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Subject: Follow-up comments on stormwater, hydrology, and hydraulics aspects of proposed 3rd runway and related development actions at Seattle-Tacoma International Airport, Corps Reference No. 1996-4-02325.

Northwest Hydraulic Consultants has been retained on behalf of the Airport Communities Coalition to provide technical reviews of stormwater, hydrology, and hydraulics elements of proposed development actions at SeaTac airport. Our comments on the December 2000 version of the project stormwater management plan and related environmental documents were submitted to Ecology and the Corps in a letter dated February 15, 2001.

Responses to public comments, including those submitted by NHC, were made in a document dated April 30, 2001, by or on behalf of the Port of Seattle. The purpose of this letter is to provide our follow-up comments based on those Port responses.

Follow-up comments are provided below for each of the numbered points in our comment letter and in the Port's response. Those documents do not share a common numbering system. In order to facilitate cross-referencing to the prior documents, each comment below begins with "NHC xx; Port xx" to reference the corresponding comment and response numbers from our comment letter of February 15, 2001 and the Port's response document of April 30, 2001.

1. NHC 1; Port 1. In our opinion there is a need to eliminate ambiguity as to what stormwater standards will be applied for this project. A clear commitment is needed that the "updated" standards described in SMP Section 2.1.4 will be followed, and are not subject to further negotiation. Vague references to "the Port's stormwater management standards" (SMP page 6-3) are inappropriate and should be eliminated. Also, as noted in our original comment, it

is of concern that the now-approved major modification to the SeaTac Airport's NPDES permit has a requirement for stormwater management standards which are less stringent than the updated standards described in the SMP.

2. NHC 2; Port 2. The response does not address the substantive concern regarding the absence of a clearly-defined, post-SMP review process. The recent history for this project, particularly the major flaws in both the November 1999 and August 2000 versions of the project SMP, highlights the need for an independent design review to supplement the Port's quality assurance and review processes. Without certainty of ongoing, independent, competent review, there can be no reasonable assurance of project compliance with either King County surface water policies or Ecology conditions of approval for Section 401 Certification.

3. NHC 2; Port 3. The response is inconsistent with our understanding of the status and scope of the review work being conducted by King County. First, while the response asserts that the Port has "addressed all of the comments of the King County reviews," it is apparent from the record of subsequent Ecology-County-Port meeting notes that the King County review is an ongoing process which was not satisfied or concluded by the Port's initial responses. Second, the King County review was limited in several respects and did not consider airport impacts from non-Master Plan Projects (such as the post-1994 IWS expansion, IWS lagoon linings, or borrow pit mining) and did not assess compliance with state water quality standards. Our understanding of the study scope is based in part on the following statement from the second paragraph of King County's February 22, 2001 review findings letter: "*As with our previous review of this project, it is important to keep in mind the limitations of the work that we have performed. First, this review is limited to ascertaining whether the SMP attained minimum compliance with 1998 King County Surface Water Design Manual. Compliance with the technical provisions of the Design Manual does not mitigate all potential impacts of development and may not provide sufficient information to allow for approval under other codes and regulations.*"

4. NHC 3; Port 4. The response does not address the substantive concern regarding the cost of the proposed facilities and, per the Port's own consultant, that "Obviously, the success of the mitigation depends on the effectiveness of implementation and monitoring. . .It is critical that sufficient guaranteed funding be available. . ."

5. NHC 3; Port 4. Our comment on the unit cost of stormwater vaults was based on information provided in the SMP for Vault SDE-4. We examined the costs for all facilities shown in SMP Appendix M and selected Vault SDE-4 because 87% its costs were found to be determined by factors of basic structure cost, excavation, and backfill, all of which should be independent of whether the area had been previously developed. In contrast, we purposefully did NOT use unit cost information for SDS-3 Vault 3 which was found to have total unit costs about double those for SDE-4 due to significant (about 44% of total) costs relating to pre-development issues of removing existing pavement and constructing a new taxiway. If the Port's cost estimates are reliable, then the cost data provided in SMP Appendix M for Vault SDE-4 should provide a reasonable basis for estimating vault costs for areas of new construction. Given the Port's reluctance to provide cost estimates for storage vaults and ponds to provide peak flow control, it is of concern that the Port is using the costs

in Appendix M as justification that it is "not reasonably practicable" to construct Vault SDE-4 so that previously-developed areas can meet state water quality standards. Also see Comment 4 above.

6. NHC 4; Port 5 and 6. Response noted.

7. NHC 4; Port 5, 7, 8, and 9. Responses noted.

8. NHC 4 and 19; Port 10 and 40. The response fails to provide any analysis of the frequency and duration of standing open water in Lagoon 3 or other open water facilities. The Port's position seems to be that a realistic analysis of the frequency and duration of standing open water is irrelevant since bird attraction hazards will be controlled by other mitigation techniques.

9. NHC 5; Port 11. The amount of any "reserve storage" being proposed at stormwater facilities needs to be consistently included in SMP tables and exhibits. We agree that a distinction is needed between live storage and reserve storage.

10. NHC 5; Port 12. We disagree with the premise that the reserve storage proposal described in the SMP is a historical practice. The proposed reserve storage is not a water supply cistern from which water is regularly recharged and regularly withdrawn. The proposed reserve storage is also unlike the dead storage in a water quality wetpond in which a plug of old water is pushed out with each new storm event. Instead, the proposed reserve storage scheme involves a dead storage zone below the detention live storage. The reserve storage will be filled with the first fall or early winter storm and then function entirely as dead storage for up to nine months, accumulating whatever materials or pollutants might precipitate from the live storage zone during that time. Our point is that all of the reserve storage water will function like a dead storage zone for a very prolonged period prior to the water being put to use, and that the summer-period quality of the reserve storage water, and its suitability for low flow augmentation, is uncertain.

11. NHC 6; Port 13. Response that "The model has been calibrated and checked against the King County Gage 11F" is noted. Further comment will be offered once the results of that calibration and checking are made available for public review.

12. NHC 6; Port 14. Response appears to have mis-interpreted or has not addressed our observation of an internal inconsistency in the SMP. The calibration text (SMP page B1-10) states that there is groundwater inflow from 1,240 acres of non-contiguous area. This is inconsistent with the model input sequence which shows inflow from only 512 acres. The Port's response suggests that groundwater inflow is highly dynamic, variable, and that interpretation is subject to professional judgement. The SMP should in our opinion be internally consistent in describing the relevant factors and modeling assumptions. Also see Comment 15 below.

13. NHC 6; Port 15. Given the availability of upper-basin data, we disagree with the choice of calibrating primarily to lower gages and in matching overall watershed conditions. Our

opinion as stated previously is that because the purpose of this work is to address and mitigate conditions in the upper basin (airport) areas of the watershed, calibration efforts should place more emphasis on matching upper basin flows unless those data are confirmed to be unreliable. Emphasis on overall watershed conditions and lower-basin data will tend to mask impacts and mitigation needs from airport development activities in the upper basin.

14. NHC 7; Port 16. Response that "Data from gage 42C is being used to improve the Walker Creek model" is noted. Further comment will be offered once the results of that model improvement are made available for public review.

15. NHC 8; Port 17. The response does not address the substantive discrepancy between the 630 acres of Walker Creek non-contiguous groundwater basin assumed for model calibration, the approximately 690 gross acres (before IWS diversions) of available non-contiguous groundwater basin based on groundwater mapping (SMP Figure B2-23), and the approximately 350 acres of available non-contiguous groundwater basin once IWS areas are removed. The available mapping data suggest that diversions to the IWS system from this groundwater recharge area and implementation of IWS leak detection and repair programs could potentially cause a nearly 50% reduction in the base flows of Walker Creek. Our point is that it is difficult to provide any reasonable assurance of appropriate mitigation for airport impacts on stream base flows, or seepage flows to wetlands, when the source of those flows is so poorly understood.

16. NHC 8; Port 18. The Port response suggests with apparent certainty that leakage from the IWS lagoons does not have any influence on Walker Creek base flows. This certainty is inconsistent with Port responses 14 and 17 which suggest that groundwater inflow is highly dynamic, variable, and that interpretation is subject to professional judgement.

17. NHC 9; Port 19. Response noted.

18. NHC 10; Port 20. The response fails to address the substantive concern that post-1995 lining of the IWS lagoons has and/or will cause low streamflows in Des Moines (and possibly Walker) Creek to be reduced below the low streamflows which would have occurred during base year (1994) conditions. SMP Section 2.1.2 (page 2-2) discusses selection of the base year. Our point remains that airport impacts to stream base flows, as well as mitigation needs, have likely been underestimated because they have not considered the effect of lining these lagoons.

19. NHC 11; Port 21. Response noted. We agree that many of the potential impacts can be suitably mitigated by future reclamation activities, providing that the borrow pit areas are reclaimed to a forested basin condition. However, the SMP and related documents offer no assurance or commitment that the borrow sites will be reclaimed to a forested condition.

20. NHC 11; Port 21. The Port response does not address our comment of effects on Des Moines Creek flows due to lost flow attenuation capacity. The Port's low streamflow analysis makes the claim that summer flows in Miller Creek will be improved due to attenuation effects in the fill material which will be imported for the third runway

embankment. Because significant quantities of that same fill is being excavated (to depths of up to 100 feet) and exported from borrow pits in the upper Des Moines Creek basin, it follows that there will be some corresponding impairment of summer flows in Des Moines Creek.

21. NHC 11; Port 22. Response noted.

22. NHC 11; Port 23. Response noted. Our use of "headwaters" is intended to reflect the fact that the forested areas in question are in the upper portion of the basin where Des Moines Creek appears to be a gaining stream, and that low streamflows in Des Moines Creek are sustained, in part, by runoff from these forested areas.

23. NHC 11; Port 24. See Comment 20 above.

24. NHC 11; Port 25. We disagree with the assertion that there will be no adverse impacts from borrow pit activities. See Comments 19 and 20 above.

25. NHC 12a; Port 26. The response is inadequate and avoids the question of how well the HSPF model reproduces summer flows for the months of August and September.

26. NHC 12b; Port 27. Response noted.

27. NHC 12c; Port 28. The response is inadequate. Our point, again, is that it is difficult to provide any reasonable assurance of appropriate mitigation for airport impacts on stream base flows, or seepage flows to wetlands, when the source of those flows is so poorly understood.

28. NHC 12d; Port 29. Response noted.

29. NHC 12e; Port 30. See Comment 18 above.

30. NHC 12f; Port 31. We are confused by the response. According to the SMP, the analysis of base year 1994 conditions was made using existing (1994) land uses superimposed on future (year 2006) subbasin boundaries. Our understanding of the HSPF streamflow modeling is that areas tributary exclusively to the IWS system (as of the year 2006 basin boundaries used for both existing and future conditions) were not included in the HSPF models. With this methodology, it is impossible for the SMP to have evaluated the baseflow impact in Des Moines Creek due to the diversion of 111 acres of basin area to the IWS system. Our point is that project impacts to low flows in Des Moines Creek have been underestimated because the assessment has not accounted for the post-1994 expansion of the IWS system.

31. NHC 12g; Port 32. See Comments 19, 20, and 22 above.

32. NHC 12; Port 33. See Comments 25 through 31 above. We repeat our original comment here. Insufficient information has been provided to confirm whether the models are reasonably well calibrated for assessing low flows conditions. Furthermore, the analysis

methods have overlooked several airport activities--IWS expansion, IWS lagoon lining, borrow pits--which will likely have an adverse impact on low streamflows, particularly in the Des Moines Creek basin. Individually and cumulatively, these problems result in a failure to adequately address airport impacts on low streamflows and associated water quality concerns in the affected streams, and a corresponding failure to provide reasonable assurance of adequate mitigation.

33. NHC 13 and 22a; Port 21, 34 and 51. The responses provide a plausible explanation of how surface contouring, densification, and application of bonded fibre matrix for erosion control could have caused the monitored embankment runoff to generate far more surface runoff (and allow far less infiltration) than would be consistent with theoretical values for the embankment fill. We agree that the surficial effects of these practices should diminish over time due to weathering and biological actions. However, no information is given to address the uncertain consequences of the layers of densified soils and bonded fiber matrix which are being buried within the body of the embankment and which will not be exposed to significant weathering or biological actions.

34. NHC 14; Port 35. Response noted. See Comment 33 above.

35. NHC 15; Port 36. Response noted. We recognize that the full dam safety review will require design drawings more advanced than those presented in the SMP. However, given the size and complexity of this project, the SMP should provide a summary table to identify which of the facilities being proposed will require Ecology review and approval, prior to construction, for compliance with dam safety regulations. Also, Ecology should confirm whether a dam safety review is needed for Pond G prior to the start of construction of that facility per the "Third Runway - Embankment Construction Phase 4" drawings and specifications dated January 29, 2001 which have been approved by the Port and issued for bid.

36. NHC 16; Port 37. See Comment 35 above.

37. NHC 17; Port 38. We disagree with the response which proposes deferring substantive issues of the feasibility of certain facilities until final design. The facilities at issue are Vault SDS7 and Vault G1. Vault SDS7 proposes above-grade storage of 21.4 acre-feet of water volume in a rectangular structure with an above-ground water depth of 19.8 feet. Vault G1 proposes storage of about 13.8 acre-feet of water volume (detention storage plus reserve storage) with a water depth of 30 feet. There is an obvious need for a safety review to assure the structural stability of Vault SDS7. Our concerns over Vault G1 result from its close (about 20 feet) proximity to the top edge of a 140-foot high fill embankment. Furthermore, because of its proposed placement in fill, Vault G1 (and perhaps others) fails to satisfy the KCSWDM technical requirement (pg 5-37) that "Vaults shall not be allowed in fill slopes, unless analyzed in a geotechnical report for stability and constructability."

38. NHC 18; Port 39. Response noted.

39. NHC 19; Port 40. See Comment 8 above.

40. NHC 20, 20a, 20b, and 20c; Port 41, 42, 43, and 44. Responses noted. However, they fail to answer the specific technical questions presented in our comments 20a, 20b, and 20c.

41. NHC 20d; Port 45. Response noted.

42. NHC 20e; Port 46. The response does not address the conflict between use of the outer swales to collect (clean water) seepage from the toe of the embankment and convey the water to wetlands with the use of the same ditches for conveyance of (turbid water) construction site runoff to erosion control treatment facilities. One consequence of this conflict is that erosion control treatment facilities may be undersized. (This relates to the unanswered, technical questions from our previous comment 20b: "What is the tributary area for each of the proposed ESC facilities? What are the design flows? Have the design calculations been reviewed?")

43. NHC 20f; Port 47. We appreciate that the Port recognizes the need for additional analyses and management solutions to the challenge of pumping erosion control water from a pond which will be excavated, within a wetland, to a depth which is about 9 feet below the seasonal groundwater level. However, this is a situation which should have been identified and corrected prior to Port approval of the construction plans[1] and specifications which describe this work. The oversight illustrates that the Port's "systematic, critical construction plan review process" (Port response 41) is fallible and would benefit from additional independent review.

44. NHC 20; Port 48. See Comment 40 above.

45. NHC 21; Port 49. The response provides an adequate proposal for drainage from the MSE wall, but fails to provide a proposal for collecting runoff from the face of the sloping embankment. Specifically, the response does not address our comment that SMP Appendix O, Exhibit C115 shows that undetained surface runoff collecting at the bottom of the embankment, and also from the airport security road, would be discharged directly into adjacent wetlands without any peak flow detention as required by King County and Ecology regulations.

46. NHC 22 and 22a; Port 50 and 51. Responses noted. See Comment 33 above.

47. NHC 22b; Port 52. Response noted.

48. NHC 23; Port 53. The response does not adequately address our concern that the proposed construction excavation for Pond D, as shown by SMP Appendix D, Exhibits C133 through C134.1, is very likely to intercept the local shallow regional groundwater table and to significantly disrupt the water supply to Wetland 39. These are the same exhibits as presented

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[1]Port of Seattle major contract construction plans titled "Third Runway - Embankment Construction - Phase 4", Work Order #101346, Project STIA-0104-T-01, approved 1/25/01. The accompanying two-volume Project Manual, including Specifications, is dated January 29, 2001.

in Appendix I of the Port's Wetland Functional Assessment and Impact Analysis. At issue is the degree to which the shallow regional groundwater table will be intercepted and the feasibility of providing returning some flow from the Pond to the wetland. Site soil boring logs and a much better understanding of the source of water supply to Wetland 41a and the upper end of Wetland 39 are needed for this issue to be resolved.

49. NHC 24; Port 54. Response noted.

50. NHC 25; Port 55. The response states that "The relative floodplain storage is matched at each depth of flooding depth. . ." but does not provide any hydraulic calculations to support the assertion that sufficient compensatory floodplain storage is being provided. The response has clarified that the compensatory storage area is intended to function like a lake subject to backwater from Miller Creek at the south end of the storage area. Our original comment had assumed that floodwater was supposed to enter the compensatory storage area by overflows along the full length of relocated channel. With our new understanding of how this system is supposed to work, there are questions of whether the ditch which connects Miller Creek to the compensatory storage area has sufficient hydraulic capacity in the initial design, and what long-term maintenance of this ditch will be required.

51. NHC 26; Port 56. The response fails to address our comment that there are no calculations or other design information to demonstrate that the goals and design criteria for the Miller Creek relocation project will be accomplished with the design now proposed. Absent a high local groundwater table throughout the full reach of relocated channel, it remains our opinion that the relocated channel, as designed, will at least intermittently fail to achieve the target minimum flow depth of 0.25 feet during low-flow (0.5 cfs) periods. The Natural Resource Mitigation Plan (page 5-14) indicates that the relocated channel will be located in an area with peat soils, but we are unable to locate information in that or other documents to show whether the local water table is sufficiently high to keep these peat soils saturated throughout the summer months.

52. NHC 26; Port 56. There is an apparent mis-communication over the characteristics of the stream substrate spawning gravels to be used for the relocated reach. The Port response states, "The gravel specifications include fine sands and silts to specifically avoid the problems that were asserted by the reviewer." However, that response seems inconsistent with the stream substrate description presented under the heading of "Stream Substrate" in the Natural Resource Mitigation Plan (NRMP) and which formed the basis for our assumption that the stream substrate material will be highly permeable. NRMP page 5-19 states that "Substrate in the relocated channel will consist of gravel, course sands, and cobble material" and also that "The flow velocity criteria for the channel were set to maintain suitable substrate for fish by minimizing the accumulation of fine-grained material." Our concern as expressed previously is that the relocated channel is likely to go dry during low flow periods if it is constructed, as proposed, over a two-foot thick bed of highly-permeable spawning gravels.

In summary, there continue to be numerous unresolved deficiencies in the analyses and preliminary designs which present a risk of significant adverse impacts to the natural stream and wetland systems if the December 2000 version of the Comprehensive Stormwater Management Plan and Natural

Resource Mitigation Plan are approved 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, these deficiencies be resolved.

Sincerely,

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