The transportation concurrency analysis for Snohomish County should be included in the Final EIS as it is the method by which level of service impacts are measured on Snohomish County roads. The requirements of Title 30.66B SCC, including the level of service methodology, are the County's SEPA policy for transportation as well as a GMA regulation. The analysis will have to be updated prior to permit submittal to meet GMA concurrency requirements.

## **GROUNDWATER AND SURFACE WATER**

### **Volume 3a - Groundwater – General Comments**

At technical seminar #3, the consultants stated that they would be relying on design and construction measures as groundwater impact mitigation measures (i.e. adjusting tunnel alignments if further data revealed a problem along the conveyance line). This alone is unacceptable as mitigation as it assumes no groundwater mitigation would be needed throughout the duration of the project. However, volume 3a outlines a fairly clear plan on how Brightwater proposes to handle the excess dewatered groundwater. Mitigation of groundwater impacts must be clearly defined in the Final EIS.

The section on *Dewatered Groundwater Quality* discusses discharge options and regulatory requirements for contaminated groundwater for compliance with both water quality and quantity standards. For example, discharge options including a pre-sedimentation pond to hold the water and allow settling of larger particles, structural BMPs such as filtration systems, transporting water off-site, and treating water on-site using treatment technologies. All seemed reasonable and achievable and should be clearly identified as groundwater mitigation measures.

Snohomish County's drainage code definition of "stormwater runoff" includes groundwater base flows above the aquifer or base flow. At the very least, it will have to be demonstrated that there will be no impacts to the downstream system for increased flow of more than 0.1 cfs.

Detention and water quality treatment code compliance will be required during construction as well as during operation of the treatment plant and conveyance pipelines.

### **Volume 3a Groundwater - Specific Questions/Comments**

If there is a written groundwater monitoring plan for the conveyance line and the SR-9 site during construction and/or operation identify it in the Final EIS and share it with Snohomish County water quality staff.

In *Stormwater & Groundwater Management at Conveyance System Primary Portal Sites*, re-injecting groundwater into the aquifer using an injection well is discussed as another option for discharge of dewatered groundwater. Disclose whether this is a serious consideration and whether it is being discussed as an option for the SR-9 site or the Unocal site.

### **Volume 3a. Management of Water Quality During Construction at Treatment Plant Sites.**

Page 2, Groundwater is characterized as: "less common at construction sites, occurring typically as pumped dewatering flow from deep excavations". This statement minimizes the high probability that significant groundwater flows will be encountered at shallow levels during excavation at the SR-9 site. Experience in Snohomish County is that even shallow construction excavations at the base of hills can often be the source of continuous flows of groundwater. (At Baker Vista, a subdivision at the base of a hill, grading punctured and ultimately de-watered a small local aquifer, causing a year-round tributary of Springbrook Creek to dry up in the summer months). At the SR-9 site, serious Groundwater problems were encountered at shallow excavations for Stockpot Soup, and there are anecdotal reports of very heavy flows from shallow wells in the SR-9 area.

Pages 8-9; Pond dimensions are provided and include 2 ft freeboard, 1.5 ft dead storage, and 3.5 ft active storage. Additionally, it is mentioned ponds may be "cut" into side slopes. Unless these ponds are specifically constructed to be impermeable to groundwater discharge they will fill with groundwater, in which case these ponds would not be able to infiltrate surface water. Examples of this occur near the SR-9 site. Has groundwater discharge to these ponds been estimated and accounted for in sizing these ponds, especially, as it is noted (page 7), groundwater is found at less than 5 ft depth?

Page 10; Turbidity Monitoring. The document states that advanced water quality treatment could be used if turbidity maxima were exceeded. These advanced treatment techniques would need to be fully constructed and ready for use prior to the indication of water quality problems; otherwise the problem would persist until these treatment techniques were constructed.

1.4 Sanitary Sewer disposal - This is a critical safety feature to insure that sediment-laden runoff does not end up in Little Bear Creek. It is normal for high intensity precipitation events to occur in the summer months when there are maximum grading activities that have exposed fine clays that are extremely difficult to settle out in ponds and get mobilized by runoff. Certainly in the winter months the potential for such turbidity is also high. In technical seminar #3, information was presented that King County routinely provides sanitary sewer hookups at large construction sites to allow the option of using sanitary sewers to control runoff not meeting water quality standards. The discussion in this section of the document should emphasize that this is not a hypothetical alternative, but a guaranteed safety feature that will be in place and used if necessary.

2.2 Additional Control Measures - This section talks about the fine clays that “effectively never settle out”. This is another good place to mention the diversion of turbid construction runoff into the adjacent sanitary sewer connections that are ready if it ever becomes necessary to use them.

3.3 Dewatering - It is mentioned that a portion of the flows may be discharged to temporary infiltration ponds where feasible. Large depressions in the surrounding neighborhood should also be considered if there are willing landowners.

3.4 Runoff Control Facilities - This section should also include discussion of the ability to divert turbid flows into the failsafe sanitary sewer hookup that will be available in the event that chemical flocculation is unable to handle the volumes that may occur if there are a series of large storm events (Ponds were only sized for a 10 year, 24 hour storm event) Maximum undetained runoff from the site is stated to be 34.8 cfs.

3.5 Runoff Discharge - This section covers onsite monitoring of erosion control facilities. It mentions “weekly inspections during the dry season, and following larger storm events”. For erosion control plans on a large project to have the best chance of being fully and correctly implemented, there needs to be a dedicated staff person who does not have other priorities that could supercede erosion control work. Signs should be posted on site giving the name and number of the responsible individual, and there should be an emergency “hot line” so that a trained individual can be reached outside of normal working hours if the need arises. The dedicated individual should be proactive, monitoring weather reports and making inspections of erosion control measures before storms are expected, as well as after. Depending on the weather, weekly inspections on a pre-determined schedule are not adequate to protect Little Bear Creek.

### **Volume 3a - Permanent Stormwater Management at the Treatment Plant Sites**

Page 3, section 1.2. An "approved landscape management plan" is mentioned. Please cite approving authority.

Page 4, section 1.4 Low Impact Development (LID); LID is noted as an effective way to reduce development costs (e.g., by reducing pond sizes) and as part of an agreed to Ecology-approved stormwater-management plan. Where these measures are a substitute for or reduce regulatory requirements they should not be considered as part of mitigation for the project and paid out of the mitigation fund.

Page 9, section 2.5. Dewatering; Will dewatering affect the level of the groundwater table at the stormwater facilities? It is indicated that groundwater levels are at 5 feet or less. Would this affect the amount of available storage space if groundwater discharge to the ponds occurs?

1.1 Stormwater Requirements - Minimum Requirement #7 discusses the pre-developed condition as “undisturbed forested land.” This condition consists of a thick, forest duff organic “sponge” layer over the underlying mineral soils, containing numerous topographic depressions, and old growth logs that in varying states of decay have slumped into the topography, where they can impound water on slopes and in swales. Later is Section 2.2 Model Input - It says the pre-developed site conditions were modeled as Till-Forest cover. This very likely overestimated the amount of pre-development runoff, which could result in under-sized ponds. Runoff from pollutant generating surfaces is discussed such as “roadways, parking lots, sidewalks, and other unroofed impervious areas. Again, data should be presented that shows the reduction in runoff that LID will provide.

1.2 Modeling Methods - It is stated that specific sizing and drainage layout for the individual stormwater facilities will be developed and submitted for review and approval by the permitting agencies. Since LID Best Management Practices (BMP's) are a significant component of the proposed stormwater management plan, but are not given credit by the DOE manual for pond sizing, they were apparently not included in the modeling, and may be ultimately seen as dispensable at a later date. Even though they are not credited, the effect of significant reductions in impervious surfaces should be modeled, and the results included in tables.

1.4 Low Impact Development - Again, it is stated that for the purposes of the EIS, "analyses have assumed no reduction in stormwater runoff from LID implementation. Wherever appropriate in the Technical Report, data from modeling calculations should be presented that shows the effect of LID Implementation.

Route 9 Site - It says more information can be found in Chapter 6 of the EIS. Where is chapter 6?

2.3 Major Stormwater Facilities - It is mentioned that 27 acres will be impervious. How much could this be reduced by LID? It states that LID is "not explicitly factored into the stormwater concept plan at this stage". State when it will be factored in, and made a design requirement.

2.5 Dewatering - The effect of continual de-watering by underdrains on the local shallow aquifer that is used by some landowners having wells only 25 feet deep needs thorough analysis. While the effects on the Woodlane well are shown to be minimal, there does not seem to be enough data on the size, depth, and location of the shallow aquifer to insure that analysis could adequately identify potential impacts. While potable water could be made available to residents if their shallow wells failed, trees and pastures needed supplemental irrigation due to lower water tables. An analysis of potential effects and mitigation should be provided.

Figure 2 Stormwater Management Area for the Route 9 Site Showing major Cover Types. This would be an ideal place to show where LID alternatives could be implemented.

### **Volume 3a - Route 9 Site Runoff Effects Upon the Geomorphology of Little Bear Creek**

Page 9, Section 3.2.2, Channel Stability; It is stated there were no "signs of nickpoints or other indicators of serious channel incision." However, on the previous page it is stated the channel was, "mildly incised from 1 to 2 feet in depth, but occasionally as deep as four feet." It is also stated that, "the stream appeared to have only limited interaction with the overbank area," which is also a symptom of channel incision. Bed degradation of 1-4 feet is a significant impact, resulting from altered basin hydrology and whatever channel hydromodifications are present such as bank armoring, bridge crossings, artificial berms, and road prisms or other hardened surfaces. This type of channel change would result in channel morphology consistent with a Rosgen F channel, as it is referred to. On page 10, the report concludes, "the reach of Little Bear Creek...resides within a stable channel with no sign of significant erosion." This conclusion is not supported based on the information presented nor based upon King County's 1999 survey data.

Page 10, Channel Stability; Incipient motion likely occurs at "modest flow velocities," which suggests transport of sediment occurs within these reaches that could lead to streambed degradation (incision). This information challenges the conclusion made above. Little Bear Creek is at risk of ongoing and future channel instability (where there is no riprap) that could occur from increased flows in this reach not only from treatment site stormwater discharge but also from

future growth serviced by Brightwater. Rather than erroneously concluding Little Bear Creek is stable without signs of erosion, at a minimum, channel monitoring within Little Bear Creek should be incorporated into a design and monitoring plan for Unnamed and Howell Creeks when they are re-engineered.

Table 1 Streams Upslope of the project site. Historic average January flow for Little Bear Creek is shown as 31.4 cfs. Peak flow of undetained construction water from the site is shown as 34.8 cfs in a 10 year, 24-hour storm. This gives an indication of how critical it is to emphasize reduction of runoff with LID implementations. A series of larger storms than the ponds were designed for, that filled the ponds before they had a chance to recover, could result in excessive discharges to the creek.

### **Volume 3a - Summer Season Temperature Effects of Stormwater Ponds on Receiving Streams**

Other than being a concise review of recently published materials, this section provides no qualitative or quantitative assessment of potential or likely effects of stormwater heating, other than this phenomenon is likely to occur based on literature findings. At present, this represents an unaccounted for, unassessed potential impact given the pond volume and size and lack of mature vegetation present to provide shading. Stormwater heating must be an element of the stormwater design, monitoring and adaptive management plan given that cold groundwater resources will be available to mitigate impacts if they occur and that shading from mature vegetation will also change over time.

Engineered Techniques for mitigating the thermal impact of Stormwater ponds. This section states "The first step; however is to reduce the amount of surface runoff from impervious surfaces by using low-impact development techniques. Reducing runoff volumes should be the primary focus of mitigating thermal pollution from stormwater systems." There needs to be a clearly defined process indicating how LID implementation will assist in this goal.

### **Volume 3b - General Comments**

*Geotechnical Data Report for Proposed Route 9 Treatment Plant Site* – This report does not interpret any of the data and provides too many disclaimers. The data and results provided is useful to the County in that it shows good faith efforts in responding to our request for more geotechnical work needed. However, it would likely frustrate the public in that it doesn't provide any accompanying environmental interpretation of the geotechnical data. There needs to be either interpretation in this document, or reference to the section of the Final EIS where interpretation is provided.

### **Volume 3b - Specific Questions/Comments**

Will information from the subsurface exploration program be made readily available on-line?  
Where will the geotechnical data from this project be stored?

### **Volume 3c - Specific Questions/Comments**

It is important to Snohomish County to know whether or not the water districts agree with the Brightwater groundwater modeling results. Please ensure that we are provided with their comments.

Unresolved groundwater issue to be addressed: An established groundwater monitoring plan for both the construction and operation phases of the Brightwater project must be proposed as mitigation for the project.

Thank you for this opportunity to comment on the Technical Memoranda for the Brightwater Sewage Treatment Plant. Snohomish County looks forward to working with King County's Department of Natural Resources to address all issues regarding the Brightwater sewer treatment plant.

Sincerely,



Faith L. Lumsden, Director  
Planning and Development Services

cc. Robert Drewel, County Executive  
Snohomish County Council  
Peter Hahn, Director, DPW  
Rick Bart, Snohomish County Sheriff  
Ron Martin, Director, Parks and Recreation  
Barbara Dykes, Chief Civil Prosecuting Attorney  
Shawn Aronow, Deputy Prosecuting Attorney  
Randy Sleight, Chief Engineering Officer  
Stephen Dickson, Assistant to the Director, DPW  
Susan Scanlan, Principal Planner

# Technical Memorandum

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**To:** Steve Dickson – Snohomish County

**Subject:** **Brightwater Technical Document Review; Seminar 3, Geotechnical and Groundwater**

**From:** Aaron Silver, PE – DMJM+HARRIS

**Date:** September 3, 2003

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This technical memorandum summarizes our comments including observations and questions pertaining to our review of Technical Reports 3 of the *Brightwater Scientific and Engineering Studies – Technical Reports* prepared by King County Department of Natural Resources and Parks, Wastewater Treatment Division and dated July 2003. These reports were issued as support information to technical documentation issued by King County during the DEIS phase. Note that these reports do not address the specific comments provided in the January 2003 DMJM+HARRIS review of DEIS documentation.

## 1.0 Route 9 Treatment Plant Site: Geologic Summary

The site is located in unincorporated Snohomish County east of SR-9, just north of the intersection of SR-9 and SR-522 and the City of Woodinville, in the valley of Little Bear Creek. The creek lies to the west of the proposed site and flows to the south. The current use of the property is industrial.

The preliminary layout of the structures within the plant indicates that they will extend 14 to 55 feet below the surface, except for the influent pump station (IPS). The IPS will be constructed in a shaft extending to a depth of 250 feet.

The site was explored by King County in two separate investigations where 13 borings were advanced to depths ranging from 30 to 500 feet. Both the soil characteristics and the groundwater levels were obtained from these borings. The site is located in or on Vashon Recessional Outwash and/or fill. The fill appears to be reworked Outwash material. This material ranges from 10 to 30 feet in thickness, with the thicker section being to the southern end of the site. This material has a relatively high permeability.

Underlying the Recessional Outwash are the Vashon till-like deposits that extend from 50 to 110 feet below the surface. This material is dense but has a varying composition which means the permeability can vary greatly. Accurately predicting the location of the higher-permeability material is difficult if not impossible. Pre-Fraser glacial deposits occur below the till-like material. The other typical Vashon units appear to have been eroded away.

## 2.0 Ground Water Issues

From a groundwater standpoint, the site will be located in a shallow unconfined aquifer within the Vashon Recessional Outwash (Qvr). The underlying till-like unit creates a leaky aquitard (lower permeability) between the upper and lower aquifers. The pre-

Vashon Aquifer (Qu), which is artesian, occurs approximately 100 feet below ground surface, or at least about 50 feet below the planned foundation level of the site structures.

The Cross Valley Water District, the closest district to the Route 9 site, obtains its water from the pre-Vashon aquifer. The artesian aquifer will be pierced by the IPS shaft. Ground modification techniques will be used to mitigate the potential uplift pressure on the base of the shaft. These modifications need to be further detailed.

Overall, the report goes to sufficient lengths to analyze and evaluate the potential negative effects of treatment plant construction and operation on ground water supplies and contamination. It identifies the regional aquifer/aquitard relationships and estimates the potential ground water drawdowns for the period of construction and operation.

### **3.0 Treatment Plant Construction Issues**

King County has performed an extensive groundwater modeling analysis of the site and have predicted the impacts on both 'the during construction stage' and the 'operation stage' of the permanent facility. In each case they predict that offsite changes (up to 1500 feet) in the groundwater level in the upper aquifer will be lower approximately 1 to 3 feet. This amount of variation is well within the annual water level change due to seasonal rainfall. As a result, there appears to be little impact to the surrounding area.

We concur with this conclusion based on our work with both construction dewatering systems and the permanent siting of subsurface structures. Typically, the drawdown away from a site is quite small at distances greater than 1000 feet. In addition, to compensate for possible variabilities or errors, the designers would implement an emergency water delivery system during the construction stage. Furthermore, pumped water would infiltrate back into the aquifer on the downstream side of the property and flow directly back into the creek via a discharge pipe. This return of the water should maintain the downstream levels of the groundwater both during the construction and the operation of the facility.

#### **3.1 Recommendation**

*In addition to this emergency plan proposed by the designers, we strongly recommend that all the water sources for the houses in the local area be cataloged as a baseline database. We have had this experience in other areas of Puget Sound where residences near a major project have very shallow wells (15 feet or even less in depth). These very shallow wells or sumps can be adversely affected by even a small drop in the water table.*

#### **3.2 Ground Water Quality Issues**

If typical State water quality practices are implemented and followed throughout the construction and operation phases of the facility, we do not believe that water quality will become an issue. Both surface and pumped groundwater will be passed through a water quality improvement facility prior to discharge. This should provide adequate treatment so that the water quality is maintained.

#### 4.0 Unocal Site Groundwater Issues

We concur with the findings of the report on the groundwater impacts at the Unocal site. Since the plant structures would be located in a formation above the groundwater level, and/or in a formation that is almost impermeable, impacts on the latter would be negligible.

#### 5.0 Conveyance System

The engineering studies related to the conveyance system, 100,000-plus feet of 14 to 24-foot-diameter tunnels and several 50-foot-diameter access shafts (portals) for the tunnel construction activities, focus on two main issues, the influence of conveyance construction/operation on ground water resources in the immediate project area, and the location and construction methodology of the conveyance tunnels to mitigate potential construction problems. A reasonable number of borings were executed in this pre-design phase of engineering evaluation, from which disturbed soil samples were retrieved and tested, and into which piezometers were installed and monitored for ground water data. The level of geotechnical/hydrological investigations was commensurate with this preliminary stage of design.

##### 5.1 Ground Water Issues

The report goes to sufficient lengths to analyze and evaluate the potential negative effects of tunnel/shaft construction and operation on municipal ground water supplies and contamination, but does not comment on impacts to private owner wells, some of which may not be on any water supply register. The FEIS needs to address how a thorough inventory of private owner wells will be established, and how on-going geotechnical investigation will allow more detailed evaluation of this issue during the design stage and how this local impact would be mitigated.

It identifies the regional aquifer/aquitard relationships and estimates the potential ground water drawdowns given "expected" (most likely) and "upper bound" (worst case) conditions. For the long-term operational effects for the upper unconfined aquifers (Qal, Qvr and Qva) in both cases the maximum drawdown of the upper unconfined aquifers (< 1 foot) is within the normal seasonal variation, and therefore presents no requirement for special mitigation. For the deep pre-Vashon confined aquifer (Qu) in which most of the tunnels are constructed, the "expected" drawdown is 1 foot and the "upper bound" drawdown is approximately 5 feet during project operation, and that only in close proximity to the tunnel alignment. Where unusually high seepage rates are possible through the final tunnel or shaft liners, additional ground modification techniques or re-lining can be installed to reduce the inflows to the threshold limits. Higher than expected seepage into the influent tunnels affects plant operational cost in that it increases the volume of sewage to be treated, and therefore the cost of additional remedial lining or ground modification will certainly be warranted. The latter is

not expressly stated in the report. During construction of the shafts significantly higher short-term drawdowns are predicted, especially if heavy face inflow events occur, but these should be localized incidents that do not affect the aquifers over any great area. The FEIS needs to clarify that by use of slurry wall construction migration of water between aquifers would be prevented.

Streams fed by the near-surface unconfined aquifers are expected to have a maximum of 5% reduction in flow, well within normal seasonal variations according to the report. This reduction, however, would presumably be year-round and have the effect of diminishing the flow on top of seasonal variations. The FEIS needs to disclose whether 5% reduction in flow, particularly in dry season is significant. If so, how will this be mitigated?

## 5.2 Tunnel Construction Issues

The level of geologic and hydrologic information gathered and evaluated for the construction of the tunnels and shafts clearly addresses the principal concerns of deep tunnel/shaft construction in glacial soils with complex hydrologic relationships. The report correctly assumes that the location of the vertical profile of the tunnels goes a long way to mitigating adverse construction conditions related to ground stability during excavation, and at the same time understands that the complex relationship of soil types and ground water pressures will require provisions for handling potential face inflow events by a combination of in-tunnel ground stabilization ahead of the face, dewatering ahead of the face, and/or full-face pressurization of the TBM. The latter is especially critical given the depth of the tunnels, as deep as 450 feet below ground surface and almost always greater than 150 feet, making dewatering or ground improvement operations from the ground surface highly unlikely.

The baseline excavation/initial lining scheme visualizes the use of an earth pressure balance TBM that places gasketed concrete liner segments in the tail shield that are bolted and almost immediately contact-grouted as the machine moves forward. This both stabilizes the ground around the bore and significantly reduces ground water infiltration into the bore. The estimates of inflow per tunnel segment vary from 166 to 500 gpm, with the latter occurring where short-term face inflows reach 250 gpm for periods of several weeks. Although bothersome and capable of reducing tunnel advance rate, inflows of this magnitude are not uncommon or unmanageable in tunnels of this size, especially when bored upgrade. The report discusses various commonly-used methods of mitigating unstable ground and high ground water inflows at the face, and correctly assumes that these will halt excavation for several days until the stabilization methods take effect. This is important to note since the incorporation of tunnel stabilization methods into the design documents alerts the Contractor to potential problems, thus eliminating or reducing King County's exposure to claims.

The report implies that a judicious location of the vertical profile (tunnel horizon) will largely mitigate the currently-identified geotechnical hazards to tunnel excavation, and those that remain will be handled by ground improvement techniques, full-face pressurization of the TBM, and possibly dewatering from inside the tunnel. The identification and location of the potentially serious geologic hazards that will allow for an optimal location of the tunnel horizon will require a substantial increase in the number of borings, in our opinion. Three potentially significant geologic hazards that are not noted in the report and that experience has shown are hard to detect even in closely-spaced borings, are the occurrence of boulders, presumably emplaced as ice-rafted exotics, nested gravelly cobble units, and bedrock. **Since the occurrence of very hard boulders or nested cobbles would be a significant construction hazard for the type of TBM selected, either it should be stated that the geologic conditions preclude their existence or a suitable mitigating procedure for their removal proposed in the report.** For example, the most common method of removing boulders (access to the face) would almost certainly not be possible in the presence of high artesian conditions. An alternative would be to equip the TBM with suitable cutters and/or grout the zone ahead of the tunnel.

The report notes that bedrock reportedly occurs 600 to 1000 feet below ground surface while the deepest section of tunnel is about 450 feet below ground surface, however it does not state whether the bedrock was detected by borings or geophysical studies, presumably performed by others and not related to the Brightwater Project, and how close to the tunnel alignments these latter were located. Bedrock at tunnel level would have an even greater adverse effect to TBM excavation than the aforementioned boulders or nested cobbles. Its detection could conceivably be missed by borings if the topography of the surface is pronounced. The FEIS should state that a seismic or other geophysical traverse along the entire length of the tunnels will be performed during the design phase to minimize unknown obstacles that would be encountered during tunneling.

The report accurately identifies the principal problems with the construction of relatively large-diameter access portal shafts and the IPS shaft in the complex hydrologic and geologic conditions that occur along the conveyance route(s). The report presents several proven methods of sinking shafts through loosed to dense sands and stiff clays below the water table, all of which stabilize the shaft perimeter with concrete or sheet pile walls prior to excavating the core of the shaft, rather than attempting to dewater the ground to the point where excavation could be attempted in the dry. Ground freezing is also mentioned as an option to perimeter wall construction, however without much comment. The maximum head at the base of one of the access shafts is approximately 140 feet and at the IPS shaft over 100 feet, presenting considerable uplift pressure on the shaft base plugs. Stabilization of the shaft bottoms in order to construct the concrete base plug will utilize a ground improvement technique, likely jet grouting, possibly in

conjunction with limited dewatering, prior to attempting to excavate the natural plug of soil above the shaft bottoms.

### **5.3 Ground Water Quality Issues**

There are two issues with ground water quality during the construction and operation of the conveyance system. The first is potential ground water contamination from the excavation operation, notably the introduction of cement or sodium silicate grout as a ground improvement medium, and cement grout as void backfilling immediately behind the liner segments. The report correctly notes that in both cases the grouting is very localized and sets up in hours to a virtually inert material not chemically very different than naturally occurring minerals. The second issue regards leakage from the influent and effluent tunnels. Again, the report correctly notes that since both are lined to resist considerable inward seepage pressure from ground water, and is internally unpressurized, seepage out of the tunnels is highly unlikely. A possible adverse effect of seepage into the influent tunnel was discussed above. The report further states that rupture of the tunnels is very unlikely in a seismic event unless cut by the causative fault.

The report however does not document the non-occurrence of active faults along the conveyance route. The FIES needs to state the non-existence of faults.

## **6.0 General Summary of Findings**

In our opinion the Technical Reports adequately identify and evaluate the critical hydrologic and geologic conditions critical to project construction for the stated pre-design level of effort, except as noted for the potentially serious geologic and seismic hazards noted in Section 5.2. Given the significant impact to project cost and schedule that would likely occur if any of these latter are encountered during tunnel excavation, a significant increase in geologic exploration seems prudent, including confirmation of the existence and location of bedrock and potentially active faults along the tunnel alignments.

The evaluation of impacts to ground water levels and quality, both during construction and the operational life of the project, is sufficient in scope and detail to proceed with project design. The installation of piezometers, and an evaluation of their data, should be included in the additional borings noted above.

## **7.0 Additional Questions and Issues to be Considered**

### **7.1 Treatment Plant Sites**

1. Has, or will there be, any additional information been gathered to update the aquifer "discontinuity" in the geology at the Route 9 site? This question refers to information presented for the East-West profile where the surface aquifer to the east of the site is shown to be separated from the surface aquifer at the Route 9 site by an aquitard.

2. Have, or will there be, any further analyses been completed to define or determine liquefaction (or liquefaction potential) or land slides (or land slide potential) at the Route 9 site?
3. What is the Woodlane Well flow rate (can define as both an annual average and a peak, of some sort, such as peak day would make sense)? This would allow a direct comparison of orders of magnitude of Woodlane Well flow rates and Route 9 site dewatering flow rates (during construction or ongoing).
4. What is the specific discharge or specific yield at Woodlane Well?
5. What is the population or flow equivalent of 1.0 feet of incremental, additional drawdown – due to dewatering at Route 9 site – at the Woodlane Well?
6. What is the drawdown in the Shallow Aquifer at the Route 9 site, if only the Shallow Aquifer at the Route 9 site were included in the drawdown/dewatering model?
7. Based on the levels of drawdown shown for the Route 9 site when the two shallow aquifers are considered to be hydraulically connected (and also would be shown for the additional analysis requested in Comment 6. above), what are the expected impacts on soil settlement or wetlands at or near the site?
8. Can you expand on the information presented as to the quality of the dewatered water at any dewatering sites?
9. Based on the more specific water quality information for each dewatering site, would such water impact a receiving body of water (i.e., result in impairment of the receiving water body)?
10. What is the EPA impairment status of the receiving bodies of water (i.e., any TMDL identification)?
11. At the Unocal site, with a potential drawdown of 18 (average) to 32 (maximum) feet, is there a potential for seawater intrusion?
12. Can you state, either anecdotal or performance specification, the leakage rate from treatment plant tanks or piping?
13. Need to be more specific or descriptive of the “Early Warning Decline Program” in terms of its implementation (what and where will it measure well levels and what will it be benchmarked against and how will information be communicated).

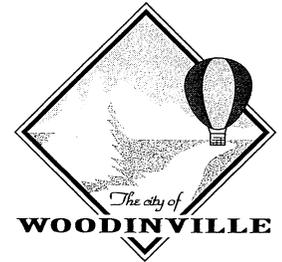
## 7.2 Conveyance System

1. For portals and tunnels, an operational seepage value is stated (< 1.5 gpm for portals and 1 to 4 gpm per 1,000 feet for tunnels). Are these values based on anecdotal information or driven by a performance specification?
2. For the tunnels, can a probability or percentage be defined for the likelihood or the anecdotal observation, respectively, of the Upper Bound Case for seepage?
3. For the various drawdown levels listed for the tunnels, is there any expected settlement of the aquifer material?
4. For the tunnel failure scenario, can you be more specific about failures (similar to a question asked on the previous technical memoranda)? This would include an “expected” failure – flexing of the tunnel and possibly larger scale cracking than aging of concrete – and “unexpected failure – complete tunnel shear due to large-scale, massive earth movement. In this discussion, discuss likelihoods of each.

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September 4, 2003

Mr. Don Theiler, SEPA Official  
Brightwater Wastewater Treatment Plant Siting Project  
201 South Jackson Street, Suite 503  
Seattle, WA 98104-3855



*"Citizens, business and local government;  
a community commitment to our future."*

Re: Brightwater Scientific and Engineering Studies Technical Reports July  
2003 - City of Woodinville Comments

Dear Mr. Theiler:

Thank you for the opportunity to comment on the latest technical documents release. Upon review of the reports, the City of Woodinville submits the following general and specific comments.

General Comment: The third technical reports are highly technical in nature, and our comments are correspondingly more technical. Although these comments are technically focused, we urge the County to consider them in the larger context of concerns the City has previously made regarding this project. To date, these prior concerns are contained in three primary documents as follows: (1) the City's Brightwater DEIS comment letter dated January 21, 2003, which contains numerous questions and concerns including growth management and annexation policy, as well as specific comments on construction and operation impacts in the areas of land use, surface and groundwater, air, plants and animals, environmental health, noise and vibration, aesthetics, recreation, cultural resources, public services and transportation; (2) the City's comment letter dated August 4, 2003, regarding the Treatment Plant and Conveyance Update technical reports, in which the City identifies concerns that are not addressed in the technical reports; (3) Resolution No. 250, adopted by the Woodinville City Council on April 21, 2003.

For sake of completeness of the public record, we again want to incorporate, by reference, the comment from the draft EIS that noted that Woodinville meets the SEPA definition of an impacted jurisdiction if the Route 9 site is selected for the treatment plant. If the Route 9 site is selected, Woodinville will be the most impacted local jurisdiction. With the new proposed route of conveyance lines through Woodinville, that impact increases. At a minimum, a right-of-way permit will be required.

For all the reasons identified in our formal responses to this project, we want to reiterate that if the Route 9 site is selected, we request the County immediately begin a process of continuous and thorough consultation and cooperation with

the City during all further aspects of project design, permitting, construction and operation.

The following are our specific comments on the Brightwater Scientific and Engineering Studies Technical Reports, July 2003.

### **General Comment**

An analysis of the cost effectiveness of the two alternative treatment plant sites is not apparent from the materials received to date. We recommend that this financial comparison be conducted as part of the evaluation process for selection of the treatment plant sites, as well as other aspects of the project, where alternative construction or operational methods are proposed. Cost-effectiveness should be a primary consideration in site selection.

### **Volume 3a**

#### **Transportation Impacts: Plant Sites and Conveyance**

Section 1.2 Study Methodology (page 3): The report states a construction schedule is documented in a separately bound "Supplemental Traffic Information". Please provide this to the City of Woodinville.

Section 2.2.1 Roadway Level of Service (page 11): Replace "...SR-9 *occasionally* experience long traffic queuing delays at unsignalized intersections and driveways..." with "...SR-9 *frequently* experiences long traffic queuing delays at unsignalized intersections and driveways *due to bottlenecks and inadequate capacity*..."

Table 2. Route 9 Site Vicinity (page 12): Existing Intersection P.M. Peak-Hour Level of Service – The Table displays LOS at four intersections. Is this analysis backed or correlated with field observations? The reported existing LOS appears to be optimistic. Verify and report actual operational LOS with field observations on several different days during the year during the P.M. Peak-Hour. Also, re-check the service level designations with Snohomish County. A Snohomish County planning commissioner made the comment at a Brightwater seminar last year that the SR 9 / 228<sup>th</sup> intersection was operating at level-of-service F.

Table 3. Route 9 Site Vicinity – Accident Analysis (page 13): What are the types of accidents on SR-9/228<sup>th</sup> Street? What are the effects of increased volumes?

Section 3.1.1 Route 9 Treatment Plant 9 (page 69): The construction schedule is documented in the separately bound "supplemental Traffic Information". Please submit "Supplemental Traffic Information".

Section 3.1.1 Route 9 Treatment Plant 9 (page 70): Trip generation credit is given to existing business. What is the existing business? Please show how the credit is calculated.

Table 49. Route 9 Site (page 70): Summary of Existing Driveway Traffic – Does the table reflect actual counts or estimates? Wording is unclear.

3.1.1 Construction Impacts – Construction Traffic Impact Analysis (2007) (page 71): Need to provide Passenger Car Equivalent (PCE) for heavy vehicles.

Table 50. Route 9 Site Treatment Plant – Estimated Project Construction Trips – 1 (page 72): Heavy truck trips are not equivalent to passenger cars. Use PCE for heavy vehicles. How are trip credits derived?

4.1(1) Mitigation Measures Common to Treatment Plant and Portal Sites (page 121): Report states “Coordinate with local agencies for final approval”. Please Identify City of Woodinville specifically. The Traffic Management Plan (TMP) will need to be reviewed and approved by the City of Woodinville.

Section 4.1 Mitigation Measures Common to Treatment Plant and Portal Sites (page 121): A general description is used to describe traffic mitigation for Brightwater project impacts. A more detailed description that identifies the limits to be mitigated should be provided. Brightwater project mitigation should be identified and provided before other Brightwater project construction begins. Identify all planned road improvement projects on SR-9 and vicinity, particularly planned State projects to improve SR-9. A construction schedule should be provided and planned improvements on SR-9 should be completed prior to beginning Brightwater construction, as this will avoid having simultaneous projects as well as allow all to benefit from through-traffic improvements prior to Brightwater Construction.

Section 4.2.1 Route 9 Alternative (Preferred) – Construction (page 121): The Construction Impact Analysis does not use PCE. The analysis needs to be adjusted for Passenger Car Equivalent (PCE).

Section 4.2.2 Operation (page 123): No trip distribution map is provided. Provide a trip distribution map down to 3 P.M. Peak Hour trips showing impacts to the City of Woodinville and surrounding areas.

Table 111. Route 9 Site – Intersection Mitigation Measures – 2040 P.M. Peak-Hour Traffic during 54-mgd Operation (page 124): Identify additional potential bottlenecks. Identify construction duration.

5.1.1 Significant Unavoidable Adverse Impacts – Route 9 Treatment Plant (page 129): Increase in accidents is not acceptable. Provide mitigation to maintain or reduce accident rate.

Additional question: The report contains a truck staging study for the Unocal site. A similar study for the Route 9 site was not found. Does this study exist, and if not, why?

## **Management of Water Quality During Construction at Treatment Plant Sites**

Section 1 Introduction, paragraph 2, last sentence (page 2): “Also, because the quality of this water is good, including minimal fines content, it can meet water quality standards with little or no treatment.”

Comment: This is dependent on the dewatering methods. Depending on the flow rate, the flows can disturb the sediment at the point of discharge. Equipment in the trench or pit can also disturb sediment. Treatment or settling pond should be required.

Section 3.3 Dewatering, paragraph 7, last sentence (page 7): “The remainder will be discharged to stabilized channels downgradient from the stormwater treatment system.”

Comment: Demonstrate that the “remainder” flows will not create or aggravate any downstream problems.

Section 3.4 Runoff Control Facilities, paragraph 2 (page 9): “The great majority of the dewatering flows are expected to be pumped groundwater and of good quality. It would, therefore, not require treatment and would bypass the sediment ponds. However, turbid water pumps from sumps or other depressions on the project site would be conveyed to the sediment ponds for treatment.”

Comment: Little Bear Creek has shown signs of increase in sediment. Dewatering flows must be monitored and evaluated prior to eliminating treatment.

Section 3.5 Runoff Discharge, last sentence (page 9): “It was concluded that Little Bear Creek is relatively stable and shows little sign of channel down-cutting or active streambank erosion.”

Comment: Areas of erosion have been identified by the City of Woodinville, and Adopt-A-Stream. Little Bear Creek has shown signs of sediment deposition. Flow rates from this site should not be allowed to exceed Ecology guidelines.

## **Permanent Stormwater Management at the Treatment Plant Sites**

Section 1.3 Source Control in Lieu of Enhanced Treatment, paragraph 2, last sentence (page 4): “The project design will be closely coordinated with Ecology and the local permit agency to determine the appropriate reduction or possible elimination of the need for enhanced stormwater treatment.”

Comment: Due to the site proximity of Little Bear Creek and the function of this facility, enhanced stormwater treatment is preferred.

Section 2.1 Offsite Flows, paragraph 2, last sentence (page 6): “This culvert does not appear to have adequate capacity to handle the increased flows resulting from the diversions and would need to be reconstructed.”

Comment: This is an opportunity to enhance a tributary to Little Bear Creek.

Section 2.5 Dewatering, paragraph 3, 4<sup>th</sup> sentence (page 9): “This water will be conveyed downgradient of the stormwater detention facilities and discharged to the stormwater swales.”

Comment: This is post construction flow. This should be considered in the detention pond design. Flow rates from the site should match pre-development flows. Bypassing the detention pond will increase the flows from this site.

### **Route 9 Site Runoff Effects Upon the Geomorphology of Little Bear Creek**

Section 3.1 Past Study, paragraph 1 (page 6): “King County conducted a habitat assessment on Little Bear Creek (along with Swamp and North Creeks) from August to November 1999...”

Comment: Was the City of Woodinville “Little Bear Creek Corridor Habitat Assessment” reviewed in this report? Karen Fevold (King County Water and Land Resources Division) has a copy.

General Comment: Little Bear Creek has shown evidence of sediment deposition at the NE 205<sup>th</sup> Street (244<sup>th</sup> Street SE) crossing. Proper actions must be taken to prevent sediment runoff from the site and channel bank erosion.

### **Summer Season Temperature Effects of Stormwater Ponds on Receiving Streams**

No comment.

### **Illumination Modeling of Route 9 and Unocal Treatment Plants**

Attachment D Model Results for the Route 9 54-MGD Plant. Comment: The illumination information needs to show existing State Route 9 highway lighting and lighting improvements needed in accordance with local jurisdiction standards and requirements.

Attachment E Model Results for the Unocal 72-MGD Plant. Comment: The illumination information needs to show existing Realigned Pine Street lighting and street lighting improvements needed in accordance with local jurisdiction standards and requirements.

Attachment F Model Results for the 72-MGD Plant with the LID Sub-Alternative  
Comment: The illumination information needs to show existing Realigned Pine Street lighting and street lighting improvements needed in accordance with local jurisdiction standards and requirements.

### **Noise and Vibration: Treatment Plant**

Section 1.3.1 Treatment Plant Sites (page 3): Reviewing tables 2 & 3; under the tables it specifies that both Edmonds site and the Hwy 9 site have noise standards of 50 dbA at night. Receiving properties are both residential and the noise producer industrial/commercial.

The statement under 3.1.2 declaring 39dbA as the night time standard for the Edmonds site is incorrect. There isn't a reference to 39dbA in the tables provided. The only reference to 39 dbA is rural property in Snohomish County.

Section 2.2.2.2 Unocal Site (page 11): The report declares a Unocal noise level allowed at 45 dbA and that the night time noise increase would rise by 5 dbA and yet the plant operation would be under the allowed maximum. This is not a correct statement if table 2 is used. The Standard is 50 and the plant would be operating at 50.

Section 2.2.2.3 Route 9 Site (page 12): The report states that the ambient night time noise level is 45dbA, and that the plant operation noise could increase the minimum levels by 5 dbA at night. Therefore the total noise would add up to 50dbA at night. Some of the property adjacent to the Hwy 9 site may be rural, which requires a dbA of 47 at night. If this is the correct night time allowance, 50dbA would exceed the Sno-County standard by 3dbA, which is perceptible to the adjacent properties.

Section 3.1.2 Operational (page 14): Question: If the Unocal site can be controlled to 39 dbA, even if that target is incorrect, why is the highway 9 site with assumed County standard of 50, and maybe 47 dbA as rural property, operating at or exceeding the noise standards?

### **Stormwater & Groundwater Management at Conveyance System Primary Portal Sites**

General Comment: Include figure showing portal sites.

**Volume 3b**

**Geotechnical Data Report for Proposed Route 9 Treatment Plant Site**

No comments

**Conveyance System Geotechnical Progress Report**

No comment.

**Volume 3c**

**Geology and Groundwater**

Effects to Ground Water During Operations (page ES-5): This section cites that the effects of operation groundwater capture systems are expected to be similar to the dewatering during construction. Under this assumption, there needs to either be a similar Potable Water Replacement Plan or a recharge plan. Per estimated extraction of ground water of 500,000 gpd, there is a concern of long term effects during prolonged dry periods.

ES-11 Operations Effects/Streams (page ES-11): There is a remark about the tunnel lining to be designed to reduce infiltration rate around streams. Understandably this is important to protect stream flows but this treatment needs to be used in all areas to protect ground water quality and infiltration. This is standard practice in all sanitary conveyance systems regardless of stream vicinity. Also, there needs to be clear indication that methods will be used to prevent flows from traversing down the tunnel alignment length.

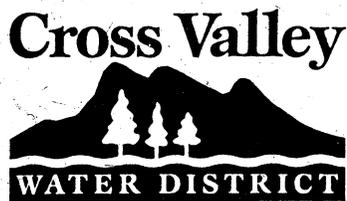
Thank you for your consideration of these comments,



\_\_\_\_\_  
Pete Rose, City Manager



\_\_\_\_\_  
Ray Sturtz, SEPA Official



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September 5, 2003

King County Brightwater Siting Project  
RE: Technical Seminar Comments  
201 South Jackson Street – Suite 503  
Seattle, WA 98104-3855

Ladies and Gentlemen,

Cross Valley Water District of Snohomish County (“the District”) hereby submits the following comments on the Brightwater Scientific and Engineering Studies Volumes 3a, 3b and 3c:

The District’s primary concern about the Route 9 site is the protection of the Cross Valley Aquifer, a federally designated sole source aquifer. The District’s other concerns were presented in our comments on the Draft Environmental Impact Statement (January 2003).

The project as it is now defined and the construction methodology discussed in the technical memoranda diminish the concerns that we discussed in our DEIS review earlier this year regarding water resources. A few issues remain, but our basic finding is that the setting as described and the project as now proposed lessens the significant threat to the District’s water resource interests. We are, however, not as confident in the assessment of the potential for impacts at our Woodlane well. Electronic monitoring both at the Woodlane well and a remote dedicated water level observation well between the proposed plant and the District’s well fields should be part of King County’s commitment prior to construction of any facility at the Route 9 site. The District requests assurance from King County that contingency protections will be negotiated to assure that our rate payers are not harmed in the unexpected case construction methods proposed are not ultimately feasible or the setting described turns out to be wrong.

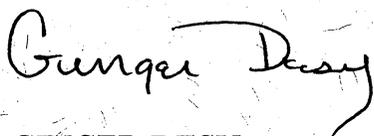
The District retained Robinson and Noble, Inc. to review the technical memoranda as they relate to water resource issues which may affect the District. Their



report dated August 2003, is attached hereto and incorporated herein as an integral part of the District's comments.

We look forward to our comments being included in the FEIS and will review that document in the same manner.

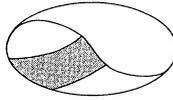
Sincerely,

A handwritten signature in cursive script that reads "Ginger Desy". The signature is written in black ink and is positioned above the printed name.

GINGER DESY  
Cross Valley Water District, President

GD/jhn

Enclosure



**ROBINSON & NOBLE, INC.**

GROUNDWATER & ENVIRONMENTAL GEOLOGISTS

ESTABLISHED 1947

REVIEW OF WATER RESOURCE ASPECTS OF  
KING COUNTY BRIGHTWATER PROJECT  
TECHNICAL MEMORANDA 3(a), 3 (b) & 3(c) -  
AUGUST 2003  
FOR CROSS VALLEY WATER DISTRICT

**REVIEW OF WATER RESOURCE ASPECTS OF  
KING COUNTY BRIGHTWATER PROJECT  
TECHNICAL MEMORANDA 3 (a), 3(b) & 3(c) – AUGUST 2003  
For  
CROSS VALLEY WATER DISTRICT**

**INTRODUCTION**

The preferred alternative for the Brightwater Project as proposed in the Technical Memoranda (TMs) offered by the proponent would place a major wastewater treatment plant on property immediately east of Route 9 and north of SR522 at the intersection of the two highways. It is the belief of the Commissioners of the District that there is sufficient possibility that this plant and its associated conveyances to bring raw sewage to and carry treated effluent from it may constitute a threat to the water resources and other interests of the District. District wells up-gradient from the plant site draw water from the same aquifer system that will be dewatered in constructing the plant and associated conveyance tunnels. Further, the maintenance of the health of nearby surface waters that may be impacted by the project have bearing on the overall management of the water resources in which the District is a participant. The District, in recognition that the Technical Memoranda represent the proponent's response to the deficiencies identified in the DEIS for the project issued late in 2002, has committed to assessing the adequacy of the water resource related documents presented in the Memoranda.

As a continuation of the services provided in review of the Brightwater Project DEIS in late 2002 and early 2003, Robinson & Noble was retained by the Cross Valley Water District to review the suite of technical Memoranda issued by King County in early August of 2003. The task involves an evaluation of the potential for the Brightwater Project to harm the interests of the District and an assessment of the effectiveness of the limited mitigations offered. Due to the relatively short review period and the highly technical nature of some of the documents, it was necessary to employ a team approach in accomplishing the review. Four Robinson & Noble hydrogeologists were assigned various review tasks in developing this response. All of the technical Memoranda within the suite were reviewed at least rapidly. Some, such as the Illumination TM and the Noise TM of Volume 3(a) were not considered pertinent to the water-resource interests of Cross Valley Water District and were given only a cursory review to assure consistency with other, more pertinent Memoranda. No comments were generated for these two documents. Others, such as the Geology and Groundwater TM (Volume 3(c)) were reviewed in significant detail. Some sections, such as Attachment 2 of Volume 3(c), required substantial technical analysis to determine the validity of the arguments made. While inherently more rapid, the team approach by its nature is also somewhat less efficient and generates occasional redundancy in effort and in the resulting comments than review by a single individual.

As with the review of the DEIS, a specific set of comments were developed for each of the documents reviewed. Once the comments were developed for a given section or TM, a general characterization of that document was prepared. The intent is to provide an overview for readers who do not desire to wade through the specific comments. These general characterizations, as well as the comments themselves, were then used to provide an overview of all three volumes (of reviewed documents) and the water-resource implications of the project as currently described. The purpose of Robinson & Noble's review is to draw attention to issues important to the District,

not to criticize the work performed for the TMs. In general, the TMs provide a great deal of information that seems to describe the project and its setting adequately to perform a SEPA review.

## **GENERAL OVERVIEW**

The Technical Memoranda provided in Volumes 3(a), 3(b) and 3(c) of the Brightwater Technical Memorandum Series collectively present an impressive amount of technical work. It is our opinion that this work goes a long way toward addressing the shortfalls of the DEIS and provides a better basis for evaluation of the potential impacts to the Cross Valley Water District interests than did the DEIS. There are, however, several aspects of the presentation that are problematic. Though these problems are not insignificant, they do not prevent a reasonable assessment of the potential impacts to the District's water- resource interests. In some cases, the issues raised in this review diminish the confidence of assertions made by investigators. In other cases, the issues raised here made the review more difficult and hurt the communication of the TMs' findings. However, the project as now described (through the TMs) and the description of the general setting within which it is to be accomplished do not raise the concerns that were previously identified in the review of the DEIS. The amount of geologic, hydrogeologic and geotechnical investigation accomplished seems adequate to address SEPA aspects of the project from the District's water-resource perspective. Provided the project can be built as proposed, the probabilities of the District suffering substantial loss as a result of the project seem low. However, the District should require a binding agreement with King County that addresses the County's commitments to protect water resources and compensate for impacts that may occur should project execution depart from the plan as currently defined or occur should aquifer responses to project components (such as dewatering) be different than predicted.

The concerns raised through the previous review of the DEIS regarding the potential draining of the Cross Valley Aquifer through annular drains created outside the project portals and tunnels appears to have been adequately addressed in the TMs by proposed construction methods and associated environmental and groundwater protections. The dewatering of the site and the conveyance system appears to be sufficiently defined in the TMS to suggest that dewatering will not cause changes in the Sole Source Aquifer that could impact the Cross Valley Water District system (though the level of confidence that the Woodlane well will not be impacted is lower than for the other wells). The proponents now indicate that dewatering rates will be much smaller than previously thought (at the time of the DEIS review) by the isolation of the deep, dewatered components through methods such as slurry walls and ground freezing. Better definition of shallow conditions at the Route 9 site appear to validly indicate a relatively small amount of dewatering will occur from shallow aquifers unrelated to the District's production aquifer. However, specific monitoring plans still need to be established. This may be best accomplished as part of a binding agreement between King County and Cross Valley Water District. Additionally, the issue of impacts to Little Bear Creek or its tributaries appear to be now adequately studied to provide a reasonable confidence that protections will be utilized.

Though the technical reports and changes to the project presented in the TMs address many of the issues raised in the DEIS review, several issues harm the current effort. For instance, various authors are commonly inconsistent in their descriptions of geologic settings and, at times, in the description of the project itself. This particularly occurs in the work related to Route 9 site geology and dewatering issues. Presentation of technical information in tables and drawings is commonly confusing and at times inconsistent. Though it does not appear that these inconsistencies

introduce serious flaws to the analyses, it does make the review of TM components, such as cross sections, maps and tables, difficult. Additionally, references to documents that are not available hindered the review and perhaps lend credence to project critics that claim SEPA requirements have not been appropriately met.

Below is a discussion of the general issues raised by the TM review as three separate categories: legitimate issues of technical analyses, issues concerning appropriateness of the SEPA process, and issues concerning communicative aspects and quality of the documents. Though the distinction between these classifications is not always well-defined, the separation of issues into these categories helps to identify the nature of concerns raised by those issues.

### **Technical Issues**

This section will give a general overview of the technical problems noted within the three volumes reviewed.

- The application of the newly developed University of Washington/USGS geologic nomenclature is inconsistent. This becomes problematic in the *Geology and Groundwater* TM (Volume 3c). Further, its application is ignored in other TM discussions of geologic setting.
- Though the nomenclature issue is confusing in its own right, it presents the potential for misinterpretation or miscommunication between various investigators within the complex Brightwater team. This perhaps is a greater concern than the inconsistent use of the nomenclature itself.
- Throughout the TMs, there is a propensity for geologic-related descriptions to lock onto stratigraphic interpretations even where hydrostratigraphic concepts are more appropriate. This could also indicate an underlying problem in the conceptual analysis.
- The discussion of the Cross Valley Aquifer as being correlative to either the Vashon advance sediments or undifferentiated older sediments found below the interglacial materials is an example of the document's propensity to ignore the hydrostratigraphic setting in favor of a less useful (from a hydrogeologic perspective) geologic stratigraphy. The place where this becomes problematic is in the eastern extreme of the study area where the Cross Valley wells exist. In this area there is no evidence of a regionally consistent confining layer separating the advance sediments (Qva) from the underlying permeable pre-Vashon (Qu) sediments. It is most appropriate to describe the entire sequence as a single, complex, hydrostratigraphic unit which does occur elsewhere in the TMs. Such a description is consistent with the assertion that the aquifer constitutes a sole source for the region and is also consistent with previous interpretations developed for the area.
- The Route 9 site discussions vary in their interpretation of the presence or absence of Vashon advance outwash sediments at the site. The geologic mapping presented shows a minor presence, however, several investigators indicate in the text that "much of the site is underlain by till and advance outwash deposits". The dewatering schematic cross section presents a conceptual interpretation which is yet completely different, in which the till, advance sands, and underlying lacustrine clay outcrop in the hillside east of the site and,

therefore, have no hydraulic relationship to the ground water of the site. Such substantial differences in the interpretation of the site geology are disconcerting.

- Though monitoring has been discussed by the proponent, no specific off-site monitoring appears to be identified within the project plan. The District has always maintained that a remote, water-level monitoring well should be placed between the Route 9 site and the District's wells. The prediction of between one and two feet of imposed drawdown occurring at the Woodlane well suggests that a position about a half mile from the Route 9 site be considered. In addition, a transducer installation in the Woodlane Well would provide information on the actual reflection of dewatering.
- In the TMs there is some confusion concerning the terms "numerical" and "analytical" as applied to modeling. These terms describe two distinct modeling techniques, both of which have been applied to the project. However, the TM uses the terms somewhat interchangeably, which confuses two distinct methods of investigation. The confusion of the two may merely be descriptive, but the apparent interchangeable use suggests an underlying conceptual problem that could be significant to the modeling calculations.
- An equation printed in the modeling section appears to be incorrect: Depending on whether the equation printed was the one actually used in the analysis or not, certain aspects of the modeling of drawdown responses could represent a significant technical deficiency. Even with all of the correct equations, the difficulties in the "numerical" analyses are sufficient that a close look should be made at the validity of the conclusions reached. For example, it is unclear with regards to the mass balance aspects the model used as to whether realistic inflow to and outflow from the model was achieved. Without a realistic water balance, the model could have produced a significant error in predicting responses but could have done so without any outward indication of a problem during the model runs. Apparently, numerical modeling techniques were used without calibration as a de facto analytical tool. These issues raise a concern about whether the mass balance (water inflows and outflows ) produced by the model is realistic in this hydrogeologic setting. Apparently the author's numerical model relied on head matching alone without regard to water balance . Consequently, the review of this model with regard to its water budget as compared to realistic expectations of the hydrologic systems being modeled is strongly advised.

### **Procedural Issues**

The second category is more related to SEPA process than technical correctness of the investigations.

- The entire suite of TMs makes regular reference to the FEIS, often asserting that more information pertinent to impacts and mitigation plans is (or will be) provided in that document. Since the FEIS is not scheduled for release until later this year, it is not available for review and, therefore, should not be referenced. If, however, the language of the FEIS had already been drafted, it should have been included as an excerpt when referenced so that the information intended to be communicated in the documents is actually presented. Without such presentation, the Brightwater proponents have created a "Catch-22" situation

where there is a need to review the FEIS so that The District can provide comments to help guide the generation of the FEIS.

- It could be argued that the process includes a fatal flaw since information critical to the assessment of impacts and evaluation of mitigation opportunities has not yet been generated. It could be further argued that this flow makes issuance of an FEIS premature. However, in our review of the TMs, the promise of additional information to be provided in the FEIS did not seem necessary, and we were able to review the water-resource aspects of the project without the additional information.
- In some cases attachments referred to in the TMs are not included in the documents.

### **Review Issues and Document Quality**

Several of the issues are related to the clarity of the discussions presented in the documents and the quality of the documents themselves rather than the underlying investigations or the regulatory implications.

- An apparent residual from the DEIS approach crops up in some of the documents where extensive discussion of a topic is provided at a generic level without any real discussion of the project-specific impacts or mitigation opportunities. The most glaring of these is the *Summer Season Temperature Effects of Stormwater Ponds on Receiving Streams* TM. At the very least, some explanation of why no specific analysis of the impact of stormwater ponds should be given. As written, there is a fairly extensive explanation of the potential for problems and then dismissal of the issue without project specific analysis or discussion. This weakness also occurs, though to a lesser degree, in the stormwater-related TMs.
- The presentation of much of the technical discussion, particularly in Volume 3(c) becomes very labored. In some cases a diagram or table would be the better way to communicate relationships. In other places the graphics themselves introduce confusion. Cross sections appear to be forced (in some cases unsuccessfully) into pre-determined formatting. The commitment to uniformity of format has caused absurdities in some of the drawings. In these cases, the information is not so much in error as strangely presented. Complex nomenclature, and its relation to other nomenclature, could probably be better presented as a correlation chart than in the convoluted text offered in the documents.
- There are differences between documents in how the project is described. Additionally, several instances were noted of differences within documents between numbers presented in text and those in drawings or tables. It would probably be worthwhile to review all of the tables and drawings to be sure that the current project plan is reflected. In most cases, the values are not significantly different, and the issue is more one of a reader having to track down numbers that do not match. This was a particular problem with Volume 3(c), Attachment 2. This problem was also noted in several of the sections discussing the dewatering values, particularly where tunnel trace values are concerned.

**SPECIFIC COMMENTS**  
**VOLUME 3(a)**

**Transportation Impacts: Plant Sites and Conveyance**

Though this TM does not have a direct bearing on the water resource aspects of the Brightwater Project, much of the information presented provides insights into the intended execution of the project. The review of this TM was accomplished to assure consistency with other documents describing the project and to establish the locations of portals which are better defined in this TM than elsewhere. The review also provides insights into the general nature of some issues found in other portions of the tech memo effort more directly related to water resources. For instance, this TM like most others make reference to information presented in the FEIS when that document is not available to reviewers. The implications of this have been presented in the general introductory comments and will not be repeated here. Even though the review of this document was less thorough than for water resource components of the supplemental investigations, where specific comments seemed appropriate to enhance the final version of the document, they have been provided.

**Volume 3a, Transportation Impacts: Plant Sites & Conveyance, Section 1.2.9, p. 6, last sentence**  
*"Final portal sites have not yet been selected"*

Since a consistent presentation of portal areas occurs throughout the documents, it is presumed that the statement means that no specific site within the designated portal location area has been selected. If the position of the portals were to be substantially outside the areas indicated our review of the impact potential could be significantly different. This interpretation of the statement is guided by statements made by Edith Hadler in her presentation (Q&A section) at the August 16, 2003 seminar.

**Volume 3a, Transportation Impacts: Plant Sites & Conveyance, Section 2.1.2, p. 8, second paragraph, second bullet**

*"Most people will tolerate LOS E, which entails very long traffic delays, in urban conditions"*

This statement requires a referenced source at the very least. It does not intuitively ring true of the everyday people the reviewer knows. We presume that this is some sort of general threshold used by traffic engineers and that it, therefore has credibility through citation. If it is merely an arbitrary assertion by the author, it would require substantial supporting argument.

**Volume 3a, Transportation Impacts: Plant Sites & Conveyance, Section 2.2.2, p. 14, second paragraph, second sentence**

*"The influent Route is the same for both, but the effluent route differs"*

This neglects the statements in other documents that describe a larger tunnel and presumably portal structure system for the 195<sup>th</sup> route dual service tunnel and a smaller tunnel for the 228<sup>th</sup> effluent only tunnel. Does the difference change the size of the effort and, therefore, the level of activity on the construction sites? Would that difference change the transportation analysis sufficiently to discuss them as different efforts?

**Volume 3a, Transportation Impacts: Plant sites & Conveyance, Section 2.3.2, p. 56 Portal 14 (Primary)**

*It was difficult to find Portal 14 since it is only indicated on Figure 12*

It is suggested that a figure reference be provided early in the discussion of a given portal to facilitate those unfamiliar with the area in finding the location.

**Volume 3a, Transportation Impacts: Plant Sites & Conveyance, Section 4, p. 121, general comment**

*Provision of several road-work type mitigation components are discussed in this section.*

Some discussion of coordination with water purveyors and other utility providers to coordinate the efforts and, thereby minimize the disruptions to traffic should be considered and protocols for such coordination established. This section appears to be the appropriate place for such discussion but none is found

**Volume 3a, Transportation Impacts: Plant Sites & Conveyance, Unocal Site, Remote Truck Staging Area, p. 2 through 8, header**

*"Route 9 Site Concurrency Analysis"*

This appears to be the wrong header since the attachment is completely about the Unocal Site. Without a title page, this could mislead someone who is reviewing with an eye toward specific topics only.

**Management of Water Quality**

The primary reason for review of this TM was to see that the potential for contamination of water resources was being realistically addressed. A troubling theme in the entire suite of technical memos occurs in this document as well, that is the tendency to advise the reader that more information will be available in the future. Within the context of SEPA review, that is not relevant in that the opportunity for response within the SEPA process is now. If the TM provides sufficient information to meet the intent of SEPA leave it at that. If not, then the issuance of the FEIS would be premature. There is also a reference to geologic conditions that is inconsistent with other documents. If that is residual from earlier interpretations of site geology, it should be updated. If it is truly a difference in how various team geologists have interpreted the data, it would cause some concern with regard to the underlying science of the project. Some of the comments presented below address the readability of the document. At times, the discussions seem complicated where it does not appear necessary. An example would be in the section dealing with upper yard and lower yard water quality on page 11.

**Volume 3a, Management of Water quality During Construction at The Treatment Plant Sites, p. 1, third paragraph, fourth sentence**

*"The Final Environmental Impact Statement (FEIS), which is expected to be issued in late 2003, will contain updated information and additional analysis of the probable significant adverse impacts of the Brightwater alternatives, along with identification of reasonable mitigation measures"*

This philosophy seems to perpetuate a major flaw in the DEIS approach. That is, it purports that it is acceptable to provide information after the opportunity to comment or to participate has elapsed. If additional information is to be provided above and beyond that needed to adequately address the SEPA obligations of the project and that information is to be provided without it being necessary to the SEPA process, then that should be stated. If, as is implied by the wording of this statement, the new information will be an essential part of the impact analysis and mitigation proposal, the information should be presented in a timely manner so as to be available for review and comment before the FEIS is issued. This is a procedural matter and may very well put the process out of compliance with the prescribed SEPA requirements.

**Volume 3a, Management of Water Quality During Construction at The Treatment Plant Sites, Section 3.1, p. 7, third paragraph, third sentence**

*"The majority of the site is underlain by glacial advance outwash and till"*

This description of the subsurface materials is in direct conflict with site descriptions in other sections and with those presented during the seminars and meetings held in July and August, 2003 and the meeting with the area water districts on July 31, 2003. The difference is substantial and carries significant implications to the analyses of dewatering impacts and the relationship the site has to the upgradient groundwater systems.

The possibility that different investigators on the team have defined the near-surface geology in such dramatically different ways reduces confidence in the statements made by all of the investigators. This difference must be resolved and its occurrence adequately explained if the site descriptions are to be accepted as a premise for the subsequent analyses provided.

**Volume 3a, Management of Water Quality . . . , Section 3.1, p. 7, third paragraph, last sentence**

*"Chapter 4 of the Final EIS provides detailed soil information"*

The Final EIS text was not available for review. The appropriate text should be excerpted from the Final EIS and provided for review.

**Volume 3a, Management of Water Quality . . . , Section 3.5, p. 10, fourth paragraph, fourth sentence**

*"(Little Bear Creek for the Route 9 site or Willow Creek for the Unocal site)"*

The reference to the Unocal site in a section discussing the Route 9 site only is somewhat misleading. We suggest the reference to Willow Creek is not necessary here and makes it appear that the Unocal site has been implied in the discussion that has taken place above.

**Permanent Stormwater Management at Treatment Plant Sites**

The review of this section was accomplished primarily to assess the implications to surface water features near the treatment plant sites. Since the tendency in watershed management is toward water purveyors participating substantially in watershed planning, it is expected that the health of the surface waters and related habitat will be a very real concern to the District in the future. Currently, the surface waters are a concern due to the relationship they have to the management of groundwater and the general interest of our rate payers in maintaining the quality of life in our

communities. The biological function of the surface waters of our area will also bear on the feasibility of obtaining water rights in the future. The review identified only one primary concern and that goes to the consistency of geologic interpretation at the Route 9 site. This is an example of a recurring issue with the suite of TMs that should be addressed in the FEIS. No review of the marine discharge of stormwater at the Unocal site was accomplished

**Volume 3a, Permanent Stormwater Management at the Treatment Plant Sites, Section 2.2, p. 6, fourth paragraph, lines 3 & 4**

*"The predeveloped site runoff was modeled as Till-Forest cover."*

This statement is followed by an explanation of why the forest portion of the model category is justified but does not provide an argument supporting the till designation. Figure 4-2 from section 4.1 of the Geology and Groundwater TM – 3c does not identify till at land surface on the Route 9 site. It would, therefore be appropriate to discuss the justification of using a till category where no till is mapped.

**Volume 3a, Permanent Stormwater Management at the Treatment Plant Sites, Section 2.1, p. 6, third paragraph, last sentence**

*"Stream relocation is discussed further in Chapter 6 of the EIS."*

The Final EIS text was not available for review. The appropriate text should be excerpted from the Final EIS and provided for review.

**Volume 3a, Permanent Stormwater Management at the Treatment Plant Sites, Section 2.5, p. 9, second paragraph, second sentence**

*"Future development of the project site to its ultimate capacity would double this dewatering flow to 700 gpm (1.6 cfs)."*

The previous discussions have detailed the effects of 350 gpm dewatering there is no description of the potential impacts generated by doubling the flow.

**Volume 3a, Permanent Stormwater Management at the Treatment Plant Sites, Section 3, p. 11, second paragraph, last sentence**

*"More information on Willow Creek and Puget Sound can be found in Chapter 6 of the EIS."*

The Final EIS text was not available for review. The appropriate text should be excerpted from the Final EIS and provided for review.

**Volume 3a, Permanent Stormwater Management at the Treatment Plant Sites, Section 3.4, p. 12, fifth paragraph, third sentence**

*"... (refer to Chapter 6 of the EIS)."*

The Final EIS text was not available for review. The appropriate text should be excerpted from the Final EIS and provided for review.

**Volume 3a, Permanent Stormwater Management at the Treatment Plant Sites, Figure 6**

*The figure implies that cross sections A-A, B-B, and C-C were generated but there is no presentation of these.*

The inclusion of these cross sections would be helpful even though stormwater issues are generally surface related.

**Volume 3a, Permanent Stormwater Management at the Treatment Plant Sites, Attachment A**

*The modeled parameters show the use of the "Till-Forest" category for predevelopment conditions on the Route 9 site.*

The issue of it being a till surface or not should be reflected in this analysis if a different interpretation of the site geology is ultimately used. We do not have the capability of determining whether the mathematical process associated with this category is appropriate or not, nor would we presume to suggest so in the capacity as a reviewer of the document.

**Volume 3(a), Route 9 Site Runoff Effects upon the Geomorphology of Little Bear Creek**

Cross Valley Water District has a vested interest in the health of Little Bear Creek as part of the team of local governments that ultimately is likely to be responsible for the water resource management of the region. The review of this TM was accomplished with an eye toward the Brightwater Project's potential to complicate that management by modifying the stream channel or changing the sediment transport characteristics of the affected reaches. The district also reviewed the document to assure consistency with the scientific findings presented in other associated documents. Within this TM a significant amount of information is presented to establish threshold conditions beyond which concern regarding the mobilization of sediments would be predicted to arise. The analyses for the critical reach of Little Bear Creek then appears to demonstrate that the relatively small increases to peak stream flow do not approach that threshold. The issue is then dismissed. It appears that much more substantial increase in Howell Creek and the Unnamed Creek north of the plant facilities will be much more substantially impacted and would likely surpass the criteria for concern defined in the earlier discussion. Yet, no discussion of the potential mobilization of sediments in the channels of these two tributaries is provided. It would seem that sediments mobilized in the tributaries have the potential to cause sedimentation problems in the reach of Little Bear Creek into which they flow and potentially reaches downstream from that point.

Some inconsistencies seem to exist between the statements made in the text and data presented in tables. This is particularly true with regard to flow values and the relationship they have to current and post-construction conditions

**Volume 3a, Route 9 Site Effects on Geomorphology of Little Bear Creek, p.1, fourth paragraph, fourth sentence**

*"The final environmental Impact Statement (FEIS), which is expected to be issued in late 2003, will contain updated information and analysis of probable significant adverse impacts of the Brightwater alternatives, along with identification of reasonable mitigation measures."*

The Final EIS text was not available for review. The appropriate text should be excerpted from the Final EIS and provided for review.

**Volume 3a, Route 9 Site Effects on Geomorphology of Little Bear Creek, section 2.1 & 2.2, p.3, paragraphs 4 & 5**

*Reference to "Attachment A" is made in both paragraphs*

Attachment A is missing and only a placeholder page is available in the document suggesting the attachment is still being worked on by Aqua Terra.

**Volume 3a, Route 9 Site Effects on Geomorphology of Little Bear Creek, section 2.2, p.4, second paragraph, last sentence**

*"The high and low monthly flows are 31.4 and 7.6 cfs, respectively"*

It is not clear to the non-technical reader what these numbers refer to or what their significance is to the analysis of impact. Some discussion of the values is warranted.

**Volume 3a, Route 9 Site Effects on Geomorphology of Little Bear Creek, section 2.2, p.5, first paragraph, last sentence**

*"Most of this is attributable to stormwater detention achieved at the project site."*

The numbers presented in Table 2 suggest that 3 cfs of the 14 cfs difference between existing and post-project downstream flows is from detention of runoff. This seems to be in conflict with the referenced statement. The difference between the table and the statement should either be explained or resolved.

**Volume 3a, Route 9 Site Effects on Geomorphology of Little Bear Creek, section 4.0, p.11, fourth paragraph, first sentence**

*"The flows of Unnamed and Howell Creeks would greatly increase as a result of the proposed diversions"*

The statement that a greatly increased flow will occur should be followed by some acknowledgement that sediment transport impacts may accompany the change. This seems to identify a potential problem that should be discussed in the TM and then defer it to later study.

**Summer Season Temperature Effects of Stormwater ponds on Receiving Streams**

The District has an interest in this subject as a participant in the management of regional water resources. This TM provides a very good basis for the discussion of such impacts but does not address specific issues related to the impacts expected from the project components. The issue does not appear to be of overwhelming importance as described and appears to present information with the intent of thoroughness not one of importance of issue. If this is the case, then the issues raised may not have much significance either. We would suggest that once the appropriate studies have been accomplished, the findings be made available for review and perhaps application elsewhere in the stormwater systems of the region. No specific comments were generated for this TM.

**Stormwater and Groundwater Management at Conveyance System Primary Portal Sites**

This TM provides significant insight into what can be done and what should be done by regulation but, perhaps necessarily, does not discuss what will be done in stormwater management at the

portal sites. The District requests that once design level definition of these project components is accomplished, the information be made available for review. This will help to identify possible incompatibilities between disposal plans and the capabilities of the various disposal options. This TM, like many of the others, makes reference to the FEIS as a source of information to the reviewer and implies a source of information to the SEPA process that does not exist.

**Volume 3(a), Stormwater & Groundwater Management at Conveyance System Primary Portal sites, Estimated Dewatering rates section, Table 3**

*Dewatering rates as high as 250 gpm are discussed*

These rates appear higher than discussed in the August 6<sup>th</sup> seminar where discussions of isolation technology to minimize dewatering flow were presented. Is this a residual set of values from older versions of the project or is this consistent with presentations provided in the seminar?

**VOLUME 3(b)**

The geotechnical volume is predominantly a presentation of data generated in the investigations of the Route 9 site, the first TM component of Volume 3(b) or the conveyance systems, the second component of the volume. In neither case is significant interpretation of the data discussed. As such, without having been present during the field investigation, there is little to review except for internal consistency of the documentation of the data. Since much of this data was used in accomplishing interpretations for other TM efforts, it was determined that familiarization with the techniques used and the data generated was required. As would be expected, the familiarization effort did not result in a substantial number of comments.

**Geotechnical Data Report for Proposed Route 9 Treatment Plant Site**

This volume presents the geotechnical data related to field explorations and laboratory testing specific to the Route 9 Treatment Plant Site. Although no major issues with specific potential impacts to operations at the Cross Valley Water District were noted, there were issues that could not be adequately assessed do to apparent inconsistencies of the data. Of primary concern are the water level-data obtained from the deep exploration (PB-12). These data do not reflect a common hydrogeologic condition and it may be that they are erroneous. Given that this is the only source of deep data at the site, the validity of these data needs to be verified before a complete assessment of the hydrogeology can be made.

**Volume 3b, Geotechnical Data Report for Proposed Route 9 Treatment Plant Site, Page 3, Starting with Radiocarbon Dating**

Under Radiocarbon Dating, document states that "*tests were performed to better clarify the geologic interpretation at the site*" – this implies that it was helpful in this task. On the same page under Nomenclature, 1<sup>st</sup> paragraph the document states that "Major delineations were based on geologic age." – This also seems to imply "dating", and the dating efforts were useful for categorizing units observed in borings. In the second paragraph of the Nomenclature section, it is indicated that dating was limited to the interglacial episode just prior to Frasier-Time. The initial statements on this page are somewhat misleading and should be reworded for clarity or possibly just be omitted.

**Volume 3b, Geotechnical Data Report for Proposed Route 9 Treatment Plant Site, Page 5, Vashon Recessional Outwash [Qvro]**

In these two sections, Vashon Recessional Outwash is divided into Qvro for outwash, Qvrl for lacustrine, and Qvi for ice contact. This is not consistent with Designations presented in Volume 3c, which divide Qvr into Qvrf for fluvial, Qvrl for lacustrine (and then state it is not used in this report), and Qvi for ice contact. Geologic designations should stay consistent for clarity.

**Volume 3b, Geotechnical Data Report for Proposed Route 9 Treatment Plant Site, Page 6 through 7, Pre-Vashon Units**

As with the previous comment, the unit designations in this section are inconsistent with designations used in other volumes of this report. In this section, Pre-Frasier units are divided into Pre-Frasier Non-glacial and Pre-Frasier Glacial units are denoted with (Qp...). In Volume 3c, Pre-Frasier deposits are distinguished as (Qu) for undifferentiated, (Qpo) for pre-Olympia deposits, which are also described as pre-Frasier glacial units, and (Qpf) for pre-Frasier non-glacial units, or non-glacial units older than Holocene. As in the preceding comment, more effort should be made to maintain consistence of unit designations. By deviating from an already cumbersome classification system, it becomes virtually impossible to correlate any of the data used in this document.

**Volume 3b, Geotechnical Data Report for Proposed Route 9 Treatment Plant Site, Page 10, Table 1. Water level Summary**

Under PB-12, there are no measurement depths listed for five piezometers. It is listed in text but would also be useful on table (not very conspicuous on Figure C-3). Despite being calibrated (as discussed in the text) it seems that the water levels indicated in Table 1 for PB-12 and on the log in Figure C-3 may be in error. Between VWP1 and VWP2 head differences increase with depth (indicating a discharge zone). Between VWP2 and VWP3, and then again between VWP3 and VWP4, heads decrease with depth (indicating a zone of recharge). Then between VWP4 and VWP5, heads increase again with depth (indicating a discharge zone again). It would be unusual to have this condition (all at the same time as indicated) and it may be worth rechecking calibration. Head differences are significant as well (differences in adjacent zones range from 5.6 feet between VWP3 and 4, to 25.7 feet between VWP 2 and 3, and a total range between highest and lowest heads of 31.3 feet), indicating this is not likely a tolerance issue. Also, on page 9, under Groundwater, second paragraph, it is stated that water levels were measured between April and May 2003, but the table only lists one date (5/7/2003). Also see comment for Figure 4-8 of Volume 3c.

**Volume 3b, Geotechnical Data Report for Proposed Route 9 Treatment Plant Site, Figure 3**

There is no data presented to justify the bending of the 160 foot contour near PB-2

**Volume 3b, Geotechnical Data Report for Proposed Route 9 Treatment Plant Site, Figure A-2, C-2**

Previous comments regarding consistency of geologic nomenclature apply to this figure (i.e. 1: Qpg pre-Olympia glacial deposits, listed on right side of figure is not discussed in text of this section and is not listed on left side of figure. 2: Qvro is listed on left side of figure and in text as Vashon recessional outwash and on right side of figure as older recessional deposits?). Also, the term "Esperance Sand" (used on right side of figure) is a somewhat ambiguous unit designation-a local designation for Qva. The term "hardpan" is listed on the right side of the figure under the description for Till. This is a local driller's term and geologically, is inappropriately applied in this setting.

**Conveyance System Geotechnical Progress Report**

This document details the data collection methods, results of the field exploration and the findings of the geotechnical laboratory testing. The sections provide description of selected drilling and sampling methods. Sufficient information has been provided to properly review the attached well logs and photographs. There is no interpretation of the geology encountered during the exploratory drilling are presented in this section. No comments have been generated during the review of this section.

**VOLUME 3(c)  
Geology and Groundwater**

This volume describes the regional geology and groundwater conditions associated with the proposed project. Presented within this document are detailed descriptions of the geology pertaining to each proposed site and alternative alignments. As would be expected, a significant portion of the review was dedicated to Volume 3c, and consequently, this volume generated a considerable number of comments. Detailed below are the specific comments organized by specific section. Many of the comments generated, deal with the inconsistent use and misapplication of geologic and hydrogeologic nomenclature. Several comments are concerned with the inconsistencies and inaccuracy between the text and the figures/tables provided. Significant concerns regarding the development and use of the numerical and analytical models were also noted. Though it does not appear that these inconsistencies and problems introduce sufficiently flawed analyses to render the results inadequate, it does raise a concern as to the accuracy of the authors' interpretations and conclusions.

**Volume 3c, Executive Summary, p. ES-2 through ES-3**

Under the heading "Regional Aquifers" the document discusses generic aquifers:

1. Qal, Qvr
2. Qva
3. Qu

Then under the heading "Unocal Site Conditions", second bullet, the document discusses the "Whidbey Formation Regional Aquifer". This is confusing because this should fall under the established category of "Qu aquifer" following the generic scheme. Further, the Whidbey

Formation is a nonglacial deposits, which typically do not form aquifers, at least on a regional scale.

**Volume 3c, Executive Summary, p. ES-3, fourth paragraph, second sentence**

*"Groundwater flow discharges to Puget Sound; the QVA Aquifer likely does as well."*

This statement is rather confusing why is the Qva singled out. Is it the authors' contention that rather than the Qva entering the sound as groundwater it enters as spring discharge surface water from Deer Creek?

**Volume 3c, Executive Summary, p. ES-8, seventh paragraph**

*"It is anticipated that most portals will be constructed with...."*

This section does not address what will be done with the water collected from the portal inflows.

**Volume 3c, Executive Summary, p. ES-8, last paragraph, last sentence**

*"Traditional relief wells drilled from the surface will not be used."*

What type of wells will be used? When will the authors discuss the drilling methods which have been selected?

**Volume 3c, Executive Summary, p. ES-9, second paragraph**

*"Unanticipated face inflow events could occur...."*

What mitigation plans are in order to account for such "unanticipated" events? What is the likelihood of these events taking place?

**Section 1**

This section presents introductory information and does not contain substantial technical discussions or interpretations. Though it is critical to the understanding of the context of subsequent discussions, it does not have direct bearing on the assessment of the potential for the project to impact District interests.

**Volume 3c, Section 1.4.2.6, p. 6 through p. 7**

The document only seems to discuss water right certificates and claims with brief mention of permits for short term use as specified by Water Resources Program Policy (POL-1037) (top of p. 7). This is different than a permit issued subsequent to a certificate. No specific mention of applications or permits as (preliminary to certificates) was found in the document (except for Table 2-5 on page 24 which only gives a definition and describes it generically).

**Section 2**

This section describes the regional geologic and hydrogeologic setting for the Brightwater Project. Primarily, it attempts to define the geologic nomenclature and basic stratigraphic scheme to be utilized throughout the document. This includes a separate scheme for describing both standard

geologic units (employs the nomenclature system adopted by the SGMP) and hydrostratigraphic units (uses a six-unit hydrostratigraphy scheme defined in section 2.4.1). As is typical and appropriate, the hydrostratigraphic scheme is more generalized than the geologic stratigraphy, and broadly overlays the more intricately defined geologic units. Although the approach as initially described is sound, there is considerable deviation and misapplication throughout this and subsequent sections of the document. To add further complication, roughly synonymous nomenclature from other stratigraphic schemes was also used (and misapplied) throughout the document. As such, the document, at a minimum, is difficult to decipher. Given the level to which the geologic nomenclature is inconsistently defined and applied, there is a degree of warranted concern with regard to the accuracy of geologic and hydrogeologic interpretations as related to project impacts (or more appropriately, the perceived lack of project impacts). As such, there is also considerable concern with the lack of mitigation planning to account for potential consequences of misinterpretations.

The section also describes the regional hydrogeologic setting of the project area and how the proposed project relates to the general groundwater flow systems (i.e. recharge and discharge, precipitation and ET, water quality, and water use). Overall, this section describes these aspects adequately, primarily through a compilation of previous work. There does, however, appear to be a potentially significant deficiency with regard to the description of water use, in particular, the description and discussion of water rights within the project area. Water rights, on file with State (DOE) appear to have been reviewed at a cursory level, but it seems apparent that there has been no in-depth review (i.e. there is no mention of pending applications or active permits), and certainly no discourse with major purveyors to determine the nature of the larger water rights in the project area that may be affected by this project.

**Volume 3c, Section 2.1, p. 9 through 10, fourth paragraph, third sentence**

The climatological data presented in this paragraph are referenced to "U.S. Weather Bureau, 1965". It is not clear why such an old reference is used. Later, under section 2.4.4.1, p.17 the document indicates a low precipitation value of 33 inches contradicting this section which shows a low value of 35 inches.

**Volume 3c, Section 2.3, p. 10 through 11, fourth paragraph**

This entire paragraph, which starts "Note that the SGMP nomenclature includes a ...", takes a lot of effort to decipher and seems like it could be said better somehow. Part of the problem may be that the designations presented as Pre-Frasier and Pre-Olympia are intuitively backwards. Older undifferentiated interglacial deposits are classified as Pre-Frasier (which is a glacial interval) and older undifferentiated glacial deposits are classified as Pre-Olympia (which is correctly used as an interglacial designation). This is confusing enough, but then later in the document this terminology is used inverted (see comment for volume 3c, Section 4.1.1.2, p.41).

**Volume 3c, Section 2.3.1, p. 11**

There is no distinct difference between designations for (m) modified Land and (af) fill. The (af) designation is a subset of (m).

**Volume 3c, Section 2.3.2, p. 11**

Within the designation for Mass Wastage Deposits (Qmw), top soil is included as a component of the unit. Top soil is included here but it is not formed by a mass wasting-process.

**Volume 3c, Section 2.3.2, p. 12**

The designation for Recent Alluvium (Qal) includes lacustrine deposits. Alluvium by definition excludes lacustrine deposits. As listed in (Bates and Jackson, 1980; Glossary of Geology, 2<sup>nd</sup> addition, P-46): Alluvium (a) A general term for clay, silt, sand, gravel, or similar unconsolidated detrital material deposited during comparatively recent geologic time by stream or other body of running water.....not intended to include subaqueous deposits in seas, estuaries, lakes.....

**Volume 3c, Section 2.3.3, p. 12, Advance Outwash (Qva), first sentence**

*"....known locally as the Esperance Sand,..."*

This term is somewhat dated and may be misleading. Like Colvos Sand in Pierce County, it is described as fine to medium fluvial sand with little to no gravel. It is a term applied locally (often misused by contractors) to relatively clean sands and does not necessarily imply dirtier portions of Qva.

**Volume 3c, Section 2.3.4.4, p. 14**

This entire paragraph is poorly worded (actually misstated) and very confusing. It states, *"The Whidbey Formation is a group of sediments deposited during the next oldest nonglacial period recognized in the Puget Lowland, the Possession Glaciation...?, which followed the Olympia interglacial period"*. It should be reworded somehow, to at least give an accurate statement: i.e. The Whidbey Formation represents the interglacial period preceding the Possession Glaciation, which preceded the Olympia Interglacial, etc.....

**Volume 3c, Section 2.4.1.2, p. 15, third sentence**

*"Locally perched groundwater conditions develop seasonally on top of the till in areas of low topographic relief."*

It is unclear what the term *"locally"* refers to. Ground water also perches in permeable zones within the till (domestic wells terminate in the till).

**Volume 3c, Section 2.4.1.4 and 2.4.1.5, p. 15**

No elevations are given for the Qvlc Aquitard (section 2.4.1.4) or the Qu Aquifers and Aquitards (section 2.4.1.5), but were for the preceding Qva aquifer (section 2.4.1.3). Elevation, even if qualified as *"generally occurring"* would be helpful (and consistent). Also, in the third line of section 2.4.1.5, the document states *".... and generally occur under confined conditions."* Given that the formations occur at or below sea level, they would always be confined (and, again, this section should list elevations).

**Volume 3c, Section 2.4.4.1, p. 17, second sentence**

The statement *"....a low of 33 inches at Scriber Creek (furthest west)...."* is not in agreement with the reference in section 2.1, p. 9, fourth paragraph, 35 inches listed by U.S. Weather Bureau, 1965.

**Volume 3c, Section 2.4.4.3, p. 18, fourth full paragraph, last sentence**

*"Thirty-six thousand acre-feet per year is equivalent to approximately 200,000 gallons per minute."*

This conversion is incorrect. Thirty-six thousand acre-feet per year is roughly 22,319 gpm.

**Volume 3c, Section 2.4.4.3, p. 18, second to last line**

11 inches should be rounded up to 12 inches. *"....annual precipitation of 33 to 40 inches per year....."* is not in agreement with reference in section 2.1, p. 9, fourth paragraph, 35 inches listed by U.S. Weather Bureau, 1965.

**Volume 3c, Section 2.4.6, p. 21, third paragraph**

Third paragraph: (General comment) The document seems to employ generalized statements to discount potential concerns: i.e. second line, *"....typically localized....."*, and second to last line, *".....and hydraulic gradients are often upward....."*.

There should be some discussion or mention of possible mitigation if the unexpected is encountered, i.e. deeper, more extensive contamination. Are there contingencies to deal with construction activities causing existing contamination to migrate, among other questions.

**Volume 3c, Section 2.4.7, p. 23, second paragraph, third sentence**

It is not clear if the 32 water rights listed here are certificates only, or if they include applications and permits as well. The document also states that records are listed in Attachment 1b but the attachment only lists claims.

**Section 3**

Section 3 describes the geologic and hydrogeologic settings specific to the major water districts within the Brightwater Project area. As in the preceding Section 2, the inconsistent use and misapplication of geologic and hydrogeologic nomenclature is a primary issue throughout this section. As before, this leads to concerns regarding accuracy of interpretations and associated concern for the lack of contingency plans should major misinterpretations occur.

**Volume 3c, Section 1.1, p. 2, sixth paragraph, third sentence**

*"Detailed descriptions of the treatment plant and conveyance pipelines are provided in Chapter 3 of the Final EIS."*

The Final EIS text was not available for review. The appropriate text should be excerpted from the Final EIS and provided for review.

**Volume 3c, Section 3.3.2, p. 34-35, last paragraph, last sentence**

Golder (2000), estimated that the K ranges from 3.8 to 3,056 ft/day and they used a K of 600 ft/day for WHPA delineations. This is a wide range of K values, and although it is appropriate for use in delineating WHPAs, it seems very inadequate for the purpose of predicting more specific response to construction activities. Values should be refined for more specific areas given the wide range of values.

**Volume 3c, Section 3.3.3 p. 35, first sentence**

The phrase *".....appears to be relatively simple....."* throws up a red flag for some reason. *"Ground water discharges to the streams...."* All groundwater? Qva-groundwater? What is the relationship of lakes? Are they perched or in continuity with Qva? This section is comparatively very brief (see section 3.1.3, p. 28) and should probably be expanded a bit.

**Section 4**

This section discusses the groundwater regime during construction and operation of plant sites. The text and figures of this section have been reviewed by Robinson and Noble personnel to determine their accuracy and consistency. Section 4.1 specifically addressed the Route 9 site, while section 4.2 dealt with the Unocal site. Each of the projects, as described has to deal with large quantities of stormwater during both construction and operation of the sites. Some inconsistencies have been discovered and are explained within the comments section to follow. Currently, stormwater is being routed to Little Bear Creek (Route 9 site) and Puget Sound (Unocal site) and will continue to be routed to these locations during construction and once the project is complete. More resources were brought to bear on the problems facing the construction team in dewatering the respective sites. Each of the sites selected will require some level of dewatering to allow construction of the proposed facilities. However, the Route 9 site is designed to be equipped with under-drains which will be constantly "dewatering" the sediments beneath the site. Many of the comments generated from this section are specifically addressed to the dewatering practices which will be employed during and construction and operation of the sites.

**Volume 3c, Section 4.1.1.2 p. 40, fourth paragraph, second and third sentences**

*".....the till-like deposits may be unique to the Route 9 site. However, it is found in other similar topographic settings....."*

It can't be unique to the Route 9 site if it is found elsewhere. The term "unique" is inappropriate and should be clarified or changed.

**Volume 3c, Section 4.1.2.1, p. 40, first paragraph, first sentence**

*"The proposed plant facilities at the Route 9 site are described in detail in Chapter 3 of the Final EIS."*

The Final EIS text was not available for review. The appropriate text should be excerpted from the Final EIS and provided for review.

**Volume 3c, Section 4.1.1.2, p. 40, fifth paragraph, first sentence**

*"Vashon Advance Outwash (Qva) stratigraphically underlies Vashon Till (Qvt) and Vashon Diamict (Qvd), but appears to have been completely eroded or reworked within the Route 9 site."*

This statement appears in direct conflict with the geologic map provided as Figure 4-2. The Qva appears to outcrop within the northeast corner of the Route 9 site as represented in the figure.

**Volume 3c, Section 4.1.1.2 p. 40-41, last paragraph continuing to next page**

*"...pressure head 15 feet higher than hydrostatic at the location..."*

It is not clear what this is saying. In literal terms, this says that the pressure head is 15 feet higher than the pressure head, which is nonsensical. The term "hydrostatic" in this context appears to be a "contractor-term" for water-table and its use is not really appropriate here.

- The cross-section (Figure 4-8) shows the Qpgl unit of well PB-12 as a flowing well. However, water levels indicated for the various units on Figure 4-8 at PB-12 show opposite gradients for the same well (suggesting both a recharge and a discharge zone at this well...?).
- The figure key lists Qpgl, Qpgf, etc.. as Pre-Glaciolacustrine Beds, Pre-Glaciofluvial Deposits, etc. Are these prior to glaciolacustrine beds or glaciolacustrine beds that are older than the Olympia non-glacial deposits (i.e. Possession Glaciation).
- The relevant text to Figure 4-B on page 41 discusses "pre-Fraser glaciolacustrine deposits (Qpgd) – this is not the same as discussed in section 2.3 in the third paragraph on page 11 (see previous comment for this section and paragraph), which states that "non-glacial deposits older than Holocene will have a Qpf (pre-Frasier) designation". Glaciolacustrine deposits are glacial and should be denoted by a Qpo (pre-Olympia) designation according to the classification presented in Section 2.
- General comment – this stratigraphic nomenclature scheme is cumbersome, somewhat non-intuitive, and is inconsistently applied and /or seems to get mix-matched often throughout the document.

**Volume 3c, Section 4.1.1.3, p. 42, fourth paragraph, second sentence**

*"It is postulated that the deep, highly permeable aquifer at the Route 9 site is either the same geologic unit as the high-productivity Cross Valley aquifer to the east, or is well connected to the Cross Valley Aquifer, based on material descriptions and the artesian head in this aquifer at the site."*

What is being referred to as the deep aquifer at the Route 9 site? What depth? What unit? Which well shows this connection? Is the inferred connection based on water level data, water chemistry, or well-test data?

**Volume 3c, Section 4.1.1.3, p. 42, fourth paragraph, second sentence**

*"The cut bench would range be 3,200 feet long in the north-south direction (parallel to the existing slope) and about 350 feet wide in the east-west direction."*

Should the sentence read: (The cut bench **range would be** 3,200 feet long in the north-south direction (parallel to the existing slope) and about 350 feet wide in the east-west direction.)?

**Volume 3c, Section 4.1.2.1, p. 45 last paragraph, second sentence (to following page)**

*"As noted in the site-specific geology section (Section 2.3), artesian pressures were measured in an aquifer between elevation 60 and 10 feet in a boring near the IPS location. The measured head in this aquifer was at elevation 175 feet. . . .Currently, the finish grade at the IPS site is elevation 180 feet, so (assuming the pressure head in the aquifer is constant with horizontal distance) an artesian condition does not exist at the IPS site and no depressurization would be needed."*

There appears to be some confusion regarding the use of the word "artesian." "Artesian" is synonymous with "confined" and simply indicates that the measured head in an aquifer or well is above the top of the aquifer materials. By definition, a strongly artesian condition exists at the IPS site, as the water level is 115 feet above the top of the aquifer. It would appear that the document intends to refer to "flowing artesian" conditions, wherein the water level is above land surface and the well could flow without pumping. It should also be noted that the assumption that pressure head is laterally constant assumes that water does not flow in this aquifer; however this assumption could be adequate over short distances. No indication is provided as to how close the nearby boring is to the IPS location.

**Volume 3c, Section 4.1.2.1, p. 46, first paragraph, second sentence**

*"The measured head in the aquifer was at elevation 175 feet."*

When was this water level recorded; does this water level reflect the seasonal high- or low-water level? This water level proves critical in the accurate estimation of the dewatering required to complete the IPS.

**Volume 3c, Section 4.1.2.1, p. 46, eighth paragraph**

This paragraph details the stormwater facilities, however the description does not describe the upper flow limit of the stormwater system.

**Volume 3c, Section 4.1.2.1, p. 48, first paragraph, last sentence**

*"Refer to Chapter 6, Water Resources, of the Final EIS for more details on surface water management."*

The Final EIS text was not available for review. The appropriate text should be excerpted from the Final EIS and provided for review.

**Volume 3c, Section 4.1.3.2, p. 53, Table 4-3**

No units have been listed for several of the columns: Treatment Plant (Dewatering Wells), Treatment Plant (Underdrains), Influent Pump Station (IPS).

**Volume 3c, Section 4.1.3.1, p. 55, second paragraph, third sentence**

*"Thus, the total dewatering flows during 3 years of construction time range from approximately 100 gpm at the beginning to 600 gpm at the peak, with a weighted average of about 350 gpm."*

The discussion has focused on the 350 gpm rate. Can the described flow rates of 600 gpm be effectively handled by Little Bear Creek, and if so for what duration and during what season (i.e. wet or dry)? Or is there an alternative route for the handling the additional flow?

**Volume 3c, Section 4.1.3.2, p. 56, second paragraph, fourth sentence**

*"Since Mueser Rutledge's analysis, the plant configuration has developed and changed, so that the current existing ground surface and finished grade around the IPS would be at the same elevation as the measured groundwater head in the Qpogf unit in PB-12."*

There is no water level noted for the Qpogf unit on the PB-12 log. In previous discussions it has been suggested by the authors that at least a five foot difference in the finish grade of the IPS and any water level measured in PB-12 exist. Has there been a change which is not represented in the cross sections?

**Volume 3c, Section 4.1.3.2, p. 56, second paragraph, fourth sentence**

*"These isolated layers are not in direct hydraulic connection with the regional aquifer or Little Bear Creek."*

In previous discussions the aquitard separating the Qva from the Qvrf and Little Bear Creek, was referred to as a "Leaky Barrier". The same sediments (aquitard) are shown in the cross sections to separate the deeper aquifer from the Qvrf. Would it be accurate to suggest that with the high water levels (pressure heads) within the deeper system would "leak" through to the overriding Qvrf and then to Little Bear Creek? Has this connection been examined?

**Volume 3c, Section 4.1.3.2, p. 59, fourth paragraph,**

*"We believe that zones of the low ..."*

Within this paragraph the authors seem rather cavalier and dismissive of the potential interaction of the Qva and the Qvrf. Earlier in the document (page 42 within the second full paragraph) low permeable unit being described is referred to as "leaky" doesn't this suggest a hydrologic connection?

**Volume 3c, Section 4.1.4.2, p. 62, second full paragraph, third sentence**

*"However, as discussed in greater detail in the Final EIS Chapter 6 surface water discussions. . . ."*

The Final EIS text was not available for review. The appropriate text should be excerpted from the Final EIS and provided for review.

**Volume 3c, Section 4.1.5.1, p. 63, last sentence of section**

*"Chapter 17, Public services and Utilities, in the Final EIS, discusses measures for impacts on private wells."*

The Final EIS text was not available for review. The appropriate text should be excerpted from the Final EIS and provided for review.

**Volume 3c, Section 4.1, Figure 4-3, 4, 5, 6, 7**

The cross sections are presented in a rather nontraditional manner. For example when cross section A-A' is compared to the map it appears it does not originate at the location "A" as

represented by the axis. Also the cross sections appear to be constructed using a grid, however the grid is not plotted on the map. The cross sections do not show the location of the other section completed across the site, thus correlations between each of the cross sections can not accurately be made. Cross section A-A' seems also missing approximately 200 feet from the center of the section, this becomes apparent when the reader attempts to connect the two separate figures (Figure 4-4a and 4-4b). Cross section C-C' has several confusing properties; the section is presented with shift in the vertical scale. The aforementioned shift hinders the readers ability to infer lateral relationships of the described units. Also section C-C' represents the log of well PB-12 the depth of the well is to large to be reflected within the selected scale. To account for this deep well the log has been cut to reflect its total depth. In conjunction with the segmenting of the log a contact has been drawn **below** the horizontal axis. While none of these choices changed the data provided; it again limited the readers' ability to make accurate interpretation of the subsurface geology detailed in the well logs. Also, no dates are given for the water levels recorded within any of the wells.

#### **Volume 3c, Section 4.1, Figure 4-8**

The cross section presented is not on any of the provided maps. No dates are given for the water levels recorded within any of the wells. Where does the previously discussed cross section A-A' (Figure 4-4) cross Figure 4-8 (A-A')?

#### **Volume 3c, Section 4.1, Figure 4-9**

The conceptual cross section as represented in Figure 4-9 suggest that both the Vashon Advance Outwash (Qva) and the Lawton Clay (Qvlc) are absent below the Route 9 site. It appears that the Qva and Qvlc are limited in lateral extent and found only in the upland above the Route 9 site. However, in the Figure 4-6 (cross section C-C') the authors suggest Qvlc was penetrated at Well PB-12 at an elevation of 65 to 70 feet beneath the Route 9 site. The Qvlc is also logged in Wells SB-1 and PB-10 both represented in Figure 4-5 (cross section B-B') with an elevation of 90' – 110' and 120' – 130' respectively.

#### **Volume 3c, Section 4.2.1.2, p. 68** *"Whidbey Formation regional aquifer"*

In several instances throughout this page the Whidbey Formation is referred to as a Regional Aquifer, however it is a non-glacial deposit and generally considered an aquitard. It may be less confusing to suggest the Whidbey Formation is "locally" characterized as an aquifer.

#### **Section 5**

In general, Section 5.0 discusses the likely impacts that the proposed Brightwater Project will have to ground water and surface water systems based upon the expected- and worst-case scenarios proposed. Section 5.1 defines the thresholds of potential impact by the Brightwater Project that, if exceeded, "could result in significant impacts to groundwater quantity or quality." (p. 81) While the thresholds identified may be appropriate, it should be noted that the criteria used to define these "safe" thresholds of impact to groundwater, stream flows, and water quality are not provided for review. Section 5.2 provides descriptions of the conveyance facilities, anticipated construction conditions and proposed construction methods. The majority of comments to this section were in

regard to inconsistencies between the anticipated hydrogeologic conditions, anticipated geologic conditions, and the proposed construction methods presented in Table 5-1. Section 5.3 presents estimates of groundwater inflow to the conveyance facilities (portals and tunnels) under expected- and worst-case (cumulative upper-bound case) scenarios for both the period of construction and under long-term operation conditions. From the text of this section, it would appear that these estimated flows are largely based upon the experience of project team members in similar environments rather than on an analysis of site-specific conditions. Using the seepage estimates presented in Section 5.3, Section 5.4 presents the results of the un-calibrated numerical analyses (discussed in Attachment 2 to Volume 3c) for the impacts to groundwater flow and water levels, surface water/aquifer interaction, and water quality. Inconsistencies between information presented in the text of this section and the presented cross-sections make it unclear whether the "numerical analyses" consistently reflect the most current geological interpretations and proposed conveyance alignments. Precautionary measures (such as groundwater monitoring) and contingency plans (i.e., Potable Water Replacement Plan (PWRP), Spill Prevention, Control, and Countermeasures Plan (SPCCP), and Stormwater Pollution Prevention Plan (SPPP)) are presented in Section 5.6.

**Volume 3c, Section 5.1.2.1, p. 82, second paragraph, all sentences**

*"To put this drawdown in perspective, the Qva Aquifer water table elevation varies by up to 200 feet across the 195<sup>th</sup> Street alignment (Figure 2-9), and fluctuates seasonally as well. The water table elevation within the Qal/Qvr Aquifers probably has a lower gradient (i.e., a flatter water table), but typically would have greater seasonal fluctuation. A decline in the water table elevation of 1 foot or less would be virtually indistinguishable from natural fluctuations and variations in the water table elevation throughout most of the area."*

It is inappropriate to use the lateral differences in aquifer elevation (and its related water level) to put an imposed project drawdown "in perspective." While it is appropriate to use seasonal water level fluctuations in such a discussion and it is likely true that a one-foot drawdown may indeed be indistinguishable from this variation, no actual estimates of what the seasonal fluctuation might be are provided for comparison. Further, while the reader is provided with the assertion that the imposed drawdown is "virtually indistinguishable" from concurrent seasonal fluctuations, any such drawdown is clearly in addition to any natural fluctuations.

**Volume 3c, Section 5.2.4.1, p. 86, first (incomplete) paragraph, first full sentence**

*"For more details, refer to Appendix 3-B of the Final EIS."*

The Final EIS text was not available for review. The appropriate text should be excerpted from the Final EIS and provided for review.

**Volume 3c, Section 5.2.4.1, p. 89-90, Table 5-1**

- Table suggests apparently contradictory information regarding Portals 19, 44, 11, 39, and 7. Portal 19 (Route 9-195<sup>th</sup> Street alignment) suggested to have a flowing artesian head equal to 20 feet above ground surface, however no confining layer is identified in the Anticipated Geologic Conditions. Portal 19 is listed a second time (under unlabeled [Route 9-228<sup>th</sup> Street???) alignment) with a water level of 5 feet BGS, for the same geology and portal depth. Also, different Anticipated Construction Methods are identified.
- Portal 44 (Route 9-195<sup>th</sup> Street alignment) suggested to have a flowing artesian head equal to five feet above ground surface, but second listing (under unlabeled [Route 9-228<sup>th</sup>

Street???) alignment) indicates a shallower portal depth and water level at land surface. Different Anticipated Construction Methods are identified for each listing. Verify that changes in portal depth, water level, and proposed construction methods are correct.

- Portal 11 (Route 9-195<sup>th</sup> Street alignment) has different Anticipated Construction Methods than for the unlabeled [Route 9-228<sup>th</sup> Street???) alignment, although depth of portal and water level are the same. The third listing of Portal 11 (Unocal alignment) the depth is 15 feet greater, water level is the same, but a third set of Anticipated Construction Methods are identified.
- Portal 39 (unlabeled [Route 9-228<sup>th</sup> Street???) alignment) is suggested to have a flowing artesian head equal to 10 feet above ground surface, however no obvious confining layer is identified in the Anticipated Geologic Conditions. [Base of portal is also not in water-bearing materials—flow must be leakage—is 10 feet of artesian head consistent with anticipated influent flows?]

**Volume 3c, Section 5.3.1.2, p. 93, first full paragraph, first sentence**

*"Unanticipated inflows of groundwater may occur when the tunnel operation encounters a more permeable zone, or passes from a less permeable zone into a more permeable zone, combined with groundwater under high head."*

This sentence is either vague or redundant. When the tunnel operation "encounters a more permeable zone," it has by definition passed "from a less permeable zone into a more permeable zone." The sentence should be modified to clarify the vagueness or remove the apparent redundancy.

**Volume 3c, Section 5.3.1, p. 96, Table 5-2**

The title of Column 12 "Maximum Sustained Discharge" is slightly misleading. According to Section 5.3.1.3 (p. 94, fourth paragraph, second sentence), Table 5-2 indicates "the conservatively high combined flows that could occur during normal tunneling (column 12). . . ." Per the text in Section 5.3.1.3 (p. 94, fifth paragraph, fifth sentence), the upper value in this column "represents the estimated maximum inflow of water from the full length of the tunnel segment (sum of columns 5, 6, 7, 9, and 11)." All values presented in columns 9 and 11 are given "less than" values (e.g., <10, <20). When added in Column 12, however, these values are counted at half the stated "less than" value. The more "conservative" approach would be to add these values at their stated "less than" quantity.

**Volume 3c, Section 5.3.2.2, p. 97, second paragraph, second sentence**

*"Permanent facilities would vary from site to site as indicated in Section."*

This is a typographical error. To correct, the appropriate Section number should be inserted.

**Volume 3c, Section 5.3.2.2, p. 97, third paragraph, second sentence**

*"Exfiltration, therefor, would not occur in these structures during conveyance system operation."*

This is a typographical error. The word "therefor" is misspelled.

**Volume 3c, Section 5.3.2.2, p. 98, second paragraph, second & third sentences**

*"Hydraulic calculations completed for the 195<sup>th</sup> Street alternative show that exfiltration could occur in a 2,000-foot segment at the extreme western end of the conveyance line and for an approximate 7,000 foot segment west of portal 44. These areas are identified in Table 5-3 with negative net pressure heads and a zero seepage rate."*

Possible typographical errors. Table 5-3 indicates a 1,900-foot segment (very close to the indicated 2,000-foot value) and a 9,382-foot segment (2,382 feet longer than the 7,000 feet indicated). An explanation (or correction) of the second discrepancy would be appropriate.

**Volume 3c, Section 5.4.2.1, p. 101, eighth paragraph, first sentence**

*"The range of drawdowns expected during construction-related groundwater inflows for these two portals was estimated using the analytical approach described in Attachment 2."*

Attachment 2, p. A2-1 and A2-2, presents modeled estimates for three portals (not two), specifically Portals 11, 14, and 41, with estimates inflows of 80, 80, and 100 gpm.

**Volume 3c, Section 5.4.2.1, p. 102, first three paragraphs**

This discussion only presents the findings regarding two portals (11 and 41), despite the fact that the results for Portal 14 (presented in Attachment 2) also meets the criteria of "Significant maximum short-term groundwater inflows (i.e., a maximum of 80 gpm) indicated on p. 101.

**Volume 3c, Section 5.4.2.2, p. 102-3, general comment on section**

This appears to be the first section of the document to discuss the "numerical analysis" and related results. However, in its typical use, "numerical analysis" (and "numerical modeling") suggests a very high level of analysis and modeling wherein the assumptions and construction of the model are verified by calibrating the model to real-world values. As indicated in Attachment 2, no attempts to calibrate the model to real-world values were accomplished, and the analysis is solely being used as an "analytical tool" (p. A2-3) because "the analysis is intended to be relative rather than absolute. In other words, the analysis provides a worst-case estimate of construction related changes in flows and pressure heads compared to baseline conditions." (p. A2-7) The uncalibrated nature of the model should be presented in the initial discussion of the model and results to place the actual level of analysis into perspective.

**Volume 3c, Section 5.4.2.2, p. 103, sixth paragraph, first sentence**

*"The numerical analysis results for the cumulative upper-bound 14-day face inflow event estimated short-lived drawdowns of up to 2 feet in the Qva Aquifer and up to 132 feet in the Qu Aquifers at the point of inflow (effectively a single point in the aquifer).*

It should be noted that these maximum estimated short-lived drawdowns are for the Route 9-195<sup>th</sup> Street alignment, per Table A2-8 (p. A2-11).

**Volume 3c, Section 5.4.3.1, p. 104, first paragraph**

*"However, despite the proximity of many portals to streams (Figure 2-1), only those portals that would include depressurization at the invert during the approximately 6-month construction*

*period could potentially affect a nearby stream. Of these, only Portals 11, 14, and 41 are anticipated to have sustained flows of any significance (Table 5-2). The anticipated construction-related groundwater inflows required to depressurize the invert (to make it stable) from these two portals are listed below. . . ."*

Text in this paragraph changes from discussing three to two portals, although Table 5-4 and Attachment 2 each cite three portals.

**Volume 3c, Section 5.4.3.2, p. 106, fourth paragraph, first sentence**

*"The Route 9-228<sup>th</sup> Street alignment tunnel would pass about 150 feet below Little Bear Creek, and is separated from the creek bed by 70 feet of glacial diamicton and an additional 80 feet of interbedded tills and fluvial sediments."*

This statement conflicts with data presented in cross-section. According to Figure 2-6b, this tunnel will be 37 to 52 feet below the creek, and is separated from the creek bed by 15 feet of diamicton (Qvd) and 22 feet of recessional gravel (Qvr). While the tunnel alignments have not been finalized, the cross-sections and text should provide consistent information.

**Volume 3c, Section 5.4.3.2, p. 107, second paragraph, first two sentences**

*"The Route 9-228<sup>th</sup> Street effluent tunnel would be at least 100 feet below the creek elevation and about 70 feet below the base of the outwash deposits present in the North Creek valley at this location. Up to 25 feet of low permeability silt and clay would separate the tunnel from the more permeable near-surface deposits."*

This statement conflicts with data presented in cross-section. According to Figure 2-6b, this tunnel will be 41 to 56 feet below the elevation of North Creek. Beneath the outwash, approximately 19 feet of lower permeability deposits (gm) would separate the top of the tunnel from more permeable outwash deposits (Qvr). While the tunnel alignments have not been finalized, the cross-sections and text should provide consistent information.

**Volume 3c, Section 5.4.3.2, p. 107, third paragraph, first sentence**

*"The Route 9-195<sup>th</sup> Street tunnel would pass through the loose saturated alluvial deposits (Qal Aquifer) in the North Creek valley, within 20 feet of the base of North Creek."*

This statement conflicts with data presented in cross-section. According to Figure 2-7b, this tunnel will pass through the Qal/Qvr Aquifer approximately 52 feet below the base of North Creek. While the tunnel alignments have not been finalized, the cross-sections and text should provide consistent information.

**Volume 3c, Section 5.4.3.2, p. 107, fifth paragraph, first sentence**

*"A cumulative upper-bound numerical analysis was also conducted for this crossing to further evaluate the potential for influencing stream flow."*

According to Attachment 2, p. A2-4, the aquifer layering and geometry incorporated into the numerical model "were determined from the appropriate cross-section lines and interpretations of aquifers: Route 9-195<sup>th</sup> Alignment (Figure 2-6), Route 9-228<sup>th</sup> Alignment (Figure 2-7), and Unocal Alignment (Figure 2-8). However, given the identified inconsistencies between the text and the presented cross-sections, it is not clear whether or not the current/correct information (proposed

tunnel depths/alignments relative to geological interpretation) is represented in the numerical model. To address this, all such identified inconsistencies should be corrected and checked against the numerical model representation. If the numerical model incorporates the appropriate data, the text should be appropriately modified. If errors are found in the numerical model, the model should be reviewed to determine the likely impact of these errors and, if appropriate, modeling may need to be re-accomplished.

**Volume 3c, Section 5.4.3.2, p. 109, first paragraph, first sentence**

*"The Route 9-228<sup>th</sup> Street effluent alignment crosses beneath Swamp Creek at depth of approximately 150 feet below ground surface."*

This statement conflicts with data presented in cross-section. According to Figure 2-6a, this top of this tunnel will pass through the Qu deposits approximately 89 feet below the base of Swamp Creek. While the tunnel alignments have not been finalized, the cross-sections and text should provide consistent information.

**Volume 3c, Section 5.4.3.2, p. 109, second paragraph, first sentence**

*"The Route 9-195<sup>th</sup> Street effluent tunnel crosses beneath Swamp Creek at depth of approximately 40 feet."*

This statement conflicts with data presented in cross-section. According to Figure 2-7a, this top of this tunnel will pass through the uppermost Qu deposits approximately 34 feet below the East Fork of Swamp Creek and along the Qu Aquifer/Qv/c contact 54 feet below the West Fork of Swamp Creek. While the tunnel alignments have not been finalized, the cross-sections and text should provide consistent information.

**Volume 3c, Section 5.4.3.2, p. 109, third paragraph, first sentence**

*"A numerical analysis of cumulative upper-bound seepage conditions was conducted to confirm the expected lack of effect on Swamp Creek."*

As mentioned above, according to Attachment 2, p. A2-4, the aquifer layering and geometry incorporated into the numerical model "were determined from the appropriate cross-section lines and interpretations of aquifers: Route 9-195<sup>th</sup> Alignment (Figure 2-6), Route 9-228<sup>th</sup> Alignment (Figure 2-7), and Unocal Alignment (Figure 2-8)". However, given the identified inconsistencies between the text and the presented cross-sections, it is not clear whether or not the current/correct information (proposed tunnel depths/alignments relative to geological interpretation) is represented in the numerical model. To address this, all such identified inconsistencies should be corrected and checked against the numerical model representation. If the numerical model incorporates the appropriate data, the text should be appropriately modified. If errors are found in the numerical model, the model should be reviewed to determine the likely impact of these errors and, if appropriate, modeling may need to be re-accomplished.

**Volume 3c, Section 5.4.3.2, p. 109, fifth paragraph, first sentence**

*"The Route 9-195<sup>th</sup> and Route 9-228<sup>th</sup> Street alignments cross beneath Lyon Creek at depths of approximately 100 and 275 feet, respectively (Figures 3-5 and 2-6a). In both cases, the tunnel and creek bed would be separated by at least 50 feet of low permeable [sic] glaciomarine drift which acts to hydraulically isolates [sic] surface water from groundwater at the tunnel."*

These statements conflict with data presented in cross-section. Although of minor issue, Figure 3-5 indicates the Route 9-195<sup>th</sup> alignment is 90 feet below Lyon Creek; Figure 2-6a indicates the Route 9-228<sup>th</sup> alignment is roughly 265 feet beneath the East Fork of Lyon Creek and 260 feet beneath the West Fork of Lyon Creek. However, Figure 3-5 indicates no low permeability glaciomarine drift whatsoever overlying the Route 9-195<sup>th</sup> alignment, although roughly 30 feet of non-glacial lacustrine deposits are present. While the tunnel alignments have not been finalized, the cross-sections and text should provide consistent information.

**Volume 3c, Section 5.4.5, p. 115, third full paragraph, third sentence**

*"However, Deer Creek spring [sic] is not expected to be impacted by any of these alternatives, because the tunnel elevation would be 200 feet below and over a mile away from the springs (Figures 3-1, 3-2, and 3-3)."*

These statements are inconsistent with the data presented. In Figure 3-1, the 228<sup>th</sup> Street alignment is only 3,535 feet (0.67 miles) from the eastern Deer Creek Spring location and the 195<sup>th</sup> Street alignment is only 4,470 feet (0.85 miles). The text should be modified to be consistent with data presented in the figures.

**Volume 3c, Section 5.4.6, p. 119, first full paragraph, first sentence**

*"The Lake Forest Park Water District wellfield includes four closely spaced wells tapping fluvial deposits within the undifferentiated pre-Fraser deposits, and eight closely spaced 20-foot deep wells likely completed in the Qva Aquifer (see Figures 3-4, 3-5, and 3-6)."*

Both Figures 3-5 and 3-6 indicate "Lake Forest Park Well No. 4." Are the other 3 wells at this same location and not indicated due to scale issues? Also, no wells completed in the Qva Aquifer are indicated. Are these also not indicated due to scale?

**Volume 3c, Section 5.4.6, p. 123, first paragraph, first sentence**

*"To avoid having temporary construction-related declines of up [sic] 7 feet, the design measures described above would be implemented."*

This is a typographical error. The sentence should include the word "to" between "up" and "7."

**Attachment 2**

This section provides an overview of the modeling methods, assumptions, and parameters used in the evaluation of water level impacts resulting from the estimated seepage into portals and tunnels. Three model approaches were used. The first approach discussed in this section involved the application of the Theis equation for non-steady (confined) flow to a well, corrected for unconfined aquifer conditions, to analyze the effects of pre-determined portal seepage rates on the water levels of the adjacent aquifer. It is unclear from the text whether the formulae were used directly (i.e. in a spreadsheet) or through an analytical modeling program. However, the equation for the correction to unconfined aquifer conditions is incorrect as written. Without additional data from the modeling process, it cannot be determined whether this represents a typographical error in the report or if the inaccurate equation was used in the analysis (resulting in the underestimation of drawdown impact). Additional errors or inconsistencies in the tables and associated text were also identified.

The second model approach discussed is a series of uncalibrated numerical flow models for the Western, Central, and Eastern portions of the project area. These transient flow models were designed to evaluate the effects of the pre-determined portal and tunnel seepage rates on the shallow Qva/Qal Aquifers and the deeper Qu Aquifer as construction of the tunnels progresses. The effects of high-volume, short-term tunnel face-inflow events are also analyzed and discussed. Results from these analyses were used to support the assertion that project-related drawdowns during construction would be minimal and that mitigation beyond the use of specific construction practices was not necessary. The third model approach discussed in Attachment 2 is an uncalibrated numerical flow model for the entire project area. This steady-state model is designed to analyze the drawdown resulting from the proposed project under operating conditions. Results from this model were used to support the assertion that no substantial long-term impacts requiring mitigation would occur.

Two primary concerns regarding both numerical model approaches were raised. The first concern is that the numerical model may or may not correctly reflect the most current geological interpretations of the area. Specifically, numerous inconsistencies were identified in the text, cross-sections and related tunnel alignments of Volume 3c of the Technical Reports upon which the model framework is constructed and it is unclear which interpretations are incorporated in the numerical analysis and what, if any, impact these inconsistencies would have on model results. The second concern is that no discussion of the water-budget of these models is presented. Given that the models are uncalibrated to real-world conditions, it is all the more important to verify and document that the constant-head and drain cells used to define the boundary conditions of the model reflect realistic flow volumes through the model.

**Volume 3c, Attachment 2, p. A2-1, first paragraph, first sentence**

*"The range of drawdowns during construction for Portals 11, 14, and 41 were estimated using an analytical approach."*

It is somewhat confusing to place a discussion of analytical analysis methods under the heading of "Numerical Analysis Methodology and Results." If this section reflects analytical (as in analytical modeling) methods, modify the attachment title to reflect both methods of analysis, and clearly identify where the analytical methodology discussion stops and the numerical methodology discussion starts.

**Volume 3c, Attachment 2, p. A2-1, first paragraph, second sentence**

*"This involved applying the Theis equation for non-steady flow into a single well (Theis, 1935), and applying the Jacob correction to account for unconfined (rather than confined) aquifer conditions: ( $s' = s^2/2b$ ), where:  $s'$  = corrected drawdown (feet),  $s$  = confined drawdown (feet), and  $b$  = saturated thickness (feet)."*

No citation for the Jacob correction is provided in the EIS and the equation, as written, appears to contain a typographical error. According to Walton (1987, *Groundwater Pumping Tests, Design & Analysis*, Equation 2.15, p. 33) and Porges and Hammer (2001, *The Compendium of Hydrogeology*, Equation 2-26, p. 223), this equation should be  $s' = s - (s^2/2b)$ . Jacob's original paper (1944, *Notes on Determining Permeability By Pumping Tests Under Water Table Conditions*) cited by Walton (1987) was not available for review and verification. If this is indeed a typographical error, it should be corrected and the analytical procedure more clearly described (i.e., was an analytical model or spreadsheet used?). If this is not a typographical error and the

equation is in fact in error, the resultant calculations will, in all cases, underestimate drawdown values. The degree of underestimation could be substantial in areas where the aquifer is thin, however Porges and Hammer (2001, p. 223) indicate that the Jacob correction is only required if the drawdown amount is "large relative to the original saturated thickness of the aquifer." The text should be modified to include a more comprehensive discussion of the use of this correction. For clarity, subsequent tables (e.g., Tables A2-1 and A2-2) should provide both uncorrected (Theis) values and the values after the Jacob correction.

**Volume 3c, Attachment 2, p. A2-1, third paragraph, first sentence**

*"Although the aquifers at the two portals were assumed to have uniform properties, two hydraulic conductivities were assessed."*

This appears to be a typographical error. The sentence should refer to ". . .the three portals. . .", specifically Portals 11, 14, and 41.

**Volume 3c, Attachment 2, p. A2-1, third paragraph, third sentence**

*"The ambient saturated thickness at Portals 11, 14, and 41 were 35, 30, and 75 feet, respectively (Table 5-1)."*

As discussed above, Table 5-1 provides data for different alignments as well as some potentially conflicting data. Portal 11 is indicated as having both a 35- and a 50-foot saturated thickness (due to a 15-foot difference in portal depth between alignments). Portal 41 is indicated as having both an 85- and a 75-foot saturated thickness (due to a 10-foot difference in portal depth between alignments).

**Volume 3c, Attachment 2, p. A2-2, Table A2-1**

Table A2-1 presents transmissivity values (in gpd/ft) under both the "Low-k ( $10^{-2}$  cm/sec)" and the "High-k ( $10^{-2}$  cm/sec)" headings. However, for the aquifer thicknesses given, both values for the transmissivity (T) values presented for Portals 11 & 14 are incorrect. Using the hydraulic conductivity values presented, the aquifer thicknesses provided, and the relationship  $T = Kb$ , transmissivity values of 636 gpd/ft (Portal 14 with a 30-foot thickness) and 742 gpd/ft (Portal 11 with a 35-foot thickness) were obtained for the low-k scenario. The value of 1,060 gpd/ft is only obtained for the Unocal alignment of Portal 11, where the saturated thickness is estimated to be 50 feet. Transmissivity values for the high-k scenarios were an order of magnitude greater at 6,360 gpd/ft (Portal 14) and 7,420 gpd/ft (Portal 11). Similar to the low-k case, the presented T value of 10,600 gpd/ft is obtained for the Unocal alignment of Portal 11.

In most modeling analyses, either both the hydraulic conductivity and the aquifer thickness are entered or just the transmissivity value is entered. It is unclear from the discussion presented what type of model (if any) was used for this analysis and what specific data were used. It should be determined whether the correct data were used in this modeling effort. If the wrong data or the data for the wrong alignments were used for this analysis, the modeling should be re-accomplished and the new results incorporated into Tables A2-1 and A2-2 in the next draft of the EIS. If this table contains typographical errors, they should be corrected in all appropriate locations throughout the document and the discussion sections modified accordingly.

**Volume 3c, Attachment 2, p. A2-2, Tables A2-1 and A2-2**

Both tables present estimated drawdown values. For clarity, the uncorrected drawdown values (obtained from the Theis analyses) and the corrected drawdown values (using the Jacob correction) should both be indicated.

**Volume 3c, Attachment 2, p. A2-2, first paragraph, first sentence**

*"These results indicate that the expected drawdown at the portal after six months will be in the range of 8 to 10 feet assuming high permeable [sic] soils, and 57 to 70 feet assuming lower permeable [sic] soils."*

This statement is in conflict with Table A2-1 which indicates six-month drawdowns of 70 to 86 feet in Portals 41 and 11&14, respectively. It should be noted, however, that these drawdown values presume that the data presented in Table A2-1 is accurate (see preceding comment). If Table A2-1 is modified, the modeled results presented in Table A2-2 will also need to be updated.

**Volume 3c, Attachment 2, p. A2-2, third paragraph, heading and first sentence**

As mentioned above, a numerical modeling method description should not be titled "Analytical Approach", due to the ease of confusion with analytical (as opposed to numerical) modeling.

**Volume 3c, Attachment 2, p. A2-3, fourth paragraph, last sentence**

*"The MODFLOW-96 analysis did not include a formal calibration and, therefore, was used as an analytical tool rather than a predictive flow model."*

This should be made clear much earlier on in the EIS document, particularly in Section 5.4.2.2, in order to place the level of analysis into perspective. Numerical analysis is typically presumed to refer to a model calibrated against real-world data to ensure that any modeled scenarios reasonably reflect reality. In the absence of such calibration, even as an analytical tool, some discussion of the water-budget of the model is warranted to verify that an expected flow pattern, gradient, or direction actually reflects realistic flow volumes and is not dominated by erroneous flow volumes from constant-head cells or to drain cells.

**Volume 3c, Attachment 2, p. A2-4, second paragraph, first sentence, Table A2-3, Figure A2-1**

*"Figure A2-1 shows the locations of the three analyzed areas (Western, Central, and Eastern), and Table A2-3 summarizes the principal features of each area."*

The areas depicted in the scaled Figure A2-1 do not accurately reflect the areas indicated in Table A2-3. As mapped, the Western Area (40,000' x 35,000' per Table A2-3) is roughly 35,100' x 35,100', the Central Area (45,000' x 32,500' per Table A2-3) is roughly 40,650' x 32,200', and the Eastern Area (45,000' x 32,500' per Table A2-3) is roughly 47,000' x 32,350'. These areas should be more accurately reflected in Figure A2-1.

**Volume 3c, Attachment 2, p. A2-4, Table A2-3**

The "general baseline flow direction" row does not specify which layer is being referred to, nor is any flow direction indicated for the Eastern Area (flow appears to be generally west and south in

the Qva (Layer 1). Flow directions should be identified by layer; if the flow directions are similar in both Layer 1 and Layer 3, the row label should reflect this.

**Volume 3c, Attachment 2, p. A2-5, unlabeled Layer 1 hydraulic conductivity table**

This section summarizes for "Layer 1—Qva and Qal Aquifers", however the associated table and text provide no values for the Qva portion of this aquifer (only Qal and Qvr). Since the Qva is the predominant portion of Layer 1, particularly where the Qal Aquifer is not present, additional discussion is necessary.

**Volume 3c, Attachment 2, p. A2-6, second paragraph, first through third sentences**

*"The only published storativity value for aquifers in the area is  $7 \times 10^{-5}$ , as reported for one of the deep Lake Forest Park Water District wells (Converse, 1980). Layer 3 (Qu Aquifer) was therefore assigned this value for all cases. This value is unusually low for this region and would result in rapid propagation of pressure declines outward a substantial distance from the tunnel; however, a sensitivity analysis was conducted with higher storativity values and showed no significant difference in estimated drawdowns."*

With only one published storativity value for aquifers in this area, how are the authors able to determine that this value is "unusually low for this region. . . ."? While Converse (1980) was not available for review, the reported value does not seem unreasonable or unexpected for a relatively deep well such as Lake Forest Park Well No. 4 as depicted in Figures 3-5 and 3-6.

**Volume 3c, Attachment 2, p. A2-6, second full paragraph**

Depending upon the model parameters (layer hydraulic conductivity values, conductance values assigned to constant-head and drain cells, etc.) the model can provide expected flow patterns while funneling erroneously high or low volumes of water through the model. As discussed previously, a water-budget for the numerical analysis (specifically addressing the constant-head and drain cell boundary conditions) is warranted.

**Volume 3c, Attachment 2, p. A2-6, fifth full paragraph, second through fourth sentences**

*"The baseline flows in the Qva Aquifer were set to generally approximate flow directions and gradients shown in Figure 2-8 [sic]. No comparable map has been produced for the Qu Aquifer, although the general flow directions are expected to be similar to those shown in Figure 2-9. Significant vertical gradients have been identified in some parts of the area, and the baseline flow fields generally represent this condition."*

The first sentence mistakenly refers to Figure 2-8, whereas it should refer to Figure 2-9.

This section suggests that the model parameters and boundary conditions were adjusted until the water table/potentiometric surface looked appropriate. Given the potential for constant-head boundaries to erroneously contribute and remove essentially infinite volumes of water to a modeled system, some discussion or summary of the water-budget of the model would be appropriate to confirm whether or not system flows are realistic.

**Volume 3c, Attachment 2, p. A2-7, second full paragraph, third sentence**

*"Seepage rates were simulated by assigning a negative flux (or flow rate) using the MODFLOW Well function, in which the flux is applied across the entire area and thickness of a cell."*

Why was the Well function used rather than the Drain function? To provide easier "compartmentalization" of the different seepage rates? What is the benefit or impact of spreading the flux across a 100-foot wide by 100-foot long by XXX-foot (layer thickness) volume rather than a more representative cross-sectional area of the tunnels?

**Volume 3c, Attachment 2, p. A2-7, second full paragraph, fourth sentence and Table A2-4**

The text indicates that "All seepage fluxes were applied to Layer 3" and Table A2-4 indicates that the seepage from the Working Portal is incorporated at the initial cell. Since the portals are vertical structures, this appears to presume that no seepage occurs from Layer 1, despite the fact that earlier analyses quantified such seepage (see Section 5.3.1.1 and Table 5-2). What impacts does this have to the drawdown analyses for Layer 1 (Qva/Qal/Qvr Aquifers)? Layer 3 (Qu Aquifers)?

**Volume 3c, Attachment 2, p. A2-9, Table A2-6**

The tunnel lengths presented in Table A2-6 are different (perhaps less rounded off?) than in Table 5-2 (p. 96). Also, the construction times presented in Table A2-6 (after adding the 6-month working portal construction period) are different than in Table 5-2. Although final alignments for the tunnels have not yet been established, lengths and construction times should be consistent within the confines of the EIS.

**Volume 3c, Attachment 2, p. A2-9, first paragraph, first sentence**

*"It is possible that at some stage of the tunneling process, a significant change in soils would occur whereby a portion of the TBM face would potentially encounter both low- and high-permeability sediments, causing an unexpectedly high groundwater inflow (face inflow event; see Section 5.3.1.2)."*

Why would exposure to both low- and high-permeability sediments be more of a concern than high-permeability sediments across the entire TBM face? Is it more difficult to pressurize the face in this scenario?

**Volume 3c, Attachment 2, p. A2-10, fourth paragraph, first sentence**

*"In all cases, both the water table and potentiometric heads are expected to recover toward static levels for each tunnel segment within a few weeks of ceasing construction-induced seepage."*

This section could use some clarification. By definition, all water level recovery is toward static levels unless the withdrawals have led to overdraft of the aquifer. Further, recovery times are typically equal to the period of withdrawal, although the fact that the proposed withdrawals extend through significant seasonal changes in recharge may complicate this issue.

**Volume 3c, Attachment 2, p. A2-11, third full paragraph, second and third sentences**

*"A maximum worst-case drawdown of approximately 26 feet is estimated to occur in the Qu Aquifer in the Portal 19 to 26[sic] segment. The overlying Qva Aquifer shows less than 0.3 feet of drawdown in this same segment, indicated that even under worst-case conditions there would be no discernable effect on Deer Creek Springs."*

These statements are in conflict with data presented in the adjacent table. Table A2-9 indicates that approximately 26 feet of drawdown occurs in the Portal 33 to 26 segment, with roughly 0.8

feet of drawdown in the overlying Qva Aquifer. These inconsistencies should be resolved. If the table is correct, the subsequent 14-day face inflow event analysis for Portal 19 to 26 may need to be re-accomplished to reflect the Portal 33 to 26 segment. It should also be determined whether a tripling of the anticipated drawdown in the Qva Aquifer (from 0.3 to 0.8 feet) has any implications to Deer Creek Springs.

**Volume 3c, Attachment 2, p. A2-13, Numerical Analysis for Operational Conditions**

**General Comment:** The description of this steady-state "numerical approach" in comparison to the previous transient numerical approach is somewhat confusing. The text states that this new approach used a "single, larger-scale approach" rather than the previous approach which defined "a series of segments and assessing each segment individually using different geographical conditions." Why then does the second step of this new analysis involve the assigning of "seepage rates to segments. . . ."? Does this section actually describe the use of tunnel segments as a unit rather than the model cells?

**Volume 3c, Attachment 2, p. A2-13, fourth paragraph, second sentence**  
*"These rates are summarized in Table A2-11 below."*

The table reference is incorrect. These rates are presented in Table A2-13.

**Volume 3c, Attachment 2, p. A2-13, sixth paragraph, fifth sentence**  
*"Individual segment infiltration rates are listed in Table A2-12 below."*

The table reference is incorrect. These rates are presented in Table A2-13.

**Volume 3c, Attachment 2, p. A2-14, first paragraph, general comment**

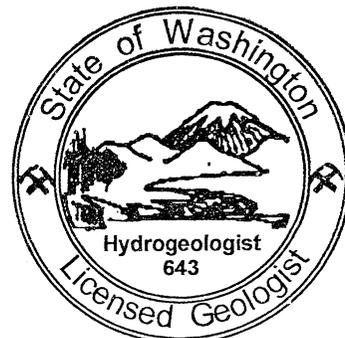
Presentation of the expected case and worst case results would be enhanced and facilitate comparison by presenting the data in a table format as was done for previous analyses.

**Volume 3c, Attachment 2, p. A2-15, first full paragraph, general comment**

Presentation of the expected case and worst case results would be enhanced and facilitate comparison by presenting the data in a table format as was done for previous analyses.



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Seattle, WA 98104-3855

Re: Comments on the Technical Memoranda 3(a), 3(b) and 3(c)

Olympic View Water and Sewer District has reviewed the Technical Memoranda 3(a), 3(b) and 3(c) (TMs) prepared and submitted by King County (KC) for their BrightWater Project. As with the review of the Draft EIS, our current review primarily consists of a detailed technical review of the Technical Memoranda and the project's impact on Olympic View's groundwater source. Robinson and Noble (R & N) again conducted this review. R & N has provided hydrogeologic services to Olympic View for many years. They are considered one of the preeminent experts in the hydrogeology of the central Puget Sound area. Attached is a copy of their review document in both printed and electronic form. Their comments and recommendations are submitted as if submitted by Olympic View. We expect these comments to be seriously considered in the preparation of the Final EIS

In addition to the technical comments prepared by R & N, we have additional concerns and further elaborations on some of the themes they presented. Our first concern along this line involves the project in general. Over the last twenty years, we have devoted considerable resources to developing ground water as a permanent supply source for our customers. Regardless of the technical conclusions elaborated upon in the TMs, we think your project is putting these resources at considerable risk. As demonstrated by the detail of the TMs regarding the complex nature of this ground water, we think King County now understands this risk and our level of concern about the project. In further demonstration of KC's understanding our problem, we were encouraged to hear during the July 31, 2003 briefing for water utilities, that KC is prepared to enter into hold harmless agreements to protect us against the loss of our supply. We think it is time to start developing those agreements and expect to hear from KC representatives soon.

In their review, R & N mentioned our 228<sup>th</sup> St. well many times. We have been working on this facility for several years. In 1993, we received a permit to develop this source. This permit is currently active. Our permit allows us to explore all aquifers under the site. Originally, we were exploring the deep aquifer. It was found to have unacceptable water quality. We recently modified the well to develop a shallower aquifer. This shallower aquifer is of high quality and capable of providing a portion of the permitted quantity of water. We still are intending to fully utilize this permit. This may include additional deep or shallow wells as necessary. We think it is inappropriate for you to assume that we are not interested in all the aquifers (deep as well as shallow) at this site. We expect you to analyze your project's impact on these aquifers at this site to the same extent that you addressed the impact of your project on our Deer Creek source.

To further emphasize an issue that is detailed in R & N's review, we are concerned that the groundwater impacts of the Unocal option are not adequately addressed. This is not only the  
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King County Wastewater Treatment Division  
BrightWater Siting Project  
201 South Jackson St. Suite 505  
Seattle, WA 98104-3855  
September 4, 2003  
Page 2 of 2

impacts of the plant construction but also the conveyance impacts. This is especially important regarding the transport of large quantities of raw sewage through our aquifers. We understand this option is not preferred by KC. However, it is still an option. If it is selected, we expect further environmental studies of the same quality you have used to evaluate the preferred option.

Finally, we are especially concerned about the "Catch 22" nature of a large number of your statements in the TMs. R & N has detailed many places where the support for your conclusions comes from the Final EIS that is to be a result these very same conclusions. We think this is not appropriate and greatly detracts from the validity of these documents and their conclusions. We hope there is some way for you to make this support information available while the TMs are still open for review.

Sincerely,

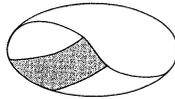
OLYMPIC VIEW WATER AND SEWER DISTRICT

Roger C. Eberhart, PE  
General Manager

RCE/rce

Attachments:

Cc: Board of Commissioners



**ROBINSON & NOBLE, INC.**

GROUNDWATER & ENVIRONMENTAL GEOLOGISTS  
ESTABLISHED 1947

REVIEW OF WATER RESOURCE ASPECTS OF  
KING COUNTY BRIGHTWATER PROJECT  
TECHNICAL MEMORANDA 3(a), 3(b) & 3(c)-  
AUGUST 2003  
FOR OLYMPIC VIEW WATER & SEWER DISTRICT

**REVIEW OF WATER RESOURCE ASPECTS OF  
KING COUNTY BRIGHTWATER PROJECT  
TECHNICAL MEMORANDA 3(a), 3(b) & 3(c) – AUGUST 2003  
For  
OLYMPIC VIEW WATER AND SEWER WATER DISTRICT**

**INTRODUCTION**

The preferred alternative for the Brightwater Project as proposed in the Technical Memoranda (TMs) offered by the proponent, would place a major wastewater conveyance along 195<sup>th</sup> Street immediately south of the source protection area of Olympic View Water & Sewer District's (OVWSD) Deer Creek Springs facility. An alternative conveyance route along 228<sup>th</sup> Street would cross the source protection area to the north of the Deer Creek Springs facility and would pass immediately beneath the aquifer feeding the newly modified 228<sup>th</sup> Street Well. In addition to the preferred treatment site, King County is also evaluating an alternative treatment site at the Unocal Site north of the District's Deer Creek facility. If this alternative were to be pursued, the proposed conveyance system would carry raw sewage through a deep tunnel immediately below the identified capture zone for the Deer Creek Springs. The Commissioners of the Olympic View Water and Sewer District (OVWSD) have determined that there is sufficient possibility that the various alternatives of the proposed Brightwater Project may constitute a threat to the water resources upon which OVWSD depends (or other District interests) to warrant a thorough review of the new TMs presented by King county in August of 2003. These Technical Memoranda in part represent the proponents' response to the deficiencies in the DEIS for the identified in January 2003, and as such are a continuation of the SEPA process for the project.

As an extension of the services provided to review the Brightwater Project DEIS in late 2002 and early 2003, Robinson & Noble was retained by OVWSD to review the TMS issued by King County in early August of 2003. Our task is to continue to evaluate the potential for the Brightwater project to harm the interests of the OVWSD and to assess the effectiveness of the limited mitigations being offered by King County. Due to the relatively short review period and the highly technical nature of some of the documents, it was necessary to employ a team approach in accomplishing this review. Four hydrogeologists were assigned various review tasks in developing this response. All of the TMs were at least reviewed by scanning the document for items of interest or concern. Some TMs, such as the Illumination TM and the Noise TM of Volume 3(a), were not considered pertinent to the water resource interests of OVWSD and were given only a cursory review to assure consistency with other, more pertinent, Memoranda. No comments were generated for these two documents. TMs, such as the *Geology and Groundwater* TM (Volume 3(c), were reviewed in significant detail. Some sections (Attachment 2 of Volume 3(c) for example) required substantial technical analysis to determine the validity of the arguments made.

By its nature the team approach is somewhat less efficient and generates some redundancy in both work effort and the resulting comments. We apologize for any tediousness this adds to the comments provided.

As with the review of the DEIS, a specific set of comments were developed for each of the documents reviewed. Once the comments were developed for a given section or TM, a general characterization of that document was prepared. The intent is to provide an overview for those who do not desire to wade through the specific comments. These characterizations, as well as the

comments themselves, were then used to provide a general overview of all three volumes of reviewed documents and the water resource implications of the project as currently described. The purpose is to draw attention to issues, not to merely criticize the work. In general, the TM provides a great deal of information that seems to adequately describe the project and its setting sufficiently to perform a SEPA review. The dewatering calculations and modeling work presented for the conveyance corridors have enough problems that we must reserve judgment on the validity of that effort until certain questions have been answered. Though the hydraulics of the hydrogeologic setting in which the dewatering would take place suggest that the OVWSD resources are not substantially threatened, the aquifer water budget aspects may not have been afforded sufficient analysis to address the issue at that level. Some additional evaluation would be advised to resolve the problems (as noted below).

## **GENERAL OVERVIEW**

The Technical Memoranda provided in Volumes 3(a), 3(b) and 3(c) of the Brightwater Technical Memorandum Series collectively present an impressive amount of technical work. It is our opinion that this work goes a long way toward addressing the shortfalls of the DEIS and provides a much better basis for evaluation of the potential impacts to the OVWSD water resource interests. There are, however some technical aspects of the impact analysis that do not adequately assess potential impacts and several aspects of the presentation of the work that are problematic. With the exception of the water budget questions mentioned above, it is our opinion that the detail provided in the TM allow a reasonable assessment of the potential impacts to the District's water resource interests. In some cases, the issues we raised in this review diminish the confidence in assertions made by investigators. In other cases, the issues discussed made the review more difficult and hurt the communication of the findings. However, the project (as now described) and the description of the general setting within which it is to be accomplished, remove most of the concerns that were identified in the review of the DEIS. The amount of geologic, hydrogeologic and geotechnical investigation accomplished seems adequate to address all but one of the SEPA aspects of the project from the District's water resource perspective. Provided the project can be built as proposed, the probabilities of the District water resources being harmed as a result of the preferred alternative seem low. The level of analysis for the Unocal site is not sufficient, but the treatment plant site is unlikely to have an adverse effect on the District's aquifer or surface water features in which the District would have an interest. The conveyance features associated with the Unocal alternative are a concern even though the pipe hydraulics of the influent tunnel suggest there is no possibility of exfiltration given the position of the tunnel and the water levels in the materials in which the tunnel is to be placed. Since there has been no geotechnical investigation nor exploratory drilling accomplished along the Unocal influent tunnel route, it is presumed that there is no serious consideration of this alternative at this time. Clearly, if this alternative were to be pursued at a later date, the OVWSD will want assurances that it will have an opportunity to review and have substantial influence on any such plan. Regardless of the approach the project takes, the District will require an agreement with King County that addresses the County's commitments to protect the water resources or compensate for impacts that occur. The agreement must cover contingency plans to address situations where the project execution deviates from the preferred alternative (as currently defined in the documents) and acknowledging a responsibility to compensate the District should impacts to the water resources render some or all of the Districts allocated resources unavailable for any period of time.

Though the changes to the project and the technical information presented in the TMs address many of the issues raised in the DEIS review process, several problems within the documents diminish the effectiveness of the current effort. For instance, the various authors are commonly inconsistent in their descriptions of the geologic settings and at times in the description of the project. Presentation of technical information in the tables and drawings is often confusing and inconsistent between documents or even between the text and the tables or drawings within a given document. Though we did not identify any instances where these inconsistencies resulted in seriously flawed analyses, it does make the review of such things as cross sections, maps and tables difficult and diminishes confidence in the work product in general. Additionally, references to documents that are not available hinder the review and perhaps lend credence to those claiming that the SEPA requirements have not been appropriately met.

We have chosen to discuss the general issues as three separate categories, those that are legitimate issues of technical analyses, those that appear to raise issues of appropriate SEPA process, and those that relate to the communicative aspects and quality of the documents themselves. Though the distinction is not always pure, we expect it will help to identify the nature of the concerns raised.

### **Technical Issues**

This section will give a general overview of the technical problems noted within the three TMs.

- The inconsistent application of the newly developed University of Washington/USGS geologic nomenclature becomes problematic in the Geology and Groundwater TM (Volume 3c) and its application is ignored in other TM discussions of geologic setting.
- The propensity for the geologic descriptions to use stratigraphic interpretations even where hydrostratigraphic concepts are more appropriate could also indicate an underlying problem.
- Though the nomenclature issue is confusing (a problem in and of itself) the underlying potential for misinterpretation or miscommunication between investigators within the Brightwater investigation team is a greater concern.
- The lack of any added field information regarding the Unocal influent route makes the discussion of that option inappropriate until such time as the subsurface conditions are sufficiently defined to address the potential for induced leakage to affect flows at the Deer Creek Springs facility. Further, though the possibility of contamination appears to be minimized by the proposed tunneling methods and the relationship of aquifer water levels to the proposed tunnel invert, the interpretations of the geology are not sufficiently reliable without test drilling to alleviate fears of catastrophic events threatening this critical water resource.
- Though monitoring has been discussed by the proponent, no specific monitoring of the District's aquifers appears to be identified in the project plan.
- The use of the term "numerical" where analytical modeling techniques have been applied confuses two distinct methods of investigation. The confusion of the two could merely be

descriptive but the apparent interchangeable use suggests an underlying conceptual problem that could be significant.

- Issues related to the modeling of drawdown responses could represent a significant technical deficiency depending on whether the equation printed in the document is the equation used in the analysis or not. Even with all of the correct equations, the difficulties in the "numerical" analyses are sufficient that a close look should be taken at the validity of the conclusions reached. We have concerns regarding the mass balance aspects of the model used and whether realistic inflow to the model and outflow from the model was achieved. Without a realistic water balance, the model could have significant error in predicting responses and could do so without any indication of a problem during model runs. The statements that the numerical techniques were used without calibration as a de facto analytical tool raise concern regarding the unknown flows through the model between the input and output modes. Reliance on head-matching alone (as it appears was done in the authors' numerical model) is traditionally considered dangerous. The review of this model with regard to its water budget as compared to realistic expectations of the hydrologic systems being modeled is strongly advised.
- In addition to concerns about a lack of attention to realistic water budgets within the models themselves, there is a concern that this aspect of the impact analysis is inadequately addressed. The analyses related to potential impacts on the Vashon advance aquifer that might occur as a result of dewatering and leakage associated with the operation of the system seems to focus completely on well hydraulics/drawdown type responses in the aquifer. The possibility of diminished water tables through the summer months due to extraction of significant volumes of water from storage in a given portion of the aquifer does not appear to have been addressed.

### **Procedural Issues**

The second type of issue is more related to SEPA process than technical correctness of the investigations.

- The TMs make regular reference to the FEIS often asserting that more information pertinent to impacts and mitigation plans is (or will be) provided in that document. Since the FEIS is not scheduled for release until later this year, it is not available for review and therefore should not be referenced. If however, the language of the FEIS has been drafted and has been referenced, it should have been included as an excerpt so that the information intended to be communicated to those reviewing the documents is actually presented. Without such presentation, the Brightwater proponents have created a situation where we need to review the FEIS so that we can provide comments to help generate the FEIS.
- In some cases attachments referred to in the TMs are not included in the document.
- It could be argued that the implication that information critical to the assessment of impacts and evaluation of mitigation opportunities is not yet generated represents a fatal flaw in the process and makes issuance of an FEIS premature. The language referring to the FEIS occurs throughout the TMs and seems to offer a promise that more information will be available later. However, In our review of the TMs the promise of additional information to

be provided in the FEIS did not seem necessary to our ability to review the water resource aspects of the project. It is difficult to know how important the missing attachments are, but these too did not seem necessary to accept the assertions made with regard to the water resource aspects of the project.

### **Review Issues and Document Quality**

Several of the issues found in the document are related to the clarity of the discussions and the quality of the documents themselves rather than the underlying investigations or the regulatory implications. These issues are discussed to assist the proponent in communicating the findings more effectively in the FEIS.

- An apparent residual problem from the DEIS approach occurs in some of the documents where extensive discussion of a topic is provided at the generic level without any real discussion of the project specific impacts or mitigation opportunities. The most glaring of these is the *Summer Season Temperature Effects of Stormwater Ponds on Receiving Streams* TM. At the very least, some explanation should be given of why no specific analysis of the impact of the ponds. As it is, there is a fairly extensive explanation of the potential for problems and the importance of dealing with those problems, but this is then dismissed without project specific analysis or discussion. This weakness also occurs, (to a lesser degree) in the Stormwater related TMs.
- The presentation of much of the technical discussion, particularly in Volume 3(c), becomes labored. In some cases a diagram or table would be the better way to communicate the relationships. In other places the graphics themselves introduce confusion. Cross sections appear to be forced (in some cases unsuccessfully) into pre-determined formatting. The commitment to uniformity of format has caused absurdities in some of the drawings. The information is not so much in error as strangely presented. Complex nomenclature such as the new SGMP geologic system and the relation to other sets of geologic nomenclature could probably be better presented as a correlation chart than in the convoluted text offered in the documents. This would also provide a tool to the investigative team that might eliminate some of the inconsistencies throughout the documents or at least facilitate a reader's ability to ascertain who is discussing what geologic unit.
- There are differences between documents in how the project is described. Several instances were noted of differences within documents between numbers presented in text and those in drawings or tables. It would be worthwhile to review all of the tables and drawings to be sure that the current project plan is reflected in the figures and tables. In most cases, the values are not so significantly different that the outcome of a given analysis is brought into question. The issue is more one of having to track down numbers that do not match. This was a particular problem with Volume 3(c), Attachment 2 where rigorous review became necessary. This problem was also noted in several of the sections discussing the dewatering values, particularly where tunnel trace invert values and portal depths are concerned.

## SPECIFIC COMMENTS

### VOLUME 3(a)

#### **Transportation Impacts: Plant Sites and Conveyance**

Though this TM does not have a direct bearing on the water resource aspects of the Brightwater Project, much of the information presented provides insights into the intended execution of the project. The review of this TM was accomplished to assure consistency with other documents describing the project and to assess the locations of portals which are better defined in this TM than elsewhere. The review also provides insights into the general nature of some issues found in other portions of the Tech Memo effort more directly related to water resources. For instance, this TM like most others make reference to information presented in the FEIS when that document is not available to reviewers. The implications of this have been presented in the general introductory comments and will not be repeated here. Where specific comments seemed appropriate to enhance the final version of the document, they have been provided

**Volume 3a, Transportation Impacts: Plant Sites & Conveyance, Section 1.2.9, p. 6, last sentence**  
*"Final portal sites have not yet been selected"*

Since a consistent presentation of portal areas occurs throughout the documents, it is presumed that the statement means that no specific site within the designated portal location area has been selected. If the position of the portals were to be substantially outside the areas indicated our review of the impact potential could be significantly different. This interpretation of the statement is guided by statements made by Edith Hadler in her presentation (Q&A section) at the August 16, 2003 seminar.

**Volume 3a, Transportation Impacts: Plant Sites & Conveyance, Section 2.1.2, p. 8, second paragraph, second bullet**

*"Most people will tolerate LOS E, which entails very long traffic delays, in urban conditions"*

This statement requires a referenced source at the very least. It does not intuitively ring true of the everyday people the reviewer knows. We presume that this is some sort of general threshold used by traffic engineers and that it, therefore has credibility through citation. If it is merely an arbitrary assertion by the author, it would require substantial supporting argument.

**Volume 3a, Transportation Impacts: Plant sites & Conveyance, Section 2.3.2, p. 56 Portal 14 (Primary)**

*It was difficult to find Portal 14 since it is only indicated on Figure 12*

It is suggested that a figure reference be provided early in the discussion of a given portal to facilitate those unfamiliar with the area in finding the location.

**Volume 3a, Transportation Impacts: Plant Sites & Conveyance, Section 4, p. 121, general comment**

*Provision of several road-work type mitigation components are discussed in this section.*

Some discussion of coordination with water purveyors and other utility providers to coordinate the efforts and, thereby minimize the disruptions to traffic should be considered and protocols for such coordination established. This section appears to be the appropriate place for such discussion but none is found

**Volume 3a, Transportation Impacts: Plant Sites & Conveyance, Unocal Site, Remote Truck Staging Area, p. 2 through 8, header**  
*"Route 9 Site Concurrency Analysis"*

This appears to be the wrong header since the attachment is completely about the Unocal Site. Without a title page, this could mislead someone who is reviewing with an eye toward specific topics only.

**Management of Water Quality**

The primary reason for review of this TM was to see that the potential for contamination of water resources was being realistically addressed. A troubling theme in the entire suite of technical memos occurs in this document as well, that is the tendency to advise the reader that more information will be available in the future. Within the context of SEPA review, that is not relevant in that the opportunity for response within the SEPA process is now. If the TM provides sufficient information to meet the intent of SEPA leave it at that. If not, then the issuance of the FEIS would be premature. There is also a reference to geologic conditions that is inconsistent with other documents. If that is residual from earlier interpretations of site geology, it should be updated. If it is truly a difference in how various team geologists have interpreted the data, it would cause concern with regard to the underlying science of the project. Some of the comments presented below address the readability of the document. At times, the discussions seem complicated where it does not appear necessary. An example would be in the section dealing with upper yard and lower yard water quality on page 11. The intent is to draw attention to issues not to merely criticize the work. In general the TM provides a great deal of information that adequately describes the water quality management of the sites.

**Volume 3a, Management of Water quality During Construction at The Treatment Plant Sites, p. 1, third paragraph, fourth sentence**

*"The Final Environmental Impact Statement (FEIS), which is expected to be issued in late 2003, will contain updated information and additional analysis of the probable significant adverse impacts of the Brightwater alternatives, along with identification of reasonable mitigation measures"*

This philosophy seems to perpetuate a major flaw in the DEIS approach. That is, it purports that it is acceptable to provide information after the opportunity to comment or to participate has elapsed. If additional information is to be provided above and beyond that needed to adequately address the SEPA obligations of the project and that information is to be provided without it being necessary to the SEPA process, then that should be stated. If as is implied by the wording of this statement, the new information will be an essential part of the impact analysis and mitigation proposal, the information should be presented in a timely manner so as to be available for review and comment before the FEIS is issued. This is a procedural matter and may very well put the process out of compliance with the prescribed SEPA requirements.

**Volume 3a, Management of Water Quality During Construction at The Treatment Plant Sites, Section 3.1, p. 7, third paragraph, third sentence**

*"The majority of the site is underlain by glacial advance outwash and till"*

This description of the subsurface materials is in direct conflict with site descriptions in other sections and with those presented during the seminars and meetings held in July and August, 2003 and the meeting with the area water districts on July 31, 2003. The difference is substantial and carries significant implications to the analyses of dewatering impacts and the relationship the site has to the upgradient groundwater systems.

The possibility that different investigators on the team have defined the near-surface geology in such dramatically different ways reduces confidence in the statements made by all of the investigators. This difference must be resolved and its occurrence adequately explained if the site descriptions are to be accepted as a premise for the subsequent analyses provided.

**Volume 3a, Management of Water Quality . . . , Section 3.1, p. 7, third paragraph, last sentence**

*"Chapter 4 of the Final EIS provides detailed soil information"*

Reference to the FEIS as a source of information to provide comments and input to be used to generate the FEIS has a sort of "Catch-22" quality to it. Since the FEIS is not available for review it cannot legitimately be used as a source of information in the review that is to lead to it. The actual information should have been taken from the draft document for the FEIS and made part of this document if the information is considered necessary for the understanding of this issue.

**Volume 3a, Management of Water Quality . . . , Section 3.5, p. 10, fourth paragraph, fourth sentence**

*"(Little Bear Creek for the Route 9 site or Willow Creek for the Unocal site)"*

The reference to the Unocal site in a section discussing the Route 9 site only is somewhat misleading. We suggest the reference to Willow Creek is not necessary here and makes it appear that the Unocal site has been implied in the discussion that has taken place above.

**Volume 3a, Management of Water Quality . . . , Section 4.3, p. 11, dewatering discussion**

*The discussion tends to blend statements about the "lower yard" dewatering and the "upper yard" dewatering*

Since the hydrogeologic context of these two components of the plant at the Unocal site are significantly different, it is more appropriate to keep the discussions in separate sub-sections. Issues related to the upper yard deal with groundwater associated with the hillside and perhaps the Qva aquifer whereas the groundwater of the lower yard is clearly local in its implications and likely more directly tied to the hydrology of the Sound. To discuss them in a back and forth manner, confuses the issues that need to be reviewed and considered.

**Permanent Stormwater Management at Treatment Plant Sites**

The review of this section was accomplished primarily to assess the implications to surface water features near the treatment plant sites. Since the tendency in watershed management is toward

water purveyors participating substantially in watershed planning, it is expected that the health of the surface waters and related habitat will be a very real concern to the District in the future. Currently, the surface waters are a concern due to the relationship they have to the management of groundwater and the general interest of our rate payers in maintaining the quality of life in our communities. The biological function of the surface waters of our area will bear on the feasibility of obtaining water rights in the future as well. The review identified only one concern and that goes to the consistency of geologic interpretation at the Route 9 site. This is an example of a recurring issue with the suite of TMs that should be addressed in the FEIS. No review of the marine discharge of stormwater at the Unocal site was accomplished

**Volume 3a, Permanent Stormwater Management at the Treatment Plant Sites, Section 2.1, p. 6, third paragraph, last sentence**

*"Stream relocation is discussed further in Chapter 6 of the EIS."*

The Final EIS text was not available for review. The appropriate text should be excerpted from the Final EIS and provided for review.

**Volume 3a, Permanent Stormwater Management at the Treatment Plant Sites, Section 3, p. 11, second paragraph, last sentence**

*"More information on Willow Creek and Puget Sound can be found in Chapter 6 of the EIS."*

The Final EIS text was not available for review. The appropriate text should be excerpted from the Final EIS and provided for review.

**Volume 3a, Permanent Stormwater Management at the Treatment Plant Sites, Section 3.4, p. 12, fifth paragraph, third sentence**

*"... (refer to Chapter 6 of the EIS)."*

The Final EIS text was not available for review. The appropriate text should be excerpted from the Final EIS and provided for review.

**Volume 3a, Permanent Stormwater Management at the Treatment Plant Sites, Figure 6**

The figure seems to suggest the location of several cross sections, however no cross sections within the document seem to be provided which pertain to this area.

**Volume 3a, Permanent Stormwater Management at the Treatment Plant Sites, Attachment C, Analysis – Hydraulics, second paragraph, third sentence**

*"Two tidal conditions are included in Table 3 to illustrate the effect of designing to a lower tidal standard than the maximum expected tide."*

The discussion is referring to data presented in Table 2.

**Volume 3a, Permanent Stormwater Management at the Treatment Plant Sites, Attachment C, Analysis – Hydraulics, fourth paragraph, first sentence**

*"The friction losses included in Table 3 include an estimate of minor losses attributed to an inlet (K=0.25), three 90-degree bends (K=0.3), and two 45-degree bends (K=0.2)."*

The discussion is referring to data presented in Table 2.

**Volume 3a, Permanent Stormwater Management at the Treatment Plant Sites, Attachment C, Analysis – Hydraulics, fifth paragraph, first sentence**

*"Table 3 provides estimates...."*

The discussion is referring to data presented in Table 2.

**Volume 3a, Permanent Stormwater Management at the Treatment Plant Sites, Figure 6**

*The figure implies that cross sections A-A, B-B, and C-C were generated but there is no presentation of these.*

The inclusion of these cross sections would be helpful even though stormwater issues are generally surface related.

**Summer Season Temperature Effects of Stormwater ponds on Receiving Streams**

The District has an interest in this subject as a participant in the management of regional water resources. This TM provides a very good basis for the discussion of such impacts but does not address specific issues related to the impacts expected from the project components. We would suggest that once the appropriate studies have been accomplished, the findings be made available for review and perhaps application elsewhere in the stormwater systems of the region. No specific comments were generated for this TM.

**Stormwater and Groundwater Management at Conveyance System Primary Portal Sites**

This TM provides significant insight into what can be done and what should be done by regulation but, perhaps necessarily, does not discuss what will be done in stormwater management at the portal sites. The District requests that once design level definition of these project components is accomplished, the information be made available for review. This will help to identify possible incompatibilities between disposal plans and the capabilities of the various disposal options. This TM, like many of the others, makes reference to the FEIS as a source of information to the reviewer and implies a source of information to the SEPA process that does not exist.

**VOLUME 3(b)**

This document details the data collection methods, results of the field exploration and the findings of the geotechnical laboratory testing. The sections provide description of selected drilling and sampling methods. Sufficient information has been provided to properly review the attached well logs and photographs. There is no interpretation of the geology encountered during the exploratory drilling are presented in this section. No comments have been generated during the review of this section.

## **Conveyance System Geotechnical Progress Report**

This document details the data collection methods, results of the field exploration and the findings of the geotechnical laboratory testing. The sections provide description of selected drilling and sampling methods. Sufficient information has been provided to properly review the attached well logs and photographs. There is no interpretation of the geology encountered during the exploratory drilling are presented in this section. No comments have been generated during the review of this section.

### **VOLUME 3(c)**

#### **Description of contents of volume**

##### **Geology and Groundwater**

This volume describes the regional geology and groundwater conditions associated with the proposed project. Detailed descriptions are presented within this document of the geology pertaining to each proposed site and alternative alignments. As would be expected, a significant portion of the review was dedicated to Volume 3c, and consequently, this volume generated a considerable number of comments. The specific comments organized by specific section detailed below. Many of the comments generated deal with the inconsistent use and misapplication of geologic and hydrogeologic nomenclature. Several comments are concerned with the inconsistencies and inaccuracy between the text and the figures/tables provided. Significant concerns regarding the development and use of the numerical and analytical models were also noted. Though it does not appear that these inconsistencies and problems introduce sufficiently flawed analyses to render the results inadequate, it does raise a concern as to the accuracy of the authors' interpretations and conclusions. The lack of any new hydrogeologic definition of the Unocal influent route makes evaluation of the impact potential inappropriate even with the advantage preferred by the new tunneling technique. Even the preferred alternative requires better aquifer water budget impact analysis for the Vashon advance aquifer than has been presented.

##### **Executive Summary**

###### **Volume 3c, Executive Summary, p. ES-2 through ES-3**

Under "Regional Aquifers" section they discuss generic aquifers:

1. Qal, Qvr
2. Qva
3. Qu

Then under "Unocal Site Conditions" section, second bullet, they discuss the "Whidbey Formation Regional Aquifer". This is confusing because this should fall under the category of "Qu aquifer" following the generic scheme. Further, the Whidbey Formation is nonglacial deposits, which typically do not form aquifers, at least on a regional scale.

**Volume 3c, Executive Summary, p. ES-3**

Under "Olympic View Water & Sewer District Area Conditions" section, they state *"groundwater flow discharges to Puget Sound ; the Qva Aquifer likely does as well."* This is a confusing statement because Qva is part of the groundwater in this area. Also, it discharges to springs to the west and then via surface water to the Sound, and according to the implied position of the Divide in the Qva (their figure 2-9) it could also discharge to Lake Ballenger which discharges eventually to Lake Washington.

**Volume 3c, Executive Summary, p. ES-3**

Under "Olympic View Water & Sewer District Area Conditions" section, last sentence, they state , *l"The district also has wells completed in the deeper Qu Aquifer, but they are apparently not used."* In light of the recent modification of the 228<sup>th</sup> street well, this will need to be modified to reflect completion in the Qva. Also, *"are apparently not used"*, is not technically accurate since the District has been in the process of developing / perfecting for some time under an active current Water-Right-Permit, (permits and applications appear to have been overlooked in this document (Section 1.4.2.6 - they only seem to discuss water rights and claims with mention of permits for short term use (top of p. 7). This is a different type of "Permit"). In light of the District's current permit, it may also be appropriate to discuss the District's plans for developing a well field at the 228<sup>th</sup> street site.

**Volume 3c, Executive Summary, p. ES-3, fourth paragraph, second sentence**

*"Groundwater flow discharges to Puget Sound; the QVA Aquifer likely does as well."*

This statement is rather confusing. Why is the Qva singled out. Is it the author's contention that rather than the Qva entering the sound as groundwater it enters as surface water from Deer Creek?

**Volume 3c, Executive Summary, p. ES-8, seventh paragraph**

*"It is anticipated that most portals will be constructed with...."*

This section does not address what will be done with the water collected from the portal inflows.

**Volume 3c, Executive Summary, p. ES-8, last paragraph, last sentence**

*"Traditional relief wells drilled from the surface will not be used."*

What type of wells will be used? When will the authors discuss the drilling methods which have been selected?

**Volume 3c, Executive Summary, p. ES-9, second paragraph**

*"Unanticipated face inflow events could occur...."*

What mitigation plans are in order to account for such "unanticipated" events? What is the likelihood of these events taking place?

## Section 1

### **Volume 3c, Section 1.1, p. 2, sixth paragraph, third sentence**

*"Detailed descriptions of the treatment plant and conveyance pipelines are provided in Chapter 3 of the Final EIS."*

The Final EIS text was not available for review. The appropriate text should be excerpted from the Final EIS and provided for review.

### **Volume 3c, Section 1.4.2.6, p. 6 through 7**

The document only seems to discuss water right certificates and claims with brief mention of permits for short term use as specified by Water Resources Program Policy (POL-1037) (top of p. 7). This is different than a permit issued subsequent to a certificate. No specific mention of applications or permits as (preliminary to certificates) was found in the document (except for Table 2-5 on page 24 which only gives a definition and describes it generically).

## Section 2

This section describes the regional geologic and hydrogeologic setting for the Brightwater Project. Primarily, it attempts to define the geologic nomenclature and basic stratigraphic scheme to be utilized throughout the document. This includes a separate scheme for describing both standard geologic units (employs the nomenclature system adopted by the SGMP) and hydrostratigraphic units (uses a six-unit hydrostratigraphy scheme defined in section 2.4.1). As is typical and appropriate, the hydrostratigraphic scheme is more generalized than the geologic stratigraphy, and broadly overlays the more intricately defined geologic units. Although the approach as initially described is sound, there is considerable deviation and misapplication throughout this and subsequent sections of the document. To add further complication, roughly synonymous nomenclature from other stratigraphic schemes were also used (and misapplied) intermittently throughout the document. As such, the document, at a minimum, is difficult to decipher. Given the level to which the geologic nomenclature is inconsistently defined and applied, there is a degree of warranted concern with regard to the accuracy of geologic and hydrogeologic interpretations as related to project impacts (or more appropriately, the perceived lack of project impacts). As such, there is also considerable concern with the lack of mitigation planning for potential misinterpretations (the what ifs).

This section also describes the regional hydrogeologic condition with the project area as they relate to the general groundwater flow system (i.e. recharge and discharge, precipitation and ET, water quality, and water use). Overall, this section describes these aspects adequately, primarily through a compilation of previous work. There does, however, appear to be a significant amount of oversight in the area of water use, and in particular, the issue of water rights. Water rights, on file with State (DOE) appear to have been review at a cursory level, but it seems apparent that there has been no in-depth review (i.e. there is no mention of pending applications or active permits), and certainly no discourse with at least the major purveyors potentially effected by this project.

**Volume 3c, Section 2.1, p. 9 through 10, fourth paragraph, Line 5**

The climatological data presented in this paragraph are referenced to "U.S. Weather Bureau, 1965". It is not clear why such an old reference is used. Later, under section 2.4.4.1, p.17 the document indicates a low precipitation value of 33 inches contradicting this section which shows a low value of 35 inches.

**Volume 3c, Section 2.3, p. 10 through 11, fourth paragraph**

This entire paragraph, which starts "Note that the SGMP nomenclature includes a ...", takes a lot of effort to decipher and seems like it could be said better somehow. Part of the problem may be that the designations presented as Pre-Frasier and Pre-Olympia are intuitively backwards. Older undifferentiated interglacial deposits are classified as Pre-Frasier (which is a glacial interval) and older undifferentiated glacial deposits are classified as Pre-Olympia (which is an interglacial designation). This is confusing enough, but then later in the document this terminology is used inverted (see comment for volume 3c, Section 4.1.1.2, p.41).

**Volume 3c, Section 2.3.1, p. 11**

There is no distinct difference between designations for (m) modified Land and (af) fill. The (af) designation is a subset of (m).

**Volume 3c, Section 2.3.2, p. 11**

Within the designation for Mass Wastage Deposits (Qmw), top soil is included as a component of the unit. Top soil is included here but it is not formed by a mass wasting-process.

**Volume 3c, Section 2.3.2, p. 12**

The designation for Recent Alluvium (Qal) includes lacustrine deposits. Alluvium by definition excludes lacustrine deposits. As listed in (Bates and Jackson, 1980; Glossary of Geology, 2<sup>nd</sup> addition, P-46): Alluvium (a) A general term for clay, silt, sand, gravel, or similar unconsolidated detrital material deposited during comparatively recent geologic time by stream or other body of running water.....not intended to include subaqueous deposits in seas, estuaries, lakes.....

**Volume 3c, Section 2.3.3, p. 12, Advance Outwash (Qva) , first sentence**

*"...known locally as the Esperance Sand,..."*

This term is somewhat dated and may be misleading. Like the Colvos Sand in Pierce County, it is described as fine to medium fluvial sand with little to no gravel. It is a term applied locally (often misused by contractors) to relatively clean sand and does not necessarily imply dirtier portions of Qva.

**Volume 3c, Section 2.3.4.4, p. 14**

This entire paragraph is poorly worded (actually misstated) and very confusing. It states, "The Whidbey Formation is a group of sediments deposited during the next oldest nonglacial period recognized in the Puget Lowland, the Possession Glaciation...?, which followed the Olympia

*interglacial period*". It should be reworded somehow, to at least give an accurate statement: i.e. The Whidbey Formation represents the interglacial period preceding the Possession Glaciation, which preceded the Olympia Interglacial, etc.....

**Volume 3c, Section 2.4.1.2, p. 15, third sentence**

*"Locally perched groundwater conditions develop seasonally on top of the till in areas of low topographic relief."*

It is unclear what the term *"locally"* refers to. Ground water also perches in permeable zones within the till (domestic wells terminate in the till).

**Volume 3c, Section 2.4.1.4 and 2.4.1.5, p. 15**

No elevations are given for the Q<sub>vc</sub> Aquitard (section 2.4.1.4) or the Q<sub>u</sub> Aquifers and Aquitards (section 2.4.1.5), but were for the preceding Q<sub>va</sub> aquifer (section 2.4.1.3). Elevation, even if qualified as *"generally occurring"* would be helpful (and consistent). Also, in 3<sup>rd</sup> line of section 2.4.1.5, the document states *"... and generally occur under confined conditions."* Given that the formations occur at or below sea level, they would always be confined (and again, this section should list elevations).

**Volume 3c, Section 2.4.4.1, p. 17, second sentence**

The statement *"....a low of 33 inches at Scriber Creek (furthest west)...."* is not in agreement with the reference in section 2.1, p. 9, fourth paragraph, 35 inches listed by U.S. Weather Bureau, 1965.

**Volume 3c, Section 2.4.4.3, p. 18, fourth full paragraph, last sentence**

*"Thirty-six thousand acre-feet per year is equivalent to approximately 200,000 gallons per minute."*

This conversion is incorrect. Thirty-six thousand acre-feet per year is roughly 22,319 gpm.

**Volume 3c, Section 2.4.4.3, p. 18, second to last sentence**

11 inches should be rounded up to 12 inches. *"....annual precipitation of 33 to 40 inches per year...."* is not in agreement with reference in section 2.1, p. 9, fourth paragraph, 35 inches listed by U.S. Weather Bureau, 1965.

**Volume 3c, Section 2.4.6, p. 21, third paragraph**

Third paragraph: (General comment) The document seems to employ generalized statements to discount potential concerns: i.e. second line, *"....typically localized....."*, and second to last sentence, *".....and hydraulic gradients are often upward....."*.

There should be some discussion or mention of possible mitigation if the unexpected is encountered, i.e. deeper more extensive contamination. Are there contingencies to deal with construction activities causing existing contamination to migrate, among other questions.

**Volume 3c, Section 2.4.7, p. 23, second paragraph, third sentence**

It is not clear if the 32 water rights listed here are certificates only, or if they include applications and permits as well. The document also states that records are listed in Attachment 1b but the attachment only lists claims.

**Section 3**

This section describes the geologic and hydrogeologic settings specific to the major water districts within the Brightwater Project area. As in the preceding Section 2, the inconsistent use and misapplication of geologic and hydrogeologic nomenclature is a primary issue throughout this section. As before, this leads to speculation regarding accuracy of interpretations and associated concern for the lack of contingency plans should major misinterpretations occur, and result in significant, unexpected impacts. Of additional concern is the recent modification of the District's 228<sup>th</sup> Street Production Well. This well-site is not adequately addressed in this section (or the document as a whole) and could potentially have major implications to the proposed 228<sup>th</sup> Street alignment.

**Volume 3c, Section 3.1.2, p. 27, second paragraph, last sentence**

A statement could be added here that recent testing of the modified 228<sup>th</sup> street wells indicates similar K-values for the Qva at distance and up gradient from the spring.

**Volume 3c, Section 3.1.4, p. 28, first bullet**

This needs to be modified with regard to the 228<sup>th</sup> Street production well. This well was recently modified and is now completed in the Qva. The water district is now exercising their applicable water right from the Qva.

**Section 4**

This section discusses the groundwater regime during construction and operation of plant sites. The text and figures of this section have been reviewed by Robinson and Noble personnel to determine their accuracy and consistency. Section 4.1 specifically addressed the Route 9 site, while section 4.2 dealt with the Unocal site. Each of the projects as described, has to deal with large quantities of stormwater during both construction and operation of the sites. Some inconsistencies have been discovered and are explained within the comments section to follow. Currently, stormwater is being routed to Little Bear Creek (Route 9 site) and Puget Sound (Unocal site) and will continue to be routed to these locations during construction and once the project is complete. More resources were brought to bear on the problems facing the construction team in dewatering the respective sites. Each of the sites selected will require some level of dewatering to allow construction of the proposed facilities. However, the Route 9 site is designed to be equipped with under-drains which will be constantly "dewatering" the sediments beneath the site. Many of the comments generated from this section are specifically addressed to the dewatering practices which will be employed during and construction and operation of the sites.

**Volume 3c, Section 4.1.2.1, p. 40, first paragraph, first sentence**

*"The proposed plant facilities at the Route 9 site are described in detail in Chapter 3 of the Final EIS."*

The Final EIS text was not available for review. The appropriate text should be excerpted from the Final EIS and provided for review.

**Volume 3c, Section 4.1.1.2 p. 40-41, last paragraph, continuing to next page**

*"...pressure head 15 feet higher than hydrostatic at the location..."* It is not clear what this is saying. In literal terms, this says that the pressure head is 15 feet higher than the pressure head, which is nonsensical. The term "hydrostatic" in this context appears to be a "contractor-term" for water-table and its use is not really appropriate here.

- The cross-section (Figure 4-8) shows the Qpgl unit of well PB-12 as a flowing well. However, water levels indicated for the various units on Figure 4-8 at PB-12 show opposite gradients for the same well (suggesting both a recharge and a discharge zone at this well...?). The figure key lists Qpgl, Qpgf, etc. as Pre-Glaciolacustrine Beds, Pre-Glaciofluvial Deposits, etc. Are these prior to glaciolacustrine beds or glaciolacustrine beds that are older than the Olympia non-glacial deposits (i.e. Possession Glaciation).
- The relevant text to Figure 4-8 on page 41 discusses "pre-Fraser glaciolacustrine deposits (Qpgd) – this is not the same as discussed in section 2.3 in the third paragraph on page 11 (see previous comment for this section and paragraph), which states that "non-glacial deposits older than Holocene will have a Qpf (pre-Fraser) designation)". Glaciolacustrine deposits are glacial and should be denoted by a Qpo (pre-Olympia) designation according to the classification presented in Section 2.
- General comment – this stratigraphic nomenclature scheme is cumbersome, somewhat non-intuitive, and is inconsistently applied and /or seems to get mix-matched often throughout the document.

**Volume 3c, Section 4.1.2.1, p. 48, first paragraph, last sentence**

*"Refer to Chapter 6, Water Resources, of the Final EIS for more details on surface water management."*

The Final EIS text was not available for review. The appropriate text should be excerpted from the Final EIS and provided for review.

**Volume 3c, Section 4.1.3.2, p. 53, Table 4-3**

No units have been listed for several of the columns: Treatment Plant (Dewatering Wells), Treatment Plant (Underdrains), Influent Pump Station (IPS).

**Volume 3c, Section 4.1.3.2, p. 56, second paragraph, fourth sentence**

*"Since Mueser Rutledge's analysis, the plant configuration has developed and changed, so that the current existing ground surface and finished grade around the IPS would be at the same elevation as the measured groundwater head in the Qpogf unit in PB-12."*

There is no water level noted for the Qpogf unit on the PB-12 log. In previous discussions it has been suggested by the authors that at least a five foot difference in the finish grade of the IPS and any water level measured in PB-12 exists. Has there been a change which is not represented in the cross sections?

**Volume 3c, Section 4.1.4.2, p. 62, second full paragraph, third sentence**

*"However, as discussed in greater detail in the Final EIS Chapter 6 surface water discussions. . . ."*

The Final EIS text was not available for review. The appropriate text should be excerpted from the Final EIS and provided for review.

**Volume 3c, Section 4.1.5.1, p. 63, last sentence of section**

*"Chapter 17, Public services and Utilities, in the Final EIS, discusses measures for impacts on private wells."*

The Final EIS text was not available for review. The appropriate text should be excerpted from the Final EIS and provided for review.

**Volume 3c, Section 4.2.1.2, p. 68**

*"Whidbey Formation regional aquifer"*

In several instances throughout this page the Whidbey Formation is referred to as a Regional Aquifer, however it is a non-glacial deposit and generally considered an aquitard. It may be less confusing to suggest the Whidbey Formation is "locally" characterized as an aquifer.

**Volume 3c, Section 4.2.1.2, p. 68, last paragraph**

The geologic description provided within this section discusses the "Transitional Beds" Qtb. The Qtb is suggested to include everything older than the Qva and younger than the Whidbey Formation, however previously (section 2.3 of vol. 3c) the "Transitional Beds are referred to in the description as being associated with the Lawton Clay. No further correlations were made within section 2.3. Why is there a change in the unit descriptions for this section?

**Volume 3c, Section 4.2.3.2, p. 75, entire section**

The section describes potential impacts to groundwater caused by dewatering during construction. The section, however neglects to address the potential for serious groundwater flow interruptions to the Deer Creek Springs facility caused by potential unexpected flow events.

**Volume 3c, Section 4.2**

This section does not adequately address the geology concerning the Deer Creek Springs. The relationship of the Qva (springs) and the underlying aquitard of the Lawton Clay, do not appear

fully understood. There is a potential in the excavation of the upper yard to disturb this relationship and cause detrimental impacts to the Deer Creek Springs facility.

**Volume 3c, Section 4.2, Figure 4-22, 23, 24**

Geologic unit descriptions from the cross sections are not consistent with the rest of the document, it is noted the units have not been correlated with the SGMP. Without this correlation interpretation of the cross sections are less useful. On cross section A-A' there is a unit labeled Hf, this unit is not described in the text. Cross section A-A' suggest Hf as the surface unit where the cross section crosses C-C', while C-C' suggests Af as the surface unit. The cross sections do not accurately reflect the mapped surface geology.

From the Notes: *"See Figure 4-18 for section locations"*

Figure 4-18 does not show cross section locations, the figure represents drawdowns for the Route 9 site. Cross section locations are represented on Figure 4-21.

**Section 5**

In general, Section 5.0 discusses the likely impacts that the proposed Brightwater Project will have to ground water and surface water systems based upon the expected- and worst-case scenarios proposed. Section 5.1 defines the thresholds of potential impact by the Brightwater Project that, if exceeded, "could result in significant impacts to groundwater quantity or quality." (p. 81) While the thresholds identified may be appropriate, it should be noted that the criteria used to define these "safe" thresholds of impact to groundwater, stream flows, and water quality are not provided for review. Section 5.2 provides descriptions of the conveyance facilities, anticipated construction conditions and proposed construction methods. The majority of comments to this section were in regard to inconsistencies between the anticipated hydrogeologic conditions, anticipated geologic conditions, and the proposed construction methods presented in Table 5-1. Section 5.3 presents estimates of groundwater inflow to the conveyance facilities (portals and tunnels) under expected- and worst-case (cumulative upper-bound case) scenarios for both the period of construction and under long-term operation conditions. From the text of this section, it would appear that these estimated flows are largely based upon the experience of project team members in similar environments rather than on an analysis of site-specific conditions. Using the seepage estimates presented in Section 5.3, Section 5.4 presents the results of the un-calibrated numerical analyses (discussed in Attachment 2 to Volume 3c) for the impacts to groundwater flow and water levels, surface water/aquifer interaction, and water quality. Inconsistencies between information presented in the text of this section and the presented cross-sections make it unclear whether the "numerical analyses" consistently reflect the most current geological interpretations and proposed conveyance alignments. Section 5.4.5 discusses the impacts to the Olympic View Water & Sewer District (OVWSD) service area. The text of this section overestimates the distance (and vertical separation in the case of the Unocal alignment) of the various conveyance alignment options, however the impacts presented in this section fall below the thresholds identified in Section 5.1. Precautionary measures (such as groundwater monitoring) and contingency plans (i.e., Potable Water Replacement Plan (PWRP), Spill Prevention, Control, and Countermeasures Plan (SPCCP), and Stormwater Pollution Prevention Plan (SPPP)) are presented in Section 5.6. Key areas of concern identified for the OVWSD area "include the Deer Creek Spring Complex, the Holyrood Cemetery Wells, and the other potential domestic wells completed in the Qu Aquifer." (p. 133)

**Volume 3c, Section 5.1.2.1, p. 82, sixth paragraph, last sentence**

*"The Olympic View Water and Sewer District would also be unaffected in terms of the Qu Aquifer as they do not currently use their 228<sup>th</sup> Street wells."*

Recently Olympic View Water and Sewer converted one of the 228<sup>th</sup> Street Wells to a shallower completion with the Qva. However, the district still holds water rights for the Qu. Considering the potential future use of the aquifer, monitoring plan should be implemented sure there are no long term impacts.

**Volume 3c, Section 5.1.2.1, p. 82, sixth paragraph, second sentence**

*"The Olympic View Water & Sewer District would also be unaffected in terms of the Qu Aquifer as they do not currently use their 228<sup>th</sup> Street wells."*

While these wells may not yet be in active use, the District's right to produce water from these wells must still be protected and considered within the framework of the EIS. It should be noted that these wells may ultimately produce from the shallower Qva Aquifer system rather than the Qu Aquifer system.

**Volume 3c, Section 5.1.2.3, p. 83, first paragraph, first sentence**

*"No significant impact to water quality would occur if post-construction aquifer water quality conditions were effectively equal to pre-construction baseline conditions."*

This statement is true, however the section neglects to discuss the potential for any tunnel failures to occur. Any such failure could result in a potential degradation to ground water quality.

**Volume 3c, Section 5.1.2.1, p. 82, second paragraph, all sentences**

*"To put this drawdown in perspective, the Qva Aquifer water table elevation varies by up to 200 feet across the 195<sup>th</sup> Street alignment (Figure 2-9), and fluctuates seasonally as well. The water table elevation within the Qal/Qvr Aquifers probably has a lower gradient (i.e., a flatter water table), but typically would have greater seasonal fluctuation. A decline in the water table elevation of 1 foot or less would be virtually indistinguishable from natural fluctuations and variations in the water table elevation throughout most of the area."*

It is inappropriate to use the lateral differences in aquifer elevation (and its related water level) to put an imposed project drawdown "in perspective." While it is appropriate to use seasonal water level fluctuations in such a discussion and it is likely true that a one-foot drawdown may indeed be indistinguishable from this variation, no actual estimates of what the seasonal fluctuation might be are provided for comparison. Further, while the reader is provided with the assertion that the imposed drawdown is "virtually indistinguishable" from concurrent seasonal fluctuations, any such drawdown is clearly in addition to any natural fluctuations.

**Volume 3c, Section 5.2.3, p. 84, fifth paragraph, first sentence**

*"The analysis presented in this document is based on the Final EIS project description and subsurface data currently available."*

Is the description of the project different from the description provided within volumes 3a, 3b, and 3c? If so is the Final EIS available for review?

**Volume 3c, Section 5.2.4.1, p. 86, first paragraph, last sentence**

*"For more details, refer to Appendix 3-B of the Final EIS."*

The Final EIS text was not available for review. The appropriate text should be excerpted from the Final EIS and provided for review.

**Volume 3c, Section 5.2.4.1, p. 86, first (incomplete) paragraph, first full sentence**

*"For more details, refer to Appendix 3-B of the Final EIS."*

The Final EIS text was not available for review. The appropriate text should be excerpted from the Final EIS and provided for review.

**Volume 3c, Section 5.2.4.1, p. 89-90, Table 5-1**

Portal 7 (Unocal alignment) is suggested to have a flowing artesian head equal to 10 feet above ground surface, however the portal is completed in very hard silt overlain with silt and no confining unit for the shallow water-bearing materials is identified.

**Volume 3c, Section 5.3.1.2, p. 93, first full paragraph, first sentence**

*"Unanticipated inflows of groundwater may occur when the tunnel operation encounters a more permeable zone, or passes from a less permeable zone into a more permeable zone, combined with groundwater under high head."*

This sentence is either vague or redundant. When the tunnel operation "encounters a more permeable zone," it has by definition passed "from a less permeable zone into a more permeable zone." The sentence should be modified to clarify the vagueness or remove the apparent redundancy.

**Volume 3c, Section 5.3.1, p. 96, Table 5-2**

The title of Column 12 "Maximum Sustained Discharge" is slightly misleading. According to Section 5.3.1.3 (p. 94, fourth paragraph, second sentence), Table 5-2 indicates "the conservatively high combined flows that could occur during normal tunneling (column 12). . . ." Per the text in Section 5.3.1.3 (p. 94, fifth paragraph, fifth sentence), the upper value in this column "represents the estimated maximum inflow of water from the full length of the tunnel segment (sum of columns 5, 6, 7, 9, and 11)." All values presented in columns 9 and 11 are given "less than" values (e.g., <10, <20). When added in Column 12, however, these values are counted at half the stated "less than" value. The more "conservative" approach would be to add these values at their stated "less than" quantity.

**Volume 3c, Section 5.3.2.2, p. 97, second paragraph, second sentence**

*"Permanent facilities would vary from site to site as indicated in Section."*

This is a typographical error. To correct, the appropriate Section number should be inserted.

**Volume 3c, Section 5.3.2.2, p. 97, third paragraph, second sentence**

*"Exfiltration, therefor, would not occur in these structures during conveyance system operation."*

This is a typographical error. The word "therefore" is misspelled.

**Volume 3c, Section 5.4.1, p. 99, first paragraph, fifth sentence**

*"This district also has a wellfield (the 228<sup>th</sup> Street wells) completed in the deeper Qu Aquifer, but apparently is not currently using this source."*

The District has an ongoing source approval effort at the 228<sup>th</sup> Street well site. Impacts at this location in both the Qu Aquifer and the overlying Qva Aquifer should be considered within the scope of this evaluation.

**Volume 3c, Section 5.4.2.1, p. 101, eighth paragraph, first sentence**

*"The range of drawdowns expected during construction-related groundwater inflows for these two portals was estimated using the analytical approach described in Attachment 2."*

Attachment 2, p. A2-1 and A2-2, presents modeled estimates for three portals (not two), specifically Portals 11, 14, and 41, with estimates inflows of 80, 80, and 100 gpm.

**Volume 3c, Section 5.4.2.1, p. 102, first three paragraphs**

This discussion only presents the findings regarding two portals (11 and 41), despite the fact that the results for Portal 14 (presented in Attachment 2) also meets the criteria of "Significant maximum short-term groundwater inflows (i.e., a maximum of 80 gpm) indicated on p. 101.

**Volume 3c, Section 5.4.2.2, p. 102-3, general comment on section**

This appears to be the first section of the document to discuss the "numerical analysis" and related results. However, in its typical use, "numerical analysis" (and "numerical modeling") suggests a very high level of analysis and modeling wherein the assumptions and construction of the model are verified by calibrating the model to real-world values. As indicated in Attachment 2, no attempts to calibrate the model to real-world values were accomplished, and the analysis is solely being used as an "analytical tool" (p. A2-3) because "the analysis is intended to be relative rather than absolute. In other words, the analysis provides a worst-case estimate of construction related *changes* in flows and pressure heads compared to baseline conditions." (p. A2-7) The uncalibrated nature of the model should be presented in the initial discussion of the model and results to place the actual level of analysis into perspective.

**Volume 3c, Section 5.4.2.2, p. 103, sixth paragraph, first sentence**

*"The numerical analysis results for the cumulative upper-bound 14-day face inflow event estimated short-lived drawdowns of up to 2 feet in the Qva Aquifer and up to 132 feet in the Qu Aquifers at the point of inflow (effectively a single point in the aquifer).*

It should be noted that these maximum estimated short-lived drawdowns are for the Route 9-195<sup>th</sup> Street alignment, per Table A2-8 (p. A2-11).

**Volume 3c, Section 5.4.3.1, p. 104, first paragraph**

*"However, despite the proximity of many portals to streams (Figure 2-1), only those portals that would include depressurization at the invert during the approximately 6-month construction period could potentially affect a nearby stream. Of these, only Portals 11, 14, and 41 are anticipated to have sustained flows of any significance (Table 5-2). The anticipated construction-related groundwater inflows required to depressurize the invert (to make it stable) from these two portals are listed below. . . ."*

Text in this paragraph changes from discussing three to two portals, although Table 5-4 and Attachment 2 each cite three portals.

**Volume 3c, Section 5.4.3.2, p. 109, sixth paragraph, second sentence**

*"The tunnel would be approximately 75 feet below the creek bed and be constructed through a 25-foot thick unit of relatively low permeable [sic] drift material (Figure 3-6). Leakage into the tunnel during construction would come principally from the Qal Aquifer, and if it were sufficiently large and occurred directly beneath or close to the stream, could theoretically result in reduced creek flow."*

This conflicts with data presented in cross-section. Figure 3-6 indicates that the low permeability unit in which the tunnel will be constructed is comprised of glaciolacustrine deposits (gl) roughly 14 feet thick. As shown, the tunnel is constructed half within this low-permeability gl and half within the underlying water-bearing glaciofluvial (gf) deposits. Figure 3-6 also shows that the low-permeability deposits (gl) targeted by the tunnel location are not directly below any Qal Aquifer material. Rather, the tunnel location is below roughly 36 feet of water-bearing glaciofluvial (gf) deposits, 10 feet of Qvlc, and 31 feet of Qva Aquifer. Why is the Qal Aquifer considered the principal source of leakage (seepage) rather than the glaciofluvial deposits or the Qva Aquifer?

**Volume 3c, Section 5.4.5, p. 115, third full paragraph, third sentence**

*"However, Deer Creek spring [sic] is not expected to be impacted by any of these alternatives, because the tunnel elevation would be 200 feet below and over a mile away from the springs (Figures 3-1, 3-2, and 3-3)."*

These statements are inconsistent with the data presented. In Figure 3-1, the 228<sup>th</sup> Street alignment is only 3,535 feet (0.67 miles) from the eastern Deer Creek Spring location and the 195<sup>th</sup> Street alignment is only 4,470 feet (0.85 miles). The text should be modified to be consistent with data presented in the figures.

**Volume 3c, Section 5.4.5, p. 116, fourth full paragraph, second sentence**

*"The numerical analysis method is described in Section 5.4."*

While Section 5.4.2.2 does discuss some of the results, the general description of the method is provided in Attachment 2.

**Volume 3c, Section 5.4.6, p. 119, first full paragraph, first sentence**

*"The Lake Forest Park Water District wellfield includes four closely spaced wells tapping fluvial deposits within the undifferentiated pre-Fraser deposits, and eight closely spaced 20-foot deep wells likely completed in the Qva Aquifer (see Figures 3-4, 3-5, and 3-6)."*

Both Figures 3-5 and 3-6 indicate "Lake Forest Park Well No. 4." Are the other 3 wells at this same location and not indicated due to scale issues? Also, no wells completed in the Qva Aquifer are indicated. Are these also not indicated due to scale?

**Volume 3c, Section 5.4.6, p. 123, first paragraph, first sentence**

*"To avoid having temporary construction-related declines of up [sic] 7 feet, the design measures described above would be implemented."*

This is a typographical error. The sentence should include the word "to" between "up" and "7."

**Volume 3c, Section 5.5.1, p. 126, first bullet**

*"The volume of aquifer material that would be displaced by the tunnel and any associated grouting is insignificant relative to the total volume of aquifers in the project area. Loss of this volume therefore represents no significant impact to the resource."*

This statement is accurate, however the tunnels being planned have diameters as great as 14 feet (possible much greater with application of grout). With this large diameter there is a potential for this tunnel to completely bisect a thin aquifer? However unlikely this is to happen, the statement as written above seems to dismissive to potential impacts.

**Volume 3c, Section 5.5.2.3, p. 127, second bullet in Deep Aquifer discussion**

*"These additional studies would also be used to optimize the tunnel depth to take advantage of geologic conditions, and to define the hydraulic relationship between the Lake Forest Park wellfield production zone and the Qu aquifer as it exists along the tunnel alignment."*

The discussion should reflect the potential use of the Qu aquifer by Olympic View Water and Sewer at their 228<sup>th</sup> Street site.

**Volume 3c, Section 5.5.3.2, p. 128, second bullet**

*"The tunnel lining would be designed to eliminate exfiltration in those segments where internal tunnel operating pressures exterior groundwater pressures. Therefore, there would be essentially no leakage from either influent or effluent lines, and, correspondingly, no affect on groundwater quality."*

What monitoring plans are in place to insure that this is true? What mitigation plans are in place to respond to a potential failure in the system?

**Volume 3c, Section 5.6.1.2, p. 132, last paragraph, first sentence**

*"Technical Appendices 6-C and 6-F discuss measures to ensure that groundwater discharges to surface waters standards for turbidity, dissolved oxygen and other parameters."*

It does not appear these Appendices are provided within the distributed text.

**Attachment 2**

This section provides an overview of the modeling methods, assumptions, and parameters used in the evaluation of water level impacts resulting from the estimated seepage into portals and tunnels. Three model approaches were used. The first approach discussed in this section involved the

application of the Theis equation for non-steady (confined) flow to a well, corrected for unconfined aquifer conditions, to analyze the effects of pre-determined portal seepage rates on the water levels of the adjacent aquifer. It is unclear from the text whether the formulae were used directly (i.e. in a spreadsheet) or through an analytical modeling program. However, the equation for the correction to unconfined aquifer conditions is incorrect as written. Without additional data from the modeling process, it cannot be determined whether this represents a typographical error in the report or if the inaccurate equation was used in the analysis (resulting in the underestimation of drawdown impact). Additional errors or inconsistencies in the tables and associated text were also identified.

The second model approach discussed is a series of uncalibrated numerical flow models for the Western, Central, and Eastern portions of the project area. These transient flow models were designed to evaluate the effects of the pre-determined portal and tunnel seepage rates on the shallow Qva/Qal Aquifers and the deeper Qu Aquifer as construction of the tunnels progresses. The effects of high-volume, short-term tunnel face-inflow events are also analyzed and discussed. Results from these analyses were used to support the assertion that project-related drawdowns during construction would be minimal and that mitigation beyond the use of specific construction practices was not necessary. The third model approach discussed in Attachment 2 is an uncalibrated numerical flow model for the entire project area. This steady-state model is designed to analyze the drawdown resulting from the proposed project under operating conditions. Results from this model were used to support the assertion that no substantial long-term impacts requiring mitigation would occur.

Two primary concerns regarding both numerical model approaches were raised. The first concern is that the numerical model may or may not correctly reflect the most current geological interpretations of the area. Specifically, numerous inconsistencies were identified in the text, cross-sections and related tunnel alignments of Volume 3c of the Technical Reports upon which the model framework is constructed and it is unclear which interpretations are incorporated in the numerical analysis and what, if any, impact these inconsistencies would have on model results. The second concern is that no discussion of the water-budget of these models is presented. Given that the models are uncalibrated to real-world conditions, it is all the more important to verify and document that the constant-head and drain cells used to define the boundary conditions of the model reflect realistic flow volumes through the model.

**Volume 3c, Attachment 2, p. A2-1, first paragraph, first sentence**

*"The range of drawdowns during construction for Portals 11, 14, and 41 were estimated using an analytical approach."*

It is somewhat confusing to place a discussion of analytical analysis methods under the heading of "Numerical Analysis Methodology and Results." If this section reflects analytical (as in analytical modeling) methods, modify the attachment title to reflect both methods of analysis, and clearly identify where the analytical methodology discussion stops and the numerical methodology discussion starts.

**Volume 3c, Attachment 2, p. A2-1, first paragraph, second sentence**

*"This involved applying the Theis equation for non-steady flow into a single well (Theis, 1935), and applying the Jacob correction to account for unconfined (rather than confined) aquifer*

*conditions: ( $s' = s^2/2b$ ), where:  $s'$  = corrected drawdown (feet),  $s$  = confined drawdown (feet), and  $b$  = saturated thickness (feet)."*

No citation for the Jacob correction is provided in the EIS and the equation, as written, appears to contain a typographical error. According to Walton (1987, *Groundwater Pumping Tests, Design & Analysis*, Equation 2.15, p. 33) and Porges and Hammer (2001, *The Compendium of Hydrogeology*, Equation 2-26, p. 223), this equation should be  $s' = s - (s^2/2b)$ . Jacob's original paper (1944, *Notes on Determining Permeability By Pumping Tests Under Water Table Conditions*) cited by Walton (1987) was not available for review and verification. If this is indeed a typographical error, it should be corrected and the analytical procedure more clearly described (i.e., was an analytical model or spreadsheet used?). If this is not a typographical error and the equation is in fact in error, the resultant calculations will, in all cases, underestimate drawdown values. The degree of underestimation could be substantial in areas where the aquifer is thin, however Porges and Hammer (2001, p. 223) indicate that the Jacob correction is only required if the drawdown amount is "large relative to the original saturated thickness of the aquifer." The text should be modified to include a more comprehensive discussion of the use of this correction. For clarity, subsequent tables (e.g., Tables A2-1 and A2-2) should provide both uncorrected (Theis) values and the values after the Jacob correction.

**Volume 3c, Attachment 2, p. A2-1, third paragraph, first sentence**

*"Although the aquifers at the two portals were assumed to have uniform properties, two hydraulic conductivities were assessed."*

This appears to be a typographical error. The sentence should refer to ". . .the three portals. . .", specifically Portals 11, 14, and 41.

**Volume 3c, Attachment 2, p. A2-1, third paragraph, third sentence**

*"The ambient saturated thickness at Portals 11, 14, and 41 were 35, 30, and 75 feet, respectively (Table 5-1)."*

As discussed above, Table 5-1 provides data for different alignments as well as some potentially conflicting data. Portal 11 is indicated as having both a 35- and a 50-foot saturated thickness (due to a 15-foot difference in portal depth between alignments). Portal 41 is indicated as having both an 85- and a 75-foot saturated thickness (due to a 10-foot difference in portal depth between alignments).

**Volume 3c, Attachment 2, p. A2-2, Table A2-1**

Table A2-1 presents transmissivity values (in gpd/ft) under both the "Low-k ( $10^{-2}$  cm/sec)" and the "High-k ( $10^{-2}$  cm/sec)" headings. However, for the aquifer thicknesses given, both values for the transmissivity (T) values presented for Portals 11 & 14 are incorrect. Using the hydraulic conductivity values presented, the aquifer thicknesses provided, and the relationship  $T = Kb$ , transmissivity values of 636 gpd/ft (Portal 14 with a 30-foot thickness) and 742 gpd/ft (Portal 11 with a 35-foot thickness) were obtained for the low-k scenario. The value of 1,060 gpd/ft is only obtained for the Unocal alignment of Portal 11, where the saturated thickness is estimated to be 50 feet. Transmissivity values for the high-k scenarios were an order of magnitude greater at 6,360 gpd/ft (Portal 14) and 7,420 gpd/ft (Portal 11). Similar to the low-k case, the presented T value of 10,600 gpd/ft is obtained for the Unocal alignment of Portal 11.

In most modeling analyses, either both the hydraulic conductivity and the aquifer thickness are entered or just the transmissivity value is entered. It is unclear from the discussion presented what type of model (if any) was used for this analysis and what specific data were used. It should be determined whether the correct data were used in this modeling effort. If the wrong data or the data for the wrong alignments were used for this analysis, the modeling should be re-accomplished and the new results incorporated into Tables A2-1 and A2-2 in the next draft of the EIS. If this table contains typographical errors, they should be corrected in all appropriate locations throughout the document and the discussion sections modified accordingly.

**Volume 3c, Attachment 2, p. A2-2, Tables A2-1 and A2-2**

Both tables present estimated drawdown values. For clarity, the uncorrected drawdown values (obtained from the Theis analyses) and the corrected drawdown values (using the Jacob correction) should both be indicated.

**Volume 3c, Attachment 2, p. A2-2, first paragraph, first sentence**

*"These results indicate that the expected drawdown at the portal after six months will be in the range of 8 to 10 feet assuming high permeable [sic] soils, and 57 to 70 feet assuming lower permeable [sic] soils."*

This statement is in conflict with Table A2-1 which indicates six-month drawdowns of 70 to 86 feet in Portals 41 and 11&14, respectively. It should be noted, however, that these drawdown values presume that the data presented in Table A2-1 is accurate (see preceding comment). If Table A2-1 is modified, the modeled results presented in Table A2-2 will also need to be updated.

**Volume 3c, Attachment 2, p. A2-2, third paragraph, heading and first sentence**

As mentioned above, a numerical modeling method description should not be titled "Analytical Approach", due to the ease of confusion with analytical (as opposed to numerical) modeling.

**Volume 3c, Attachment 2, p. A2-3, fourth paragraph, last sentence**

*"The MODFLOW-96 analysis did not include a formal calibration and, therefore, was used as an analytical tool rather than a predictive flow model."*

This should be made clear much earlier on in the EIS document, particularly in Section 5.4.2.2, in order to place the level of analysis into perspective. Numerical analysis is typically presumed to refer to a model calibrated against real-world data to ensure that any modeled scenarios reasonably reflect reality. In the absence of such calibration, even as an analytical tool, some discussion of the water-budget of the model is warranted to verify that an expected flow pattern, gradient, or direction actually reflects realistic flow volumes and is not dominated by erroneous flow volumes from constant-head cells or to drain cells.

**Volume 3c, Attachment 2, p. A2-4, second paragraph, first sentence, Table A2-3, Figure A2-1**

*"Figure A2-1 shows the locations of the three analyzed areas (Western, Central, and Eastern), and Table A2-3 summarizes the principal features of each area."*

The areas depicted in the scaled Figure A2-1 do not accurately reflect the areas indicated in Table A2-3. As mapped, the Western Area (40,000' x 35,000' per Table A2-3) is roughly 35,100' x 35,100', the Central Area (45,000' x 32,500' per Table A2-3) is roughly 40,650' x 32,200', and the

Eastern Area (45,000' x 32,500' per Table A2-3) is roughly 47,000' x 32,350'. These areas should be more accurately reflected in Figure A2-1.

**Volume 3c, Attachment 2, p. A2-4, Table A2-3**

The "general baseline flow direction" row does not specify which layer is being referred to, nor is any flow direction indicated for the Eastern Area (flow appears to be generally west and south in the Qva (Layer 1). Flow directions should be identified by layer; if the flow directions are similar in both Layer 1 and Layer 3, the row label should reflect this.

**Volume 3c, Attachment 2, p. A2-5, unlabeled Layer 1 hydraulic conductivity table**

This section summarizes for "Layer 1—Qva and Qal Aquifers", however the associated table and text provide no values for the Qva portion of this aquifer (only Qal and Qvr). Since the Qva is the predominant portion of Layer 1, particularly where the Qal Aquifer is not present, additional discussion is necessary.

**Volume 3c, Attachment 2, p. A2-6, second paragraph, first through third sentences**

*"The only published storativity value for aquifers in the area is  $7 \times 10^{-5}$ , as reported for one of the deep Lake Forest Park Water District wells (Converse, 1980). Layer 3 (Qu Aquifer) was therefore assigned this value for all cases. This value is unusually low for this region and would result in rapid propagation of pressure declines outward a substantial distance from the tunnel; however, a sensitivity analysis was conducted with higher storativity values and showed no significant difference in estimated drawdowns."*

With only one published storativity value for aquifers in this area, how are the authors able to determine that this value is "unusually low for this region. . . ."? While Converse (1980) was not available for review, the reported value does not seem unreasonable or unexpected for a relatively deep well such as Lake Forest Park Well No. 4 as depicted in Figures 3-5 and 3-6.

**Volume 3c, Attachment 2, p. A2-6, second full paragraph**

Depending upon the model parameters (layer hydraulic conductivity values, conductance values assigned to constant-head and drain cells, etc.) the model can provide expected flow patterns while funneling erroneously high or low volumes of water through the model. As discussed previously, a water-budget for the numerical analysis (specifically addressing the constant-head and drain cell boundary conditions) is warranted.

**Volume 3c, Attachment 2, p. A2-6, fifth full paragraph, second through fourth sentences**

*"The baseline flows in the Qva Aquifer were set to generally approximate flow directions and gradients shown in Figure 2-8 [sic]. No comparable map has been produced for the Qu Aquifer, although the general flow directions are expected to be similar to those shown in Figure 2-9. Significant vertical gradients have been identified in some parts of the area, and the baseline flow fields generally represent this condition."*

The first sentence mistakenly refers to Figure 2-8, whereas it should refer to Figure 2-9.

This section suggests that the model parameters and boundary conditions were adjusted until the water table/potentiometric surface looked appropriate. Given the potential for constant-head boundaries to erroneously contribute and remove essentially infinite volumes of water to a

modeled system, some discussion or summary of the water-budget of the model would be appropriate to confirm whether or not system flows are realistic.

**Volume 3c, Attachment 2, p. A2-7, second full paragraph, third sentence**

*"Seepage rates were simulated by assigning a negative flux (or flow rate) using the MODFLOW Well function, in which the flux is applied across the entire area and thickness of a cell."*

Why was the Well function used rather than the Drain function? To provide easier "compartmentalization" of the different seepage rates? What is the benefit or impact of spreading the flux across a 100-foot wide by 100-foot long by XXX-foot (layer thickness) volume rather than a more representative cross-sectional area of the tunnels?

**Volume 3c, Attachment 2, p. A2-7, second full paragraph, fourth sentence and Table A2-4**

The text indicates that "All seepage fluxes were applied to Layer 3" and Table A2-4 indicates that the seepage from the Working Portal is incorporated at the initial cell. Since the portals are vertical structures, this appears to presume that no seepage occurs from Layer 1, despite the fact that earlier analyses quantified such seepage (see Section 5.3.1.1 and Table 5-2). What impacts does this have to the drawdown analyses for Layer 1 (Qva/Qal/Qvr Aquifers)? Layer 3 (Qu Aquifers)?

**Volume 3c, Attachment 2, p. A2-9, Table A2-6**

The tunnel lengths presented in Table A2-6 are different (perhaps less rounded off?) than in Table 5-2 (p. 96). Also, the construction times presented in Table A2-6 (after adding the 6-month working portal construction period) are different than in Table 5-2. Although final alignments for the tunnels have not yet been established, lengths and construction times should be consistent within the confines of the EIS.

**Volume 3c, Attachment 2, p. A2-9, first paragraph, first sentence**

*"It is possible that at some stage of the tunneling process, a significant change in soils would occur whereby a portion of the TBM face would potentially encounter both low- and high-permeability sediments, causing an unexpectedly high groundwater inflow (face inflow event; see Section 5.3.1.2)."*

Why would exposure to both low- and high-permeability sediments be more of a concern than high-permeability sediments across the entire TBM face? Is it more difficult to pressurize the face in this scenario?

**Volume 3c, Attachment 2, p. A2-10, fourth paragraph, first sentence**

*"In all cases, both the water table and potentiometric heads are expected to recover toward static levels for each tunnel segment within a few weeks of ceasing construction-induced seepage."*

This section could use some clarification. By definition, all water level recovery is toward static levels unless the withdrawals have led to overdraft of the aquifer. Further, recovery times are typically equal to the period of withdrawal, although the fact that the proposed withdrawals extend through significant seasonal changes in recharge may complicate this issue.

**Volume 3c, Attachment 2, p. A2-11, third full paragraph, second and third sentences**

*"A maximum worst-case drawdown of approximately 26 feet is estimated to occur in the Qu Aquifer in the Portal 19 to 26[sic] segment. The overlying Qva Aquifer shows less than 0.3 feet of*

*drawdown in this same segment, indicated that even under worst-case conditions there would be no discernable effect on Deer Creek Springs."*

These statements are in conflict with data presented in the adjacent table. Table A2-9 indicates that approximately 26 feet of drawdown occurs in the Portal 33 to 26 segment, with roughly 0.8 feet of drawdown in the overlying Qva Aquifer. These inconsistencies should be resolved. If the table is correct, the subsequent 14-day face inflow event analysis for Portal 19 to 26 may need to be re-accomplished to reflect the Portal 33 to 26 segment. It should also be determined whether a tripling of the anticipated drawdown in the Qva Aquifer (from 0.3 to 0.8 feet) has any implications to Deer Creek Springs.

**Volume 3c, Attachment 2, p. A2-13, Numerical Analysis for Operational Conditions, general comment**

The description of this steady-state "numerical approach" in comparison to the previous transient numerical approach is somewhat confusing. The text states that this new approach used a "single, larger-scale approach" rather than the previous approach which defined "a series of segments and assessing each segment individually using different geographical conditions." Why then does the second step of this new analysis involve the assigning of "seepage rates to segments. . . ."? Does this section actually describe the use of tunnel segments as a unit rather than the model cells?

**Volume 3c, Attachment 2, p. A2-13, sixth paragraph, fifth sentence**  
*"Individual segment infiltration rates are listed in Table A2-12 below."*

The table reference is incorrect. These rates are presented in Table A2-13.

**Volume 3c, Attachment 2, p. A2-14, first paragraph, general comment**

Presentation of the expected case and worst case results would be enhanced and facilitate comparison by presenting the data in a table format as was done for previous analyses.

**Volume 3c, Attachment 2, p. A2-15, first full paragraph, general comment**

Presentation of the expected case and worst case results would be enhanced and facilitate comparison by presenting the data in a table format as was done for previous analyses.



F. Michael Krautkramer L.H.G.  
Principal Hydrogeologist



F. MICHAEL KRAUTKRAMER

September 3, 2003

Mr. Don Theiler  
Manager and SEPA Responsible Official  
Environmental Planning  
King County Wastewater Treatment Division  
King Street Center: KFC-NR-0505  
201 South Jackson Street  
Seattle, WA 98104-9972

Dear Mr. Theiler:

The enclosed document from our environmental consultants, Blumen Consulting Group, Inc., has prepared a response on behalf of the Port of Edmonds to the third Technical Seminar concerning the Brightwater Wastewater Treatment Plant. The seminar addressed the following:

- Design and Construction
- Geology and Groundwater
- Groundwater Control and Protection
- Potential Surface Water Impacts
- Traffic Impacts and Mitigation

The Blumen Consulting Group provided the environmental and technical review of the draft Environmental Impact Statement (DEIS) which was submitted to your office in January of this year. I am confident that they have addressed the appropriate issues of concern, especially those concerns that affect the Port of Edmonds and its constituents.

Thank you for the opportunity to provide comments on the second Technical Seminar regarding the wastewater treatment facility.

Sincerely Yours,



Christopher W. Keuss CMM  
Executive Director

Attachments

cc: Port Commissioners  
Mayor Haakenson  
Mayor Nichols



September 3, 2003

Christopher W. Keuss, Executive Director  
Port of Edmonds  
336 Admiral Way  
Edmonds, WA 98020

RE: Comments on the Supplemental Brightwater Regional Wastewater Treatment System August 16<sup>th</sup> Seminar Presentations and Technical Reports

At the request of the Port of Edmonds, Blumen Consulting Group, Inc. attended the Additional Scientific and Engineering Studies Seminar on August 16<sup>th</sup>, 2003 and reviewed the attendant supplemental technical reports prepared by King County as part of its ongoing response to comments on the Brightwater Regional Wastewater Treatment System Draft EIS. A public comment period on this Seminar extends from August 5<sup>th</sup> to September 5<sup>th</sup>, 2003.

Seminar presentations addressed the following topics:

- Design and Construction
- Geology and Groundwater
- Groundwater Control and Protection
- Potential Surface Water Impacts
- Traffic Impacts and Mitigation

Separate supplemental technical reports addressed the following topics: geology and groundwater; water quality management during construction at treatment plant sites; permanent stormwater management at treatment plant sites; thermal impacts of stormwater ponds; treatment plant noise and vibration; treatment plant illumination modeling; Route 9 site geotechnical data; Route 9 site runoff effects; stormwater and groundwater management at conveyance system portal sites; and, conveyance system geotechnical data.

King County's purpose in holding these Technical Seminars is to answer questions raised during the Draft EIS process. As such, this letter focuses primarily on Unocal treatment plant site issues that were initially raised in the Port of Edmond's Draft EIS comment letter to King County. Information related to the conveyance system is not addressed in this letter as these elements of the Brightwater treatment system would not impact Port operations, property or activities. Below is a brief summary of the

relevant information and analyses presented at the Seminar and/or provided in the technical reports, followed by a discussion of issues that could affect and/or may be pertinent to Port operations, properties, and interests.

## **Relevant Topic Summaries**

### Design and Construction Overview

The Brightwater design and construction overview provided information on contractor procurement, construction sequence and manpower levels for the treatment plants and conveyance systems. King County's preference is to hire a general contractor/construction manager (GCCM) for construction of the treatment plant. For the Unocal Alternative, the treatment plant work force would average 250 workers and peak at 340 workers (assuming no lid construction) over the estimated 4.5 year construction duration. With construction of a multi-modal lid, the treatment plant work force would average 360 workers and peak at 540 workers.

### Noise and Vibration

Construction and operational noise at the Unocal site is regulated by the City of Edmonds. Noise is regulated according to the land uses on the property generating the noise and the receiving properties. Residential properties are considered "sensitive receivers." Construction noise generated by "installation or repair of essential utility service" is exempt during daytime hours (between the hours of 7 AM and 10 PM). Permissible operational noise levels during the daytime for receiving properties that are considered "commercial" from a "commercial" noise source are 70 dBA during daytime hours. The Brightwater treatment plant would be considered a "commercial" noise source. The Port of Edmonds marina and Harbor Square are "commercial" receiving properties, based on commercial zoning designations. In general, a noise level of 65 to 70 dBA can interfere with speech and is similar to the noise levels emanating from a typical commercial area.

Three locations at the Unocal site were monitored for noise levels: two of these were along the southwest and southeast corners of the site and the third was midway along the northwest side of the site adjacent to Admiral Way and the railroad tracks. Existing noise levels range from a minimum of 32 dBA to 48 dBA at the Admiral Way location. These noise levels are characteristic of a quiet residential area.

The Technical Memorandum states that noise generated by construction equipment would be experienced by nearby receptors during construction and estimates noise impacts to nearby residential receptors. However, the Memorandum does not estimate noise impacts to the marina, nearby businesses, or the City park. Maximum sound levels generated by construction equipment at 50 feet would range from 81 dBA (tractor/dozer) to 101 dBA (pile driver). In general, continuous exposure to sound levels above 80 dBA can cause hearing loss. Based on the overall duration of construction (about 4.5 years) and the need at the Unocal site for extensive pile driving (estimated at

5,400 piles for the lid alternative), noise impacts could be significant and should be estimated for all adjacent receptors, including the marina (see Issues Pertinent to the Port, below).

No noticeable increase in noise levels would be expected from treatment plant operations, based on the proposed design-related noise reduction measures.

### Geology and Groundwater

The Unocal site is divided into the Upper and Lower Yard. The Upper Yard comprises about one-third of the site; the lower yard comprises the remaining two-thirds. Soils on the Lower Yard consist of artificial fill ranging in thickness from one to eight feet. The native soil beneath the fill is alluvium, consisting mostly of fine to medium sand with interbeds of silt, which has liquefaction potential. Groundwater lies below ground surface from about three to 10 feet and is tidally influenced. The Upper yard soil is fill underlain by dense, low permeability deposits with isolated perched groundwater overlying the larger regional aquifer.

The Unocal site is a state-listed hazardous site. Site cleanup is occurring under an Agreed Order with the Department of Ecology. Cleanup of the Upper Yard was completed to residential land use standards in the Spring of 2003. Contamination of the Lower Yard includes petroleum contamination of the soil and groundwater. Ecology is planning to determine cleanup actions for the Lower Yard in late 2004 and cleanup is planned to begin in mid-2005. The extent of soil removal or groundwater cleanup that will be required by Ecology is not yet known.

Construction dewatering at the Unocal site would result in groundwater drawdown in the Lower Yard of 18 feet near the edge of excavation, with an estimated "radius of influence" of 1,700 feet (at 1,700 feet, drawdown would be negligible). The Technical Memorandum states that groundwater cutoff walls consisting of tight sheet piles would be installed along the northern boundary of the plant in order to limit or reduce flow/drawdown from the Edmonds Marsh and Willow Creek. Analysis conducted to date by King County indicates that there may be a foot of drawdown in the Marsh, lowering water levels. The Technical Memorandum defers additional subsurface exploration and analysis regarding how to limit the drawdown of the Marsh to after selection of the treatment plant site. If discharge of groundwater proves infeasible, possible mitigation that has been identified includes discharge of treated groundwater water to the marsh and/or creeks in a controlled manner as necessary to maintain water levels, redesign of the facilities, and alteration of the construction sequence.

### Stormwater

The primary stormwater facility at the Unocal site would consist of a single, large, water quality treatment pond, covering about 1.5 acres, located in the northwest portion of the site. Following treatment, runoff from the pond would be discharged via a pipeline to Puget Sound; as such, no stormwater detention would be required. If the Unocal site is

selected, the lower 1,500 feet of Willow Creek would be daylighted to a stream that flows into Puget Sound. Stormwater discharge to Puget Sound could use the pipe that had carried Willow Creek or a newly constructed outfall into Puget Sound. Co-location with the Edmonds Crossing project would require covering most of the treatment facilities with a lid. The Technical Memorandum identifies a need for additional analysis of water quality treatment if the Unocal site is selected to determine whether water quality vaults would be a more feasible solution to an open water quality treatment pond.

### Traffic Impacts and Mitigation

Since publication of the Draft EIS, additional analysis of potential transportation-related impacts has been conducted for both the Route 9 and Unocal sites. For the Unocal site, construction traffic impacts during the peak construction year of 2007 were analyzed, along with identification of remote parking lots for construction workers and recommendations for truck holding areas to minimize conflicts with ferry traffic.

Primary access to the Unocal site is from Edmonds Way (SR-104). If the Unocal site is selected, Pine Street would be realigned to continue west from the intersection with SR-104 along the Unocal property line. Roads would be built onsite to provide internal vehicular access. Roadways potentially affected by the Unocal Alternative include Pine Street, Unocal Road, Dayton Street, Edmonds Way and SR-104 to the interchange with I-5. The intersection of Edmonds Way and Dayton Street provides sole access to Admiral Way and the Port of Edmonds. Existing PM peak hour level-of-service (LOS) at the intersection of Edmonds Way and Dayton Street is B, indicating good traffic flow.

Construction of the treatment plant is anticipated to occur between 2004 and 2010. Major earthwork would occur in the first two to three years, generating the greatest construction traffic impacts. During 2007, traffic along the site access route (SR-104) would increase by about 585 one-way trips per day, with about 100 of these trips occurring during the PM peak hour. The truck haul route for the Unocal site would exit the site on the south and follow SR-104 to the interchange with I-5 and beyond. The preferred option to mitigate traffic impacts would be to stage the trucks at a remote site and dispatch them to the intersection in convoys. The candidate site lies east of 100<sup>th</sup> Avenue West, along the north side of SR-104, about 1.4 miles from the Unocal site.

Employee parking for construction-related workers would not be provided onsite. Instead, remote parking would be provided and shuttle buses would take the workers to the construction site. Three candidate sites have been identified. Two of the sites are in the vicinity of the I-5/SR-104 interchange. The third is located along 236<sup>th</sup> Street SW near SR 99.

If the Edmonds Crossing project were to occur in the same time frame as the Brightwater project, King County acknowledges that construction-related traffic impacts could be considerably higher. However cumulative construction impacts are not evaluated in the Technical Memorandum. Construction of the Edmonds Crossing

project is projected to occur between 2006 and 2009. This would overlap with the 4.5 year construction period for the treatment plant. Cumulative transportation impacts could be significant and should be discussed in the Final EIS for the Brightwater treatment plant.

Traffic impacts during operation of the treatment plant were evaluated for the "36 mgd" plant size at 2010, and the "54 mgd" and "72 mgd with a multi-modal lid" plant size at year 2040. Operational impacts evaluated for year 2040 considered the combined impact of the Brightwater treatment plant and the Edmonds Crossing project. Treatment plant operations alone in year 2010 would not significantly affect LOS for nearby intersections, including the Edmonds Way/Dayton Street intersection. By year 2040, significant increases in delay could occur. The intersection of Edmonds Way and Dayton Street is projected at LOS F.

### Schedule and Cost Information

The Final EIS is due out in November of 2003. Based on information provided by King County, the final decision on the location for the Brightwater treatment plant will be made in 2003, following publication of the Final EIS. Permit applications will be submitted starting in 2003 and permitting is estimated to continue through 2004/early 2005. Contracts for construction will be awarded in the period extending from early- to mid-2005. Construction of the Brightwater treatment plant is anticipated to start in mid-2005 and be completed by the beginning of 2010.

Information from a flyer updated by the County in March 2003 states that the King County Council has determined that mitigation costs would approximate at least 10 percent of total project costs. Mitigation will be specified during the permit acquisition phase. County staff has stated that updated information on project costs will be released with the Final EIS.

### Issues Pertinent to the Port

The Port of Edmonds operations and properties include the waterfront and marina, resident businesses, Harbor Square, and adjacent recreation and natural resources. In addition, the Port is a partner in development of the Edmonds saltwater marsh interpretive trail and the Edmonds fishing pier. The Port supports the Deer Creek salmon hatchery, and community and environmental programs based along the Edmonds waterfront.

King County has addressed many of the concerns raised by the Port in its comment letter on the Draft EIS. However, additional information presented in the three Technical Seminars reinforces the conclusion that construction of a treatment plant at the Unocal site would generate significant, unavoidable, and unnecessary impacts to Port facilities and users over the estimated four and a half year construction duration, given the viability of the Point Wells site and the Route 9 Alternative.

The Final EIS should include an analysis of potential noise impacts on Port properties and surrounding park and recreational features. As noted in this letter, noise levels would increase noticeably in the vicinity of the Port facilities for an extended period of time and could significantly impact Port users and ongoing recreational activities. Based on information provided at the previous July 19<sup>th</sup> Seminar, construction of a treatment plant with a lid would require extensive pile driving (estimated at 5,400 piles) and would take nearly 18 months, assuming four rigs working 12 hours a day, 26 days a month. This indicates a potential for significant noise impacts that need to be fully evaluated. Impacts of the potential noise on area wildlife should also be addressed.

Willow Creek is the sole source of water for the Hatchery. The groundwater connection between the adjacent Edmonds Marsh and Willow Creek, and the fact that the groundwater is contaminated, raises additional issues regarding the potential for impacts from drawdown of the Marsh and Creek associated with dewatering during construction. Also at question is the feasibility of supplementing the Marsh with groundwater, given the current lack of information on subsurface conditions, treatment procedures, and cost. A detailed discussion of the potential risks to Willow Creek, the Hatchery and the Edmonds Marsh as a result of dewatering should be documented in the Final EIS.

Construction of the Edmonds Crossing project is projected to occur between 2006 and 2009. This would overlap with the 4.5 year construction period for the treatment plant. As a planned project, cumulative impacts could be significant and should be discussed comprehensively in the Final EIS for the Brightwater treatment plant based on information available. As an example, the Final EIS should fully address cumulative construction-related transportation impacts which are currently only noted as being potentially significantly greater than that presented in the Technical Memorandum.

The cost estimates being developed should include the need for condemnation of the planned 297 condominium units planned and approved for the Unocal site.

Thank you for the continuing opportunity to provide assistance to the Port of Edmonds regarding the proposed Brightwater Wastewater Treatment System and please contact us with any questions or comments.

Sincerely,

Michael Blumen  
President

Denise Evans  
Senior Associate

Blumen Consulting Group, Inc.

**Grothe, Ann**

---

**From:** Brightwater  
**Sent:** Monday, September 08, 2003 4:40 PM  
**To:** Grothe, Ann  
**Cc:** Marroquin, Shirley  
**Subject:** FW: Brightwater Technical Seminar #3 (Route 9) Comments

Ann, Shirley had approved an extension until the end of today for Greg's comments.

-----Original Message-----

**From:** GregLBCPA@aol.com [mailto:GregLBCPA@aol.com]  
**Sent:** Monday, September 08, 2003 2:12 PM  
**To:** Brightwater@METROK.COV  
**Subject:** Brightwater Technical Seminar #3 (Route 9) Comments

**Attn: Debra Ross**  
 Brightwater Technical Seminar #3 Comments Route 9

***Stormwater Runoff***

Little Bear Creek hosts spawning beds for endangered species-listed Chinook salmon in the stream reaches above, adjacent, and below the Route 9 site. It is therefore critical to adequately and with safeguards address the issues of turbidity, volumes, and temperature of water leaving the stormwater systems during construction. Turbid waters can suffocate not only the fish in Little Bear, but the egg and alevin-bearing gravel beds as well. Storm surges in volumes discharged cannot be allowed to overcome the sustained flow capacity of the creek. Higher volumes and faster inputs cause great velocity changes in-stream that can overcome juvenile fish abilities to avoid being flushed downstream. They can also cause increased erosion and scouring of spawning gravels. Temperature of discharged stormwaters, especially in warm weather, must not exceed the normal in-stream temperature regimes of the time of year they occur. They must match, otherwise temperature stress may disrupt fish and other in-stream inhabitants' normal cycles (i.e. spawning) or even cause die-off. Bull trout, also listed as endangered species, use Little Bear in foraging and are acutely temperature sensitive. Thermal shock - summer especially, and winter as well - is a fatal condition in fish-bearing water, even of short duration.

***Low Impact Development***

LID does not seem to be advanced as a high priority in how to handle volumes of run-off on-site at Route 9. Certainly more use of LID techniques could help to ameliorate storm flows, both volumes and flashiness of inputs.

***De-watering***

During construction, the local groundwater is set to be drawn down. Many neighbors to the Route 9 site have wells. It has been stated that potable water hook-ups will be provided anyone who is adversely affected. They should not have to pay for that water service to their residence. In addition, draw down of the near surface water table in the area affects the pastures, trees and landscaping of those residents. Water should be provided at no cost to cover these historic and usual practices. Also, during construction certainly, but also if affected permanently by plant operation of footing drains, etc. on that near surface water table, those residents should receive compensating free non-potable (re-use) water service for irrigation perpetuity. This should also occur for any affected wetlands.

***Foundation Drain Ground Water***

It is stated that perhaps 350 gallons per minute of near-surface groundwater (perhaps more) will be intercepted and piped away from foundations and below ground structures. This is pure, cold, native ground water that would normally find its way into the sustaining flows for Little Bear Creek. Rather than divert this ideal fish-friendly water into the stormwater system for disposal, it should be put to better use. Development in the Little Bear Creek watershed (for which Brightwater contributes now and into the future) continues to incrementally starve Little Bear Creek itself of near surface aquifer flows and slow-release surface flows from mature forest land and wetlands. This pure, cold intercepted foundation drain ground water should be piped to the headwater areas of Little Bear Creek and its major tributaries as dry season stream flow augmentation. Released into the

headwaters, this cold, pure water, when oxygenated, can sustain miles of in-stream salmon habitat. This summer's historic dry season (now the driest since the late 1940's) on top of last year's drought season and low snow pack winters in the Cascades, has brought us to the realization of water scarcity in a possible climate cycle shift. Add the stresses of increasing development to this climate scenario and much can be lost of the Little Bear salmon resource and our quality of local lifestyles that are inextricably linked to a healthy creek system. Three hundred fifty (350) gallons per minute can help sustain summer flows for the 6-month, April to September, dry season. That computes to 504,000 gallons each 24-hour day. In wet season, this intercepted ground water should be injected into Little Bear Creek aquifer that will also help supply a wetland system in the upper watershed. The summer season that will follow is when that slow release from replenished aquifers give added stream health.

Augmentation and injection ground water recharge is the best use of the best water which belongs to the Little Bear Creek Watershed water budget in the first place. It can be an integral part of our Puget Sound Salmon Recovery Strategy that shows an endangered species can be recovered in an urban area using innovative mitigation, rather than losing that which we cherish. This is a 100-year facility at Route 9 Brightwater. We must have a 100 year plan to go with it - that preserves and enhances our community. The previously submitted "Guidelines for Little Bear Creek Mitigation at Route 9" is a good start.

Mitigation is not an option, it is a requirement. It is likely that permit requirements will reflect the community's demands for mitigation that provides for the community needs and future quality of life. Mitigation that disappears into construction activity budgets is a fear of many. Let us not squander hard won goodwill and opportunity in our community to the sharpening machinations of pencil wielders.

Thank you.

**Greg Stephens - President**  
Little Bear Creek Protective Assn.  
21926 State Route 9  
Woodinville, WA 98072  
(206) 419-7761 Cell



# Brightwater

King County TREATMENT SYSTEM

## Technical Memoranda Comment Form

We invite you to comment on the Additional Scientific and Engineering Technical Reports during the comment period from August 5<sup>th</sup> - September 5<sup>th</sup>. Although each comment will not receive a specific response, the comments will be considered by the Brightwater project team preparing the Final EIS. Remarks received after that time can be revisited during the design process.

To be considered in preparing the Final EIS, comments must be postmarked no later than September 5<sup>th</sup>, 2003.

<p>To best assure the low cost development of the Brightwater Wastewater Treatment Plant, I request that King County DNA examine and assess excavation spoils disposal site options and haulage methodology to disposal site options. I ask that contact and discussion with Burlington Northern railroad Waste Management/Rabanco be made to inform and ask for their disposal recommendations and fees. I also ask that King County to speak to the Port of Seattle to discuss utilization of Brightwater Wastewater Treatment Plant excavation spoils for utilization at Seatac Airport Third Runway Expansion project. Because Brightwater Excavation Spoils disposal cost is prominent, I further ask that King County request Washington State's permission to dispose "CLEAN" tested Excavation Spoils by BARGE to the OCEAN at the "DLEDGED MATERIAL" OCEAN DISPOSAL SITE near Ocean Shores WA (in the Ocean).</p>	
<p>Name: PHILIP GREGA</p> <p>Address: 1902 2<sup>nd</sup> AVE #616</p> <p>City, Zip: SEATTLE, WA 98101</p>	<p>pgppatch@hotmail.com</p>

Thank You for your time.

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BRIGHTWATER PROJECT WORKSHOP  
PUBLIC COMMENTS

COPY

August 16, 2003

9:00 a.m.

University of WA Bothell Campus  
Building UW2  
11136 NE 180th Street  
Bothell, Washington

MARY A. HALL, CCR  
Court Reporter

VAN PELT CORBETT BELLOWS  
423 Second Avenue Ext. South Suite 21  
Seattle, WA 98104  
206/682-9339

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Speaker:	Page
ERIC TEEGARDEN 21906 - 41st Place West Mountlake Terrace, WA 98043	3
PHILIP GREGA 1902 Second Avenue, #616 Seattle, WA 98101	4

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 423 Second Avenue Ext. South Suite 21  
 Seattle, WA 98104  
 206/682-9339

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TESTIMONY OF ERIC TEEGARDEN

12:23 p.m.

I'm Eric Teegarden. I'm a civil engineer, a geologist, and have a master's in environmental science.

And my first question, is there a process for a cost benefit analysis on this project, because from the information I have gathered, I feel that the costs of this project are far greater than they're estimated and I'd like to know how quickly the benefits to the community will cover the costs.

My second question is I would like to know why seismic remote sensing technology was not used to get a better picture of the subsurface conditions in order to generate better data for conveyance lines and construction of the plant, because with a more accurate picture, a much more accurate determination of costs for construction could be generated. And I think that borings were chosen selectively to get a better picture of the subsurface than is going to be encountered during construction.

That's all I have to say.

## 1 TESTIMONY OF PHILIP GREGA

2 3:00 p.m.

3 My name is Philip Grega and I reside in  
4 Seattle.5 The cost of this project is a billion  
6 dollar project. I want to make my comment to ensure  
7 the low-cost development of the Brightwater project,  
8 and an important aspect of that is the disposal of the  
9 excavation spoils, the disposal of the excavation  
10 spoils. And I request that King County -- Department  
11 of Natural Resources, I assume, is leading the  
12 project -- examine and assess the excavation disposal  
13 site options and haulage methodology to disposal site  
14 options.15 See, I haven't heard what disposal site  
16 options are even being conceptually considered. This  
17 is an argument prudent for them to examine and assess  
18 which locations should be -- might be viable. It's my  
19 impression that they are currently relying on this to  
20 be the contractor's responsibility. And I deem that  
21 in itself implies a higher cost, a higher cost without  
22 examining options, options, and the haulage options.  
23 My understanding is the disposal of the excavation  
24 spoils, if not a dominant cost, it's a high cost  
25 element of the Brightwater project, especially like

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1 for the Edmonds site which has excavation spoils in  
2 excess of over a million cubic yards, a million cubic  
3 yards.

4 County council member David Irons at this  
5 expression merely provoked the thought is barge an  
6 option, is barge an option. In my request, I  
7 specifically request for the examination, request to  
8 the state of Washington to allow disposal with,  
9 disposal of Brightwater excavation spoils, disposal of  
10 Brightwater excavation spoils, at the disposal site of  
11 dredge material, dredge material. This will require  
12 an enactment of new legislation but I deem this is  
13 very, very -- would lower the costs significantly and  
14 is very relevant to Light Rail and many other projects  
15 with that needed disposal of great excavation spoils  
16 disposal.

17 It's important, though, that the excavation  
18 spoils be tested to assure that they're clean. In my  
19 statement I request, to ask that King County for  
20 permission to dispose clean, clean tested excavation  
21 spoils, clean tested excavation spoils, by barge in  
22 the ocean, at the dredge material ocean disposal site.  
23 My understanding is near Ocean Shores, Washington, is  
24 the ocean disposal site for dredge material.

25 I also ask that there is discussion with

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1 Burlington Northern, Burlington Northern, as  
2 preliminary, as preliminary just in regard to fees and  
3 also as a method of informing an announcement of  
4 Burlington of examining what railroad haulage options,  
5 railroad haulage options, of disposal waste might  
6 exist. Currently I also include a request to a  
7 discussion with waste management, waste management,  
8 Rabanco, used as references, because they are the  
9 primary, primary, dominant haulage of waste material  
10 within King County, Snohomish County, all Western  
11 Washington. My understanding, they're the national  
12 leading firm within the country of haulage of garbage  
13 and basically just waste.

14 So I just want to better assure the low  
15 cost development. And this, I deem, will help with  
16 their preliminary examination of these for  
17 recommendations to contractors and having made this  
18 information an outreach to these -- and ask for  
19 recommendations from these companies.

20 So this is my documented request if you  
21 want it. I thank you for your time and I thank you  
22 for the intended submittal of this request and reply  
23 to my request and question.

24 MS. CHRISTINA FAINE: Okay. I can take  
25 that.

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