Rozeboom
EXHIBIT NO. 240
2-5-02
M. Green

September 25, 2000

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Washington State Department of Ecology
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Subject: Preliminary Comments (Set 2) on August 2000 Stormwater Management Plan for Seattle-Tacoma International Airport Master Plan Update Improvements.

This letter is our second installment of preliminary review comments on the August 2000 Stormwater Management Plan, and should be read as a continuation of our letter dated September 21, 2000. As explained in the first installment, our comments are being provided on an incremental basis because of delays in our being provided the SMP and the lack of adequate time to provide comprehensive review comments.

This letter focuses on project impacts to stream base flows and seepage flows to wetlands. The current SMP does not adequately assess project impacts and does not demonstrate that there will be appropriate mitigation for predictable project impacts. These are not new concerns. The August 2000 SMP continues to provide conflicting information which fails to consistently recognize the impacts and consequently fails to propose sufficient mitigation. We recently questioned the Port's commitment to base flow mitigation and preservation of seepage flows during a meeting with Ecology on August 3, 2000 with follow-up by an email on August 7, 2000 from Bill Rozeboom to Eric Stockdale as follows:

> *At our meeting last week, you asked me to provide something in writing to supplement my statement that the present design offers no assurance that seepage flows will be preserved to wetlands below the proposed 3rd embankment.*
>
> *My statement is based in part on the following text which is in the public record from the Port's March 10, 2000 response to 401/404 comments. . . In the text which follows, the part of greatest relevance to your concerns is the part which reads, "Base flow mitigation from the embankment cannot be committed to in the event that the embankment cannot contribute to base flow without compromising stability." To my knowledge, base flow from the embankment is the same water which also provides the seepage flow hydrology to the wetlands below the embankment. A statement that there is no commitment to base*

flow mitigation from the embankment is equivalent to a statement that there is no commitment to preserving seepage flows to wetlands below the embankment.

---start of excerpt text from Port document---

20. Section 2.4.5 of the SMP describes the unfeasibility of creating an enhanced artificial aquifer (emphasis added). Considering other geotechnical considerations, this is a prudent decision. However, the Port has identified the potential for "natural" recharge into the proposed embankment (Appendix B of the Revised Draft Wetland Functional Assessment and Impact Analysis report (Parametrix 1999)). The potential flow benefits of the embankment have been left out when calculating base flow, which means that future base flow from the embankment has likely been underestimated. The Port has not described this as potential mitigation because the primary objective of the design must be stability; including the potential flow benefits. Base flow mitigation from the embankment cannot be committed to in the event that the embankment cannot contribute to base flow without compromising stability. As described in the SMP, base flow impacts are mitigated, and flow from the embankment need not be quantified.

The Governor's Certificate does not require that stormwater be infiltrated from the stormwater vaults. This would be infeasible for the same reasons described above.

---end of excerpt text from Port document---

The Port's response to that email was contained in a Technical Memorandum dated September 5, 2000 from Elizabeth Leavitt to Ray Helwig. The substance of the response is that, because the embankment is more than 60 percent pervious surface (and less than 30 percent impervious surface), rainwater which falls on the pervious surface will infiltrate, pass through the fill material, seep from the embankment, and be directed to wetlands. Therefore, according to the Port, "there is a commitment to preserve seepage flows to the wetland below the embankment." We agree that some seepage flows to the wetlands (and base flows to the streams) will be preserved under the Port's proposal. However, the available analyses and data indicate that the surviving seepage flows (and base flows) will be diminished in quantity and, depending on the materials imported for embankment fill, possibly impaired in quality. The Port's present commitment to preserving seepage flows does not provide any assurance as to the future quantity or quality of those flows.

Ms. Leavitt's memo (pages 3 and 4) misrepresents the *SeaTac Runway Fill Hydrologic Studies Report* (Ecology, 2000) as "The analysis concludes (pages 7, 51, 52, and 60) that the loss of these downslope wetlands would not occur as a result of seepage into the embankment and the delay in water movement through the embankment." The Ecology study was given a very narrow scope of work and the results do not support the Port's interpretation. The Ecology study executive summary discussion on wetland hydroperiod (page 7) indicates that "Recharge would be 11 percent less. . .the total quantity of water flowing to the wetlands would decrease because total recharge would decrease." However, from page 49 of the Ecology study it is apparent that this 11% reduction in local recharge "is applicable to a relatively small area and is not representative of changes anticipated from the combined Master Plan Improvements." Still on page 49, the report concludes that "...a confident assessment of basin-wide recharge and baseflow impacts is currently lacking." As to any flow attenuation/timing benefits of the embankment fill, it must be cautioned that the Ecology study looked at flow with a "slice model" taken through the tallest (thickest) segment of the embankment where flow attenuation would be the greatest, and that the attenuation predicted at this single slice will not be typical of effects for the embankment as a whole.

SMP seepage/base flow conclusions are inconsistent with the SMP data

The Port's documents continue to provide conflicting information as to the seepage and base flow impacts which should be expected as a result of embankment construction for the third runway. The September 2000 King County review of the SMP included the comment, referencing SMP page 6-6 paragraph 2, "It is inconsistent for the SMP to claim that the fill will provide increased groundwater recharge when modeling work has shown otherwise." We will expand on this observation by King County.

There are significant inconsistencies in the evaluation of the project's base flow impacts. It appears that the analysis presented in Appendix F does not rely on the same hydrologic model parameters as used elsewhere in the SMP. Most significantly, the base flow impact analysis appears to have relied on hydrologic model parameters for the fill embankment which are quite different from those presented in Table A-4, which we understand was based on calibration of the HSPF model to actual fill embankment runoff data. We have attempted to repeat the analysis presented in Appendix F using the HSPF model and the calibrated model parameters for the fill embankment. This re-analysis indicates that the fill embankment produces groundwater plus interflow totaling about 44% of the average annual rainfall as opposed to the 63.6% presented in Appendix F. The analysis presented in Appendix F seems to us a circuitous approach to estimating base flow impacts when such impacts could be obtained directly from modeling results. Accordingly, we have applied HSPF to directly model pre- and post-development runoff from STIA subbasins SDW1A and SDW1B and find that average groundwater inputs to Miller Creek from these two basins alone are predicted to be reduced by 0.10 cfs in July and 0.09 cfs in August. These figures (for just two sub-basins) are approximately twice the "conservative" values for total reductions in summer groundwater from all Miller Creek subbasins reported in the SMP (SMP page 6-6).

At several places in the SMP, the fill embankment is characterized as behaving like outwash, implying an ability to store significant amounts of groundwater and release this over an extended period of time to the benefit of base flows. For example, Volume 1 of the SMP (page 6-6) states that the structural fill "should have a relatively permeable soil zone that absorbs rainfall for subsequent discharge to groundwater". These statements appear to be contradicted by actual monitoring data that shows the 1998 fill embankment to have low surface infiltration and high internal drainage rates. This results in large amounts of surface runoff and a rapid groundwater and interflow response, with a significantly reduced ability to hold and release water during the dry summer months. This has the direct effect of reducing summer seepage flows to wetlands downslope of the embankment and reducing summer base flows.

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[1]. 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 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 <u>additional</u> 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.

Representativeness of Airport Fill Parameters is Uncertain

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[1]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.

SMP Appendix A, Page 1-16, provides a limited discussion of the flow data used to establish hydrologic response parameters for areas of airport fill. There is insufficient information to judge how representative the 1998 embankment fill is of proposed overall embankment conditions.

However, if the sediment pond at the 1998 embankment site is intercepting interflow and base flow as stated, it is probable that the pond will intercept groundwater originating from beyond the immediate area of the fill. In particular see SMP Figure B1-3 which shows that groundwater flow in the area of the 1998 embankment will originate from well beyond the immediate footprint of the 1998 embankment. This is of particular consequence in that the "calibrated" airport fill parameters might be significantly overstating the amount of interflow and groundwater which will be produced on a unit-area basis, with the result that predicted impacts to seepage and base flow might be significantly understated.

Mitigation Drawings Inconsistent with Grading Plan Drawings

There are notable discrepancies between the construction plans presented in Appendix D of the Design Drawings for the Natural Resources Mitigation Plan (Parametrix, Inc) versus the Grading Plans presented in the Stormwater Facilities Plan (SMP Appendix Q - HNTB). The discrepancies can be illustrated by a comparison of Mitigation Plan Sheet C4 (Parametrix) against Grading Plan Sheet C115 (HNTB) which show the same area. Similar discrepancies exist on other plan sheets.

The mitigation plan drawings show a replacement drainage channel located to the west of the security road, at the toe of the embankment. This is inconsistent with the grading plans which show a replacement drainage channel located to the east of the security road, in fill soils about 10 feet higher than the toe of the embankment.

According to the August 2000 Implementation Addendum for the Natural Resources Mitigation Plan (page 62), the design objective for the replacement drainage channels is to "collect seepage water to maintain baseflows to downslope wetlands along Miller Creek." That objective will not be achieved with the current grading plans because the drainage swales, as shown on the Grading Plans, will not intercept the constructed drainage blanket which will daylight at the toe of the embankment. Instead, the swales will primarily collect concentrated and flashy peak flow surface runoff from the face of the embankment, rather than naturally-attenuated groundwater seepage flows.

A second major discrepancy between the grading plans and the mitigation plans is that the mitigation plans do not account for the benches (and ditches) which will be constructed across the face of the into the embankment slope at increments of about 30-foot vertical spacing. These benches will further intercept and concentrate surface runoff as well as some interflow (shallow groundwater flow). The plans do not indicate how embankment-face runoff water will be directed into the stormwater detention ponds, as would be needed to be consistent with the stormwater management plan modeling assumptions. Both sets of plans are incomplete because there is no mechanism proposed for providing peak flow control of runoff which will be produced from the face of the embankment slope, prior to discharging that runoff to streams or wetlands.

Thank you for your consideration of this second set of comments. We are continuing our review and expect to submit additional comments to your office on September 27, 2000.

Sincerely,

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