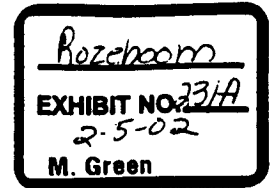


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May 3, 2000

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Subject: Follow-up comments on stormwater management plan for proposed 3rd runway development actions at Seattle-Tacoma International Airport.

Northwest Hydraulic Consultants (nhc) has been retained on behalf of the Airport Communities Coalition to provide a technical review of stormwater facilities and related streamflow impacts from the proposed 3rd runway development at SeaTac airport. By a letter dated November 24, 1999, we provided our initial comments from a technical review of documents describing the Stormwater Management Plan (SMP) for Master Plan Update Improvements at Seattle-Tacoma International Airport.

Responses to public comments, including those submitted by nhc, were made in a document dated March 10, 2000, by or on behalf of the Port of Seattle. The purpose of this letter is to provide follow-up comments based on those responses, and on a review of recently-released hydrologic model input files which were used for the SMP. The input files at issue were the basis for hydrologic aspects of environmental impact assessments and for analyses of mitigation measures including existing and proposed regional detention facilities. Those input files were not published with the November 1999 SMP but were made available to us on March 7, 2000, at the same time as the input files were provided to King County for review.

The response document dated March 10, 2000, satisfactorily addresses very few of our concerns raised previously. Instead, our concerns have been confirmed and heightened by findings of numerous, significant discrepancies and inconsistencies in the hydrologic modeling files, and by the apparent absence of a local regulatory technical review process to confirm the adequacy of current or future stormwater facility designs.

Data and comments from our initial assessment of the hydrologic model input files were provided to the Port, Parametrix, Ecology, and King County by email on April 4, 2000. Our assessment of those files focused on identifying possible causes of seemingly-erroneous model results which led to the conclusion in our November 24 comment letter that something was "seriously wrong" with simulated flows in the Miller Creek basin. Close inspection of the files identified major inconsistencies in the soil types which had been assumed for the upper Miller Creek Basin. Specifically, predominantly till soils consistent with data published in the SMP were found to have been used for establishing flow regime performance targets, but predominantly outwash soils were used in the models for predicting detention facility performance. There were also numerous unexplained discrepancies in the runoff parameters used for the various hydrologic input files, including but not limited to the use of four separate sets of parameters to simulate runoff from areas of airport fill, with apparent inconsistencies by both the basin (Miller vs. Des Moines) and scenario (current vs. future) being assessed.

The discrepancies identified in the hydrologic input files would in our opinion result in inaccurate predictions of facility performance and offer an explanation for our previous conclusion that something is seriously wrong with simulated flows in Miller Creek. We expect that independent reviews of the hydrologic modeling now in progress by King County and by Pacific Groundwater Group (under separate contracts with Ecology) will corroborate our concerns. We see several ramifications of these model discrepancies.

- First, the Miller Creek streamflow analysis in the November 1999 SMP is seriously flawed. The analysis cannot be used to make any conclusions about the future flow conditions below the Regional Detention Facility (RDF) in relation to pre-development (forested basin) Level 2 flow targets because the future condition and pre-development condition models assume significantly different soil coverages.
- Second, a reassessment is needed of the flow targets proposed in the SMP for airport facilities. The reasonableness of proposed Level 1 and existing development (1994) Level 2 flow targets for airport facilities is now unknown. Those flow targets had been proposed and justified with the critical (and now-unsupported) assumption that regional facilities would achieve the pre-development (forested basin) Level 2 targets.
- Third, the problems in the modeling and analyses are so fundamental and so pervasive that a complete overhaul appears to be required to the SMP hydrologic modeling of Miller Creek and its tributary, Walker Creek. That overhaul should begin with calibration to the recorded streamflow data for both creeks, and should include an independent detailed technical review of model calibration and establishment of target flow regimes.

With that prelude, our follow-up comments below are numbered to correspond to the numbering used in both our November 24, 1999, letter and the Port's March 10, 2000, response.

1. It is not clear what stormwater manual defines the local regulatory requirement for the proposed development. The current municipal code for the city of SeaTac has adopted the 1998 version of the King County Surface Water Design Manual (KCSWDM). However, the 09/04/97 Interlocal Agreement (ILA) between the Port and the city of SeaTac apparently specifies that the Port shall follow the KCSWDM as existing on the date of the agreement. The 1998 KCSWDM is substantially different from the (1990, with subsequent revisions) version of the KCSWDM which existed on the

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date of the ILA agreement. It should be clarified whether the project is to be designed/regulated under the 1990 or 1998 versions of the KCSWDM. (Our remaining comments assume that project is to be designed/regulated under the 1998 version of the KCSWDM.)

2. It is not clear how or why the Port would not be obligated to follow the requirement from KCSWDM Chapter 1.1.2 for a large site drainage review. It should be clarified whether the Port is claiming to be exempt from all drainage review requirements specified by KCSWDM Chapter 1.1.2, or only those requirements specific to large site developments.

It is unclear whether the ILA provides for any drainage reviews by the city of SeaTac to confirm compliance with whichever version of the KCSWDM is determined to define regulatory/design requirements. We are unaware of any review comments by the city of SeaTac on either the November 1999 SMP or on stormwater elements of the proposed SR 509 temporary interchange project associated with the 3rd runway development. In both cases, the initial design proposals have been found (by King County and WSDOT respectively) to not satisfy basic requirements of the KCSWDM and to require substantial revisions. To our knowledge, neither King County nor WSDOT will have any regulatory authority to review or approve detailed designs for any of the future proposed improvements to be constructed entirely within the city of SeaTac, outside of a WSDOT right of way. The apparent lack of local regulatory oversight to provide technical design review of Port stormwater projects within the city of SeaTac is a significant concern given the scope and complexity of the work being proposed and the confirmed significant problems in the preliminary design documents.

3. The response is non-responsive to our comment that the SMP does not satisfy the procedural element of the KCSWDM-referenced Master Drainage Plan review process. That procedural element involves four stages/opportunities for review and comment on the sufficiency of stormwater facilities: 1) Preliminary Draft MDP; 2) Draft MDP; 3) Recommended MDP; and 4) Hearing Examiner Process. The benefit of this MDP process is that significant issues are identified at an early stage so that reliable design tools/techniques are established prior to advancing to (and incurring the costs of) detailed design. In our opinion, the attempt with the November 1999 SMP to advance directly to the project approval stage (equivalent to hearing examiner process) has proven to be a highly inefficient means of identifying significant fundamental issues which should have been addressed at a much earlier stage in the design/review process.
4. The response does not satisfy our comment regarding the core requirement for discharge at the natural location. The assertion in the reply that "The SMP also demonstrates how basin areas are unchanged" is not supported by SMP Section 4.3.4 which is titled "Changes in Drainage Areas."

We agree that the KCSWDM allows for direct discharge to the Puget Sound. However, the SMP does not address the need to demonstrate per KCSWDM page 1-29 that "The direct discharge proposal will not divert flows from or increase flows to an existing wetland or stream sufficient to cause a significant adverse impact." The flow duration analysis presented in the SMP deals only with erosive flows beginning at about one half of a 2-year peak instantaneous flow. The range of flows discussed in the SMP occur only about 1% of the time in total, and represent conditions equivalent to only about 4 days per year. The SMP presents no information on how the proposed flow diversions will affect non-erosive "ordinary" discharges representing stream flow conditions for about

99% of the time or 361 days per year. An assessment is needed to determine whether the proposed out-of-basin diversions (proposed as mitigation for erosive flow concerns) will have any significant adverse impacts on the more ordinary, non-erosive, habitat-sustaining, flows.

We note also that the Governor's Certificate¹ for this project requires that the project will not change the hydrologic divide between Miller and Des Moines Creeks "in a manner which alters the average instream flow of either creek." The SMP does not provide information on the average flow of either creek for either existing or proposed future conditions, and therefore does not address this condition from the Governor's Certificate.

5. We agree that if the most restrictive flow control standard is adopted and is demonstrated to be met, there is no need to conduct an off-site analysis for purposes of determining an appropriate flow control standard. The most restrictive flow control standard proposed in the SMP is a Level 2 flow duration matching standard with pre-developed target conditions defined from the scenario of a predominantly undeveloped, forested basin, with 10% or less impervious surface. However, due to the modeling discrepancies noted in our opening remarks, the SMP has not demonstrated that this standard will be met.

The most restrictive standard is not a Level 2 standard which matches 1994 conditions. That lesser interpretation of a Level 2 standard, which is proposed in the SMP for some airport facilities, would simply preserve and perpetuate current erosion problems.

6. Same as Comment 5 above.

7. We agree that there is no need to "over-detain" stormwater flows if the most restrictive standard (Comment 5 above) is met by regional facilities. However, as noted above, it has not yet been demonstrated that the existing Miller Creek Regional Detention Facility (RDF) is sufficient to achieve that target flow regime. Also, the Des Moines Creek RDF is a proposed facility which does not yet exist and which may or may not be implemented for reasons beyond the Port's control. In the event that the proposed Des Moines Creek RDF is not constructed, the SMP text indicates a contingency plan to provide Level 2 detention to a lesser standard using 1994 as a base year². That contingency plan would not accomplish the goal of reduced erosion in the Des Moines Creek basin, but would rather preserve the (1994) existing level of erosive flows.

¹Letter dated June 30, 1997, from Governor Gary Locke to Rodney Slater, Secretary, U.S. Department of Transportation.

²This text in the SMP is inconsistent with the 11/99 Biological Assessment Figure 4-3 (following BA pg 4-26) which shows that the proposed flow conditions with the STIA retrofit alternative (the contingency plan should the RDF not be constructed) are identical to the proposed flow conditions with the Des Moines Creek RDF alternative. SMP Figure 4-5 is substantially identical to BA Figure 4-3 except that the label indicating equivalency of flow conditions between the Des Moines Creek RDF and STIA retrofit alternatives is eliminated in the SMP. The SMP text on page 2-4 indicates that the two alternatives would use significantly different performance targets which would logically result in two significantly different flow regimes in Des Moines Creek.

The response comments have served to clarify our earlier confusion over the level of flow control being proposed. The SMP "Level 2" flow control is in fact being used to describe two very different standards, as distinguished below.

- i) To our knowledge, all of the flow duration curves presented in the SMP and related documents show a "Level 2" standard which is measured or satisfied relative to flows for pre-development, forested (max 10% impervious) basin conditions. This standard should reduce presently-excessive peak flows and associated erosion to a level which restores relatively stable, natural, stream channel conditions.
- ii) We now understand that much of the text in the SMP which discusses "Level 2" flow control for airport-designed facilities is describing a very different performance standard. SMP Table 4-6 clarifies that the Level 2 performance standard for airport-constructed facilities is intended to be based on the basin development (land uses) which existed in 1994. Absent over-control by other offsite (regional) facilities, this lesser standard will preserve existing flow conditions and, by association, preserve and perpetuate existing erosion problems.

The performance standards for flow control need to be clarified. We note that the discussion of stormwater management presented in the project's August 1999 Natural Resource Mitigation Plan is prefaced (page 6-1) with, "*The Port is currently negotiating with Ecology on which standards will apply for stormwater detention and treatment, and the accepted methodologies for applying those standards. . .*" If there is a commitment to a contingency plan to size facilities sufficient to satisfy the more restrictive of the Level 2 standards described above, the SMP text (pg 2-4) needs to be revised and the commitment needs be clearly stated.

8. The response does not satisfy our comment regarding the core requirement for conveyance system calculations, sufficient for design review of those calculations. Does the FFA Advisory Circular on Airport Drainage provide design specifications for conveyance and energy dissipation of runoff which needs to be dropped more than 120 vertical feet into detention ponds? Do FFA staff provide detailed design review/approval of all aspects of airport drainage systems including off-site detention ponds and outfalls to streams and wetlands?
9. The response does not satisfy our comment regarding the core requirement for financial guarantees. The issue raised is that there needs to be a cost estimate and sufficient funding to support the worst-case scenario which in this case would appear to involve the need for all facilities to provide pre-development (forested basin) Level 2 flow control with relatively-expensive enclosed vault systems. A contingency plan which cannot be implemented due to financial or other constraints is of uncertain value.

The importance of costs and financing is also cited in a letter report dated November 10, 1999, to the US Army Corps of Engineers by Keith Macdonald, Ph.D., of CH2M Hill, who was hired by the Port to "prepare an objective, independent, peer review of the natural resources mitigation program" for the proposed Master Plan Update Improvements. Dr. Macdonald states that "Obviously, the success of the mitigation depends on the effectiveness of implementation and monitoring. . . It is critical that sufficient guaranteed funding be available. . ."

10. The response does not satisfy our comment regarding the need to assess durations of waterfowl-attracting standing open water with continuous simulation modeling, not a drain time calculation. HSPF continuous simulation modeling is already being used for this project, and the data needed for an accurate assessment of open water durations should be readily available. We disagree with the assertion that it is conservative to measure the open water duration as the time it takes for a pond to drain after the storm has stopped. The problem with this SMP analysis is that it ignores the reality of prolonged periods of wet weather in the Puget Sound area.

We appreciate that the Port may have demonstrated the ability to construct large underground detention facilities and to use wildlife deterrents. That does not change our opinion that the SMP should provide the analysis needed to determine whether such measures will be required for the facilities being proposed.

11. See Comment 10 above.

12. The response has clarified the issue of what performance standards are being used for the design of individual facilities, and what downstream points are being assumed to measure compliance. However, the response does not fully satisfy the part of our comment regarding confirmation that facilities achieve the required level of flow control. And, while preliminary design information is given for several of the proposed facilities, the SMP provides very little information for the Walker Creek facility.

We understand that the King County initial review of the SMP has included a detailed examination of the design performance of individual facilities, and that a revised document is being prepared by the Port to address the County's concerns. Pending those revisions, we have no additional comments at this time on points of compliance or on the preliminary design of individual facilities.

13. The response does not satisfy our comment that application of an "Enhanced Level 1 flow control standard" is likely to cause increases in erosive streamflows. We should have clarified that the areas of interest/concern are not the main stem channels below the existing and proposed (Level 2) regional detention facilities, but rather the tributary streams immediately below the Level 1 facilities.

From SMP Table 4-6, the following "Enhanced Level 1" facilities are proposed: 1) two vaults which will discharge to a Miller Creek tributary (upstream of the Miller Creek detention facility); 2) the SASA detention pond which will discharge to the East Branch of Des Moines Creek; and 3) two vaults which will discharge to the West Branch of Des Moines Creek. The stream reaches at some risk for increased erosion are the Miller Creek tributary (above the existing RDF) and both the East and West Branch tributaries to Des Moines Creek (above the proposed RDF). We have no knowledge of the condition of those tributaries and are unable to offer an opinion at this time on whether the potential for increased erosion in the affected stream reaches is of any concern or consequence. Because the SMP has only examined points of compliance which are below the regional detention facilities, the document presents no information on how these tributaries may be affected by the proposed Level 1 facilities.

14. The response does not address our comment that something is "seriously wrong" with the SMP Miller Creek hydrologic modeling analysis which produced target flows which were significantly

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higher than current-conditions flows. See our opening remarks which identify specific inconsistencies in the hydrologic modeling input files and which are a likely cause of significant problems with the hydrologic modeling.

Also, the response mis-characterizes the requirements of a KCSWDM Level 2 flow standard as being only "no increase in the established target flow." We have found that the requirements of a Level 2 flow standard have also been mis-stated in responses to comments by others, including a question by the US Fish & Wildlife Service following USFWS review of the Biological Assessment. The remainder of this comment presents an excerpt from our March 2000 (unpublished) review of Port/Parametrix responses to comments by USFWS, COE, and NMFS regarding the project Biological Assessment.

USFWS Comment 12 asked for the Port to quantify how a Level 2-type stream flow would benefit fish. The response correctly discussed prevention of increases in erosive flows. However, the response mis-characterized the definition of a Level 2 flow standard in a way which would be less protective of fish habitat.

The Port response to the USFWS comment stated that "The Level 2 flow control standard requires that peak storm flows be matched to existing conditions or reduced." This is inconsistent with the 1998 King County Surface Water Design Manual (pg 1-32) which states that "Level 2 flow control is a duration-matching performance standard which is effective in preventing increases in existing erosion rates." The requirement (KCSWDM pg 1-33) for Level 2 Flow Control is to "Match developed discharge durations to pre-developed durations for the range of pre-developed discharge rates from 50% of the 2-year peak flow up to the full 50-year peak flow, assuming existing site conditions (see Footnote 32, p.1-27) as the pre-developed condition."

The Level 2 flow requirement is for matching flow duration, not reducing peak flows. The wording proposed in the Port response would imply a lesser standard which would be less protective of fish habitat. Excessive reduction of peak flows can be harmful to fish resources because periodic movement of bed materials is needed to prevent siltation and cementing of the spawning gravels. Because peak flow control is proposed to be provided in part by significant diversions to the Industrial Wastewater System, the potential exists for excessive reduction of peak flows as well as excessive reduction of non-erosive flows.

15. No further comment. Access to the hydrologic modeling input files has answered our original question.
16. We disagree strongly with the response statement that "Miller Creek model calibration is not related to the selection and results of target flow analysis in the Miller Creek basin." Beyond that, we are unsure how to respond to the detailed response given to our request for information on calibration of the Miller Creek HSPF model.

On one hand, the calibration results presented in the response appear at first read to look quite good. On the other hand, detailed review of the model input files for the calibration has found that the calibration modeling has assumed soils which are very different from the basin soils described in the SMP and as summarized by response Figure 6 (pg 236). It is not clear why simulated flows from the

1995 FEIS model (with upper basin of 59% till and 35% outwash) were only about 60% of the recorded flow volumes at the upper gage, whereas the 1999 SMP revised model (with upper basin of 17% till and 66% outwash) now reports that simulated flows are approximately 11% greater than recorded flow volumes at the upper gage, based on a different period of record. Something does not seem right.

It is apparent that there have been considerable difficulties encountered in the modeling of the Miller Creek basin. As stated in our email review comments on the hydrologic modeling files, we suspect that these difficulties may reflect some deeper underlying issues related possibly to streamflow data accuracy or inaccurate assumptions for historical project operation of the Lake Reba or Miller Creek RDF facilities. We have heard anecdotally from King County that the operational gate settings for the Miller Creek RDF had to be changed from the original design settings when (in 1995?) it became apparent that the pond was at risk of overtopping. Unexpectedly high water levels would be consistent with modeling results which significantly underestimated inflow flow volumes. It would be useful to have a side-by-side comparison of model output from the 1995 (FEIS) and 1999 (SMP) models for a common period of record to confirm that the current model is in fact producing significantly greater flow volumes for the upper basin. It would also be useful to reconcile the soils assumed in the 1999 (SMP) model with the soils which actually exist in the basin.

Accurate model calibration is in our opinion vital to the sizing and assessment of regional detention facilities and in turn establishing appropriate levels of flow control for the project on-site detention facilities. Further analysis and review of the model calibration issue is still required. Our ability to provide further specific suggestions at this time is hampered by an insufficient understanding of the exact location of the upper stream gage site relative to the Lake Reba and Miller Creek Detention Facility control structures and facility inundation areas, and insufficient information on how those facilities have been operated during the period of model calibration.

17. See Comment 16 above.
18. The response does not address the point that changes in how IWS system flows were handled in the 1995 FEIS and 1999 SMP models are inconsistent with a lesser storage detention amount being identified in the 1999 analysis. However, this point is probably now moot in light of the specific discrepancies which have since been identified in the model input files for the 1999 analysis.
19. We agree that suitable (outwash) soils and local groundwater conditions are critical factors in determining if infiltration facilities would be suitable for providing peak flow control. Where there is doubt as to sufficient soil infiltration capacity during wet periods with high water table conditions, we agree that it is necessary and prudent to size facilities as though no infiltration would occur. Our main point (which was not addressed) is that the text of the SMP does not describe any effort towards identifying sites with suitable outwash soils and local groundwater conditions where infiltration facilities would be appropriate.

As a follow-up comment we note that the current KCSWDM (Section 5.1) requires that new single family subdivision projects construct downspout systems with some capacity to infiltrate water, without regard for the local soil type, recognizing that these systems will provide little or no flow control during the wet winter months. If soils and other local conditions are not suitable for

traditional engineered infiltration systems for the proposed airport master plan update improvements, some variation of the KCSWDM approach could be used to satisfy the commitment from the SMP that "infiltration is the highest priority for stormwater control." The concept which could be advanced for the airport would be to construct portions of the storm drain system using perforated pipe, in drain rock trenches, and thus offer some opportunity for infiltration during summer thunderstorm events and normally dry weather periods in general.

A good reason for providing stormwater infiltration systems which function at least during normally hot and dry periods would be to minimize temperature impacts in the receiving streams. Elevated water temperatures have been expressed as a concern in review comments by fisheries agencies. Summer cloudburst rainfall on hot tarmac surfaces would logically produce warm (and possibly even hot) runoff. The addition of dry-weather infiltration systems would minimize or prevent that risk that warm water runoff would cause adverse temperature impacts in the streams.

20. We agree with the need to establish structural stability as the primary objective for the embankment wall design. The response has clarified that "*base flow mitigation from the embankment cannot be committed to in the event that the embankment cannot contribute to base flow without compromising stability.*"

The response highlights the fact that there may be a need to minimize the quantity of water which is allowed to infiltrate into the body of the embankment. In the extreme, it would be possible to engineer a drainage system, for purposes of embankment stability, which would prevent virtually any water from infiltrating deeply into the embankment fill. This need to ensure structural stability may however conflict with the assumptions in the Stormwater Management Plan for the design of stormwater detention facilities, and with assumptions in the 8/99 Natural Resource Mitigation Plan (pg 5-88) that embankment seepage would be preserved as a source of wetland recharge³.

At this stage of project planning, there needs to be an initial determination of how much of the precipitation which falls on embankment areas can be allowed to infiltrate and how much will need to be intercepted and conveyed to the storm drain system. That determination will confirm whether it is reasonable to assume that the new embankment fill will have runoff/infiltration characteristics similar to the existing fill body, as has been assumed in the hydrologic modeling to date. If it is premature to make such a determination, it may be premature to design stormwater facilities to detain runoff from new embankment areas.

21. No further comment.

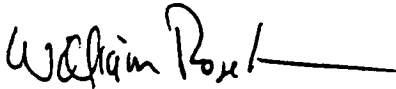
In summary, there continue to be major deficiencies in the analysis which may result in significant adverse impacts to the natural stream systems if the current version of the Preliminary Comprehensive Stormwater Management Plan (SMP) is approved and implemented as a basis for mitigation of project impacts. We request on behalf of the Airport Communities Coalition that, prior to regulatory certification or approval of the proposed 3rd runway project, the applicant be required to respond to the SMP issues we have raised in

³Reliance on embankment seepage as a source of wetland recharge is also found in the response to comments by the Environmental Protection Agency. See response document page 194. response to 4F-1 (1) and (5).

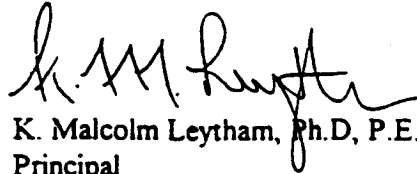
this letter, and that we be granted the opportunity to provide follow-up review and comment on that response.

Sincerely,

NORTHWEST HYDRAULIC CONSULTANTS, INC.



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