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HELSELL FETTERMAN LLP

Fendt  
EXHIBIT NO. 300  
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POLLUTION CONTROL HEARINGS BOARD  
FOR THE STATE OF WASHINGTON

Airport Communities Coalition,

Appellant,

v.

Department of Ecology and  
The Port of Seattle,

Respondents.

PCHB No. 01-160

THIRD DECLARATION OF PAUL S.  
FENDT

Paul S. Fendt declares as follows:

1. I am over the age of eighteen, have personal knowledge of the facts stated in this declaration, and am competent to testify to those facts.

2. I have more than 18 years of stormwater engineering and planning experience, encompassing a broad range of stormwater and surface water projects. I have significant experience working with hydrologic and hydraulic modeling (HEC-1, WaterWorks, HEC-2, HEC-RAS), NPDES stormwater permits, erosion control on creeks and lake shores, comprehensive storm and surface water plans, preparation of drainage ordinances and environmental impact statements. I have worked extensively with the Department of Ecology's Stormwater Manuals and with King County's Surface Water Design Manual.

COPY

THIRD DECLARATION OF PAUL S. FENDT - 1

FOSTER PEPPER & SHEFELMAN PLLC  
1111 THIRD AVENUE, SUITE 3400  
SEATTLE, WASHINGTON 98101-3299  
206-447-4400

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1           3.     I have been the project manager for stormwater management and low flow mitigation  
2 for the Port of Seattle's Master Plan Update ("MPU") projects for the past four years. I was the  
3 principal author of the Port of Seattle's Comprehensive Stormwater Management Plan ("SMP") and  
4 a principal author of the Low Streamflow Analysis - Flow Impact Offset Facility Proposal. I  
5 graduated from the University of North Dakota with a degree in Geological Engineering in 1981. I  
6 was licensed as a Professional Engineer (Civil) by the State of Washington in January 1991 and the  
7 State of Florida in February 1990. I have been employed by Parametrix, Inc. for the past 11 years. A  
8 copy of my current curriculum vitae is attached as Exhibit A the Declaration Of Paul S. Fendt that  
9 was filed in this action on October 1, 2001 (the "First Fendt Declaration").

10           4.     **Calculation of Summer Low Streamflow Impacts.** The flow rate for each of the  
11 area streams (Miller, Walker and Des Moines Creeks) was determined by calculating the potential  
12 low stream flow impact during the dry months of the year (August through October) for the 2-year,  
13 7-day low flow (i.e., a low flow period that has a 50 percent chance of occurring in any year).

14           5.     The summer low flow impacts arising from the Port of Seattle's proposed MPU update  
15 improvements are not underestimated. As described in more detail below, the revised analysis of the  
16 summer low flow impacts is expected to show no significant changes to the total low flow impacts.

17           6.     **HSPF Modeling Used To Model Existing and Future Hydrologic Conditions.**  
18 The Hydrologic Simulation Program - Fortran ("HSPF") model was one of the most important tools  
19 used to determine existing and future hydrologic conditions at STIA. It was also critical to  
20 identifying how those conditions will change as result of the construction of the Port's MPU  
21 projects. The HSPF model allows continuous simulation of stormwater runoff at STIA, both as it is  
22 currently configured and as it will be configured when the MPU projects are complete. The model is  
23 appropriate for western Washington, where stream flow is dominated by runoff from sequential  
24 storms rather than single, large storms. This modeling method is recommended by local agencies for  
25 modeling large drainage areas and evaluating runoff impacts on stream systems.

1           7.     A description of how the HSPF model was used to evaluate stormwater runoff from  
2 the Port's planned MPU projects and to evaluate how these projects would affect stream flow in  
3 Miller, Walker, and Des Moines Creeks is included in the Comprehensive Stormwater Management  
4 Plan ("SMP"). A copy of the SMP is attached to the First Fendt Declaration as Exhibit C.

5           8.     Summer low streamflow impacts in Miller, Des Moines and Walker Creeks were  
6 calculated using methods described in the Low Flow Analysis. A copy of the Low Streamflow  
7 Analysis is attached to the First Fendt Declaration as Exhibit B. The approach described in the Low  
8 Flow Analysis was discussed with both the Department of Ecology and King County, and was  
9 accepted as an appropriate approach to evaluating, quantifying, and mitigating impacts.

10          9.     **Determining the 2 year, 7-day Low Flow and the Historic Low Flow Period.** The  
11 first step in the process of assessing the amount of low streamflow mitigation was identifying current  
12 stream flow levels, focusing on low flow periods of the year. The HSPF model of current conditions  
13 (pre-MPU project development) was developed using daily average flows in each of the streams  
14 based on 47 years of precipitation record (1949-1995). The daily average flow was grouped and  
15 averaged in seven-day increments. The lowest seven-day flow in each year of the record (a total of  
16 47 values) was selected and ranked in order of smallest to largest seven-day low flow. Statistically,  
17 the 24<sup>th</sup> value in the ranking has a 50 percent chance of being equaled or exceeded in any year. This  
18 is referred to as the 2-year, 7-day low flow.

19          10.    The 2-year, 7-day low flow was selected as the flow value for impact and mitigation  
20 evaluation. The 2-year flow is protective and impacts from more extreme droughts would be  
21 mitigated with this standard. More frequent low flows (i.e. those occurring more frequently, on  
22 average, than every other year) are not limiting factors in stream production. This is shown in the  
23 earlier declaration of Dr. Donald Weitkamp filed in this action. The 47 years of record for each  
24 stream were plotted to determine when seven day low flows have historically occurred.

1           11.    **The Pacific Groundwater Group Study.** The HSPF modeling for low stream flows  
2 was supplemented by a groundwater study conducted by Pacific Groundwater Group ("PGG"). This  
3 study evaluated the component of stormwater runoff that is anticipated to infiltrate to groundwater at  
4 the embankment for the new third runway. A copy of that study is attached to the First Fendt  
5 Declaration as Exhibit D.

6           12.    The hydrogeologic modeling conducted by PGG is the same model and approach  
7 used in the Ecology-sponsored studies at the Airport, and was additionally refined as requested by  
8 Ecology. The Low Flow Analysis, the SMP, the HSPF modeling and the groundwater modeling  
9 conducted by PGG were reviewed and approved by Ecology.

10          13.    **Calibration of the HSPF Model.** Hydrologic and hydraulic models are calibrated  
11 before using them for design or analysis. Calibration involves simulating a recorded storm event or  
12 precipitation record to match the output hydrograph as near as possible to measured flow or stage  
13 data. Existing stream flow data is used to compare actual recorded flows in a stream with the results  
14 of the watershed model. Calibration of models is performed to improve the accuracy of simulations  
15 of synthetic design storms or historical precipitation records for which there are no measured flow or  
16 stage data.

17          14.    The calibration of the HSPF model for lows streamflows was completed as described  
18 in the Low Streamflow Analysis and the declaration of Joe Brascher. The calibration approved by  
19 King County in the SMP is also applicable to the Low Streamflow Analysis. In my opinion, the  
20 calibration is appropriate for evaluating low flow and peak flow analyses, such as those undertaken  
21 in the SMP and the Low Streamflow Analysis.

22          15.    **Review of Low Flow Analysis and Revised Analysis Requested by Ecology.** In  
23 the Department of Ecology's amended §401 Certification, Ecology has required that a small amount  
24 of total site stormwater be retained for use during low-flow periods to mitigate for low flow  
25 reductions. The retained stormwater will be released in quantities that match anticipated stream flow  
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1 reductions. Monitoring of streamflows during the life of the project will assure that the correct  
2 amount of mitigation is provided.

3 16. Ecology has requested additional information prior to final design of the low  
4 streamflow facilities that will be provided in the form of an updated Low Streamflow Analysis.  
5 There have been a series of meetings between Ecology, the Port's consultants and King County at  
6 which the protocols for this updated low streamflow analysis were agreed to by the Port, the County  
7 and Ecology. The updated Low Streamflow Analysis will contain the following:

- 8 • Additional detail on design elements of the reserve vaults;
- 9 • Additional detail regarding model calibration;
- 10 • Modified approach to collecting reserve stormwater for the Walker Creek vault;
- 11 • Additional monitoring requirements, including infiltration testing and biological  
12 monitoring;
- 13 • Revised drawings showing the modified storage vaults;
- 14 • Additional detail as required in the §401 Certification.

15 17. The revised analysis will be submitted to Ecology by December 17, 2001, and will  
16 address and respond to each and every condition and comment in the amended §401 Certification.

17 18. **Monitoring and Adaptive Management.** The modeling and analysis in the Low  
18 Streamflow Analysis are a detailed and exhaustive study of hydrologic conditions in the impacted  
19 watersheds at STIA. In my opinion, we have a appropriate understanding of conditions at the site to  
20 allow evaluation of how the MPU improvements will affect area streamflows. Substantial  
21 monitoring of area streams will occur post-construction to make certain that low streamflow impacts  
22 have, in fact, been accurately predicted and mitigated for. Whatever the requirements for low  
23 streamflow mitigation, there is ample stormwater to retain and mitigate those impacts.

24 19. The low streamflow mitigation for the MPU projects is a long-term, ongoing  
25 operation. As required by the amended §401 Certification from the Department of Ecology, the low  
26 streamflow conditions will be monitored and the mitigation can be tailored to match pre-existing

THIRD DECLARATION OF PAUL S. FENDT - 5

**FOSTER PEPPER & SHEFELMAN PLLC**  
1111 THIRD AVENUE, SUITE 3400  
SEATTLE, WASHINGTON 98101-3299  
206-447-4400

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1 conditions. As shown in my prior declarations filed in this matter, and by the declaration of Dr. Don  
2 Weitkamp, the summer low streamflow impacts in nearby streams will be mitigated in a way that  
3 fully preserves and protects aquatic resources in those streams.

4 20. If streamflow monitoring identifies any need to fine tune the mitigation, the amount  
5 of stormwater to be collected and released can be adjusted in order to mitigate the actual year-to-year  
6 impacts. This stormwater would be available for storage, since there is a direct connection between  
7 additional runoff from new impervious surfaces and water lost to the groundwater. In other words,  
8 precipitation that does not infiltrate to groundwater and is, therefore, unavailable to recharge area  
9 streams during low streamflow periods is available for collection and delayed release to area streams  
10 to avoid adverse low streamflow impacts.

11 21. **The Revised Modeling Analysis Will Show That Total Impacts Will Not Be**  
12 **Significantly Different Than Originally Anticipated.** When updating the low streamflow  
13 modeling for Walker Creek, problems were found in the exchange of data between the groundwater  
14 and surface water modeling tools. In particular, the HSPF model has a default function that assumes  
15 the input is in daily units and automatically converts the data to hourly units. The modeler manually  
16 applied the conversion, which resulted in modeled embankment flow that was 1/24 of what it should  
17 have been. As a result, low impacts to Miller Creek and Walker Creek were overestimated.  
18 (Because there is no embankment construction in the Des Moines basin, this did not affect the  
19 projected impacts to Des Moines Creek.) In addition, some input data from HSPF (surface) model to  
20 Hydrus (ground) model were groundwater outflow (AGWO) data rather than groundwater inflow  
21 (AGWT) data. Revising the modeling to correct these inputs will create a smaller change in the  
22 opposite direction (i.e., a small increase in projected impacts to Miller Creek and to Walker Creek).  
23 As part of the revised Low Streamflow Analysis, the entire modeling process is being peer reviewed  
24 by Dr. Norman Crawford, who is a nationally-recognized expert in this field and is the expert who  
25 originally formulated the modeling tools utilized for this project. As a result of that peer review, the  
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1 Port is taking advantage of the revised Low Flow Analysis to make other additional refinements to  
 2 the modeling. In particular, the modeling for the "filter strips" is being refined to take into account  
 3 that some water is "held" on runway and evaporates and some water in the filter strips does not  
 4 infiltrate during more intense rain events. The result will be a small revision upward in the projected  
 5 impacts to Miller and Walker Creeks. The Port is also correcting some groundwater routing in some  
 6 of the smaller basins (c.g., SDS 5, 6 and 7). The result will be a small revision downward to the  
 7 projected impacts to Des Moines Creek.

8 22. It is important to realize that the corrections being made in the revised Low Flow  
 9 Analysis are primarily limited to data handling between models and groundwater routing. The basic  
 10 modeling approach, the calibration of the models, and the underlying information regarding the  
 11 Airport area is valid and well-understood. The revised Low Flow Analysis is not anticipated to  
 12 project total low flow impacts that are significantly larger or smaller than the earlier analysis  
 13 reviewed by Ecology.

14 23. It is also important to realize the project's low flow impacts involve relatively small  
 15 amounts of water. Nevertheless, the streams adjacent to the Port's MPU projects will be monitored  
 16 in the future and that the actual mitigation can be adjusted to meet actual conditions. While there is  
 17 appropriate information about groundwater and surface water patterns at the Airport, and while the  
 18 modeling tools used to predict the anticipated low stream flow impacts are the best tools available,  
 19 the ongoing monitoring will assure that the mitigation is appropriate for actual post-construction  
 20 conditions and will fully protect the aquatic resources in those streams.

21 I declare under penalty of perjury under the laws of the state of Washington that the  
 22 foregoing is true and correct.

23 Executed at Kirkland, Washington, this 26<sup>th</sup> day of November 2001.

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 25 \_\_\_\_\_  
 26 Paul S. Fendt

THIRD DECLARATION OF PAUL S. FENDT - 7

**FOSTER PEPPER & SHIFFELMAN PLLC**  
 1111 THIRD AVENUE, SUITE 3400  
 SEATTLE, WASHINGTON 98101-3299  
 206-447-4400

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