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From: Bill Rozeboom [<mailto:BRozeboom@nhc-sea.com>]

Sent: Wednesday, December 20, 2000 5:23 PM

To: Eglick, Peter J.; Stock, Kevin L.

Re: SeaTac 3rd Lagoon Expansion

Following is a summary of excerpts on IWS issues from Northwest Hydraulic Consultants' previous comment letters.

From letter of November 24, 1999:

Comment 4 - KCSWDM Core Requirement 1: Discharge at the Natural Location. (Similar to Ecology's Minimum Requirement #2) The objective of this requirement is to protect downstream properties from increased or reduced flows due to changes in basin area. The SMP does not address this requirement, and provides insufficient basin mapping to understand how sub-basin divides will be affected by the development. There are several areas of probable non-compliance. For example, peak flow control in the Miller Creek and Des Moines Creek basins is proposed to be provided in part by diverting a total of 45.7 acres (SMP Table 4-5) of new impervious area to the Industrial Wastewater System (IWS). Significant basin area reductions will reduce erosive peak flows but will also reduce the middle-range and low flows which support habitat functions. Actual impacts in the Miller, Walker, and Des Moines Creeks are not known because the core requirement for discharge at the natural location has not been addressed in the SMP.

Comment 18 - It is unclear how stormwater runoff from areas tributary to the Industrial Wastewater System (IWS) has been handled in the modeling and what effect this has had on model calibration and target flows. Significant land areas are involved: the IWS handles runoff from about 254 acres under existing (1995) conditions and will be expanded to handle runoff from about 320 acres in the future. According to the report for the 1995 Montgomery Water Group (MWG) HSPF model, areas tributary to the IWS were not included in the HSPF model. However, these areas may in fact influence streamflows. The MWG report (pg G-8) indicates that the IWS has a hydraulic capacity of between the 10- and 25-year storm events and that overflow during more extreme events will overflow to the stormwater system. SMP Table 3-5 (pg 3-9) lists IWS areas totaling 78 acres which depend on pump systems with a capacity of only 6-month or 2-year events, after which runoff will overflow to the stormwater system. If the HSPF modeling and detention facility designs have ignored runoff contributions from the IWS areas, as seems to have occurred in the 1995 MWG study, the detention facilities will be undersized and not meet performance objectives for events

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which exceed the IWS system capacities. SMP pg 3-9 states that the most recent hydraulic models have incorporated appropriate flow splits between the IWS and stormwater systems. There appears to be an inconsistency in that the old (1995) model which excluded all IWS areas identified a need for 92.0 acre-feet of detention storage whereas the current SMP (pg 4-15) which is supposed to include stormwater overflows from the IWS is indicating a lesser requirement of 76.6 acre-feet of storage.

From letter of September 25, 2000:

Airport wastewater system effects on seepage and base flows not assessed or mitigated

For permitting and regulatory purposes, the Port has sought to describe ongoing and proposed improvements to the Industrial Wastewater System (IWS) as being separate and distinct from the Master Plan Update (MPU) improvements. However, the IWS system is a major component of the airport's overall storm drain system. The IWS has a direct significant impact on seepage and base flows in the Walker and Des Moines Creek systems by its removal of large areas of basin which would naturally form the headwater recharge areas for those streams.

SMP Figure B1-3 shows groundwater flow boundaries in the area of the airport - the areas from which the water for Walker Creek and Des Moines Creek wetland seepage and stream base flow originates. SMP Figure A-7 shows the proposed future land use and areas served by the IWS. Comparison of these figures shows that the IWS system intercepts and controls a significant portion (approximately half) of the basin which would have provided seepage and base flows to Walker Creek. Lesser, but still significant, areas of the Des Moines Creek headwater areas are also controlled by the IWS. Until recently, the effects of these diversions have been offset somewhat by IWS system losses by infiltration at the IWS storage lagoons located near the groundwater divide between Walker and Des Moines Creeks. However, those lagoons are now being lined in order to protect groundwater quality.

Our source of information on the history and status of the IWS system is from a recent hydrogeologic study by AESI Associated Earth Sciences, Inc., "Hydrogeologic Study, Industrial Waste System (IWS) Plant and Lagoons, Seattle Tacoma International Airport," prepared for Port of Seattle, June 21, 2000.. Lagoon 1 has been used to store wastewater since 1965. Lagoon 2 was built in 1972 and "is utilized during times of heavy rainfall events." Lagoon 3 was constructed in 1979 and "is used to provide excess storage capacity for industrial wastewater in the event that Lagoons 1 and 2 reach capacity." The bottoms of the lagoons most regularly in service - Lagoons 1 and 2 - were reportedly "composed of compacted gravelly sand" which should have a relatively high infiltration capacity. A program to install leak prevention liner systems in the lagoons has been underway since 1996: Lagoon 1 was lined in 1996, Lagoon 2 was lined in 1997, and construction documents have been prepared for Lagoon 3 to be lined in the near future. The flow augmentation recommendations in the 1997 Des Moines Creek Basin Plan were likely based on data which did not reflect

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impacts of the lagoon linings.

We are unaware of any evaluation having been made of impacts of the IWS system on seepage or base flows in the Walker and Des Moines Creek systems. For Walker Creek, the key issue is what pre-development condition should be targeted for purposes of retrofitting the storm drain systems - are flow targets established for a natural state, or with the IWS diversions already in place. For Des Moines Creek, a key issue is how much additional base flow mitigation will be needed (by a well or other auxiliary supply) to make up for the return flow (base flow) lost due to the lagoons being lined. The AESI study (page 20) concluded "in the vicinity of the (IWS Lagoons) study area this aquifer eventually discharges along areas of Des Moines creek located about 800 feet south of Lagoon 3." It follows that lining the lagoons may cause a direct reduction in the quantity of base flow discharge from the aquifer to Des Moines Creek.

From letter of September 27, 2000:

Feasibility of Stormwater Controls through IWS Improvements not Demonstrated

Stormwater peak flow control for the SMP is proposed to be accomplished in part by past and future diversions of runoff from the Des Moines and Miller Creek basins to the Industrial Wastewater System (IWS). The King County September 2000 review of the SMP included a comment that the assumed IWS system processing rates might not be reasonable, and concluded that "...if either of the two improvements (doubling processing rate, and increasing storage capacity to 81.4 million gallons) did not occur, overtopping of the IWS lagoons would be [a] significant issue." As discussed below, there is no certainty that those improvements will be implemented.

Our most recent comments on the IWS system improvements were by email to Ecology (Tom Luster, Kevin Fitzpatrick) and others on July 31, 2000. The stated purpose of that email was: "to record our initial comments following a review of materials describing the SeaTac International Airport Industrial Wastewater System (IWS) Lagoon # 3 Expansion Project. The focus of our review was to identify issues in that project which need to be addressed concurrently with plans for 3rd runway expansion and the Stormwater Management Plan for other (non-IWS) Master Plan Update Improvements." An email responseAn email copy of the cited email correspondence chain is available by email request to bRozeboom@nhc-sea.com. from Ecology (Chung Yee) was received on September 7, 2000 but was non-responsive to many of the issues raised. Outstanding issues include the need for continuous simulation modeling and resolution of conflicts with FAA guidelines on Hazardous Wildlife Attractants.

Lack of continuous simulation modeling for IWS lagoons: The Port has ignored past requests for an assessment of the IWS lagoons using continuous simulation modeling. To our knowledge, the most recent engineering report describing the IWS expansion project is the "Addendum to IWS Engineering Report" dated April 1998 by Kennedy/Jenks Consultants. The Ecology review of that report is

contained in a comment letter dated June 9, 1998 from Ecology (Lisa Zinner) to the Port of Seattle and states in part:

"An important consideration for the sizing of the expanded lagoon 3 is the estimated frequency of bypass that may occur. I would like more information on the predicted frequency of bypass using continuous flow modeling and the NOAA rain data for Sea-Tac Airport."

It is our understanding that the Port has not responded to this request. And, more than two years after that request, the King County review comment of the August 2000 SMP includes what amounts to the identical observation: "There should be results from the HSPF model runs of the IWS system in this section. SBUH is a poor choice to use in determining size requirements of the storage reservoir. . . KCSWDM does not allow sizing of storage reservoirs using event based models."

The capacity of the IWS system to handle increased flows without storm drain overflow to the stream systems under flood conditions--even with the optimistic assumptions of greatly expanded storage capacity and doubling of the processing rate--is not confirmed in the SMP.

Proposed lagoon expansion is incompatible with safe airport operations. The FAA has published guidelines in Advisory Circular 150/5200-33 dated 5/1/97, titled "Hazardous Wildlife Attractants on or Near Airports." The proposed expansion of Lagoon 3 would be for the purpose of storing and pre-treating liquid industrial wastes, and would therefore fall under the Advisory Circular's definition of a wastewater treatment facility. Section 2 of the Advisory Circular, "Land Uses that are Incompatible with Safe Airport Operations" recommends that any new wastewater treatment facilities or associated settling ponds be sited no closer than 10,000 feet from turbine aircraft movement areas. The existing third lagoon is located within 2,000 feet of the runway, and the proposed new expansion area is within 3,000 feet of the runway. The proposed expansion of the lagoon facilities, as assumed for purposes of SMP facility design, appears to be in direct conflict with the FAA guidelines.

Feasibility of proposed IWS discharge rate is not established. To our knowledge, the future processing rate to be achieved from the IWS system is a variable which has yet to be designed and/or negotiated. If the Port intends to rely on system performance predictions in the latest (April 1998) IWS design report, then it can be inferred that the Port may be anticipating a processing rate which is very substantially less than the 4 MGD rate presented for purposes of the King County review of the SMP.

The amount of the presently-proposed lagoon expansion--to 72 MG--is not proposed or described in the IWS design report. Instead, the design report (page D-1) indicates that the required lagoon size is dependent on the available release rate--a 47 MG lagoon would be required for a release rate of 4 MGD while a larger 67 MG lagoon would be required for a release rate of 2 MGD. The report does not indicate what release rate would be associated with a 72 MG lagoon. The proposed expansion to 72 MG is understood to have been established as simply "the maximum possible capacity within the available area information provided by

email from Ecology (Chung Yee), with reference to a letter dated November 10, 1999, from Michael D. Feldman of the Port to Kevin Fitzpatrick of Ecology.."

The IWS design report provides information to suggest that there are benefits to having a lower processing rate. First, there are questions as to what local publicly owned treatment works will accept the IWS effluent, and at what maximum delivery rate. If King County will accept the IWS discharge, a permit will be required from the King County Department of Natural Resources through its Industrial Waste Program. The IWS design report (page 4-4, Alternative A3) cites a major cost incentive for having a reduced IWS processing rate of 1 MGD in that effluent "can be metered to KCDNR at a controlled rate during off-peak hours, which is an operating benefit to KCDNR and a cost savings to the Port. . . the annual operating costs are approximately half of Alternative A1 Alternative A1 involves enlarging Lagoon 3 to 47 MG and discharging 4 MGD to King County. Disadvantages to Alternative A1 include : "Very high annual operating costs for the first 20 years. . ." and "A new pretreatment permit with KCDNR must be obtained and complied with.": \$2.9 million versus \$5.8 million."

In summary, the available design information for the IWS improvements casts doubt on whether the proposals to greatly expand lagoon storage capacity, and to double processing rates, are feasible or will be implemented as assumed for purposes of stormwater system planning. This is problematic for ensuring the adequacy of the proposed stormwater system because IWS capacity has a direct impact on the size of required stormwater facilities, yet the IWS system is being designed and permitted through processes which appear to be largely independent of the design and review processes for stormwater system planning.

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