Fendt
EXHIBIT NO. 198
2-8-02
M. Green

POLLUTION CONTROL HEARINGS BOARD
FOR THE STATE OF WASHINGTON

AIRPORT COMMUNITIES COALITION, Appellant, v. STATE OF WASHINGTON DEPARTMENT OF ECOLOGY, and THE PORT OF SEATTLE, Respondents.	PCHB No. 01-160 DECLARATION OF PAUL FENDT IN SUPPORT OF PORT'S OPPOSITION TO ACC'S MOTION FOR PARTIAL SUMMARY JUDGMENT

PAUL FENDT declares as follows:

1. I am over the age of 18, make this declaration based on personal knowledge, and am competent to testify to the facts stated herein.

Stormwater Management Experience

2. I graduated from the University of North Dakota with a degree in Geological Engineering in 1981. I was licensed as a Professional Engineer (Civil) by the State of Washington in January 1991 and the State of Florida in February 1990. I have been employed by Parametrix, Inc. for the past 11 years. A copy of my curriculum vitae is attached to this declaration as Exhibit A.

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3. 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 with hydrologic and hydraulic modeling (HEC-1, WaterWorks, HEC-2, HEC-RAS), NPDES stormwater permits, erosion control on streams and lake shores, comprehensive storm and surface water plans, and preparation of drainage and stormwater ordinances. I have worked extensively with the Department of Ecology's Stormwater Manuals and with King County's Surface Water Design Manual.

4. I have been the project manager for stormwater management for the Port of Seattle's Master Plan Update (MPU) projects for the past four years. I was the principal author of the Port of Seattle's Comprehensive Stormwater Management Plan and a principal author of the Low Stream Flow Analysis and Summer Low Flow Impact Offset Facility Proposal ("Low Flow Analysis") (December 2001). (A copy of the Low Flow Analysis is attached to this Declaration as Exhibit B.) As such, I am very familiar with the stormwater management facilities and systems required by the Department of Ecology for the MPU projects.

Impacts of Development on Stormwater

5. New development, which generally consists of constructing new impervious surfaces and clearing land can, if unmitigated, profoundly affect natural flow and water quality conditions in streams and other receiving waters. The purpose of stormwater management is to provide an integrated approach to mitigating water resource impacts caused by development. Stormwater management consists of a complex analysis of hydrology and hydraulics and the coordination and design of stormwater management best management practices (BMPs).

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6. Generally, the construction of new impervious surfaces prevents infiltration of precipitation that causes two flow-related impacts: first, increased runoff, which can cause flooding and damage stream channels, leading to erosion and damage to aquatic habitat (high or "peak" flow impacts); and second, decreased infiltration and recharge to groundwater, which can in turn diminish baseflows in streams (low streamflow impacts). Impervious surfaces also accumulate pollutants from impervious area that are "washed off" by precipitation into surface waters. Surface water management systems typically include a combination of BMPs that address different components of the natural hydrologic cycle. Both peak and low flow stormwater management consist of delaying stormwater so it is released to streams at approximately the same time and rate it would have discharged to the streams before the impervious surface was constructed. For example, infiltration and detained stormwater mitigate lost groundwater recharge. Detention facilities can mitigate both peak flow and low flow impacts by collecting runoff generated by impervious surfaces and slowly releasing water to the stream during times of lower stream flow. Water quality BMPs, such as filter strips and wetponds, remove particulates and pollutants much as natural streamside vegetation "filters" runoff before it runs into the stream.

Stormwater Management in Washington

7. In Washington, stormwater management is subject to a complex set of federal, state and local regulatory requirements. Certain stormwater discharges, e.g., those from large industrial or construction sites, require an NPDES permit under the Clean Water Act. In Washington, stormwater NPDES permits are issued by the Department of Ecology (Ecology). Typically, a stormwater NPDES permit requires the preparation of a site-specific stormwater management plan, usually referred to as a Stormwater Pollution Prevention Plan (SWPPP). The SWPPP must incorporate

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BMPs appropriate to the site. A full menu of BMPs is described in stormwater manuals developed by Ecology and local governments. The Port has obtained an NPDES permit for its stormwater discharges, and has prepared a SWPPP as required by the permit.

8. The stormwater manual prepared by Ecology is referred to as the Stormwater Management Manual for Western Washington (the "Ecology Manual") (Ecology 2001). King County has also developed a stormwater manual which is referred to as the King County Surface Water Design Manual. (King County 1998) Both of these manuals provide standards and guidance for hydrologic modeling, stormwater management, and a menu of BMPs to control impacts from development. The King County and Ecology Manuals were used as guidance for analyzing and mitigating impacts from the MPU projects, as described in the Comprehensive Stormwater Management Plan (SMP)(Parametrix 2001).

MPU Stormwater Impacts

9. The MPU project will add a total of approximately 106, 6, and 128 acres of new impervious surface to the Miller, Walker, and Des Moines Creek drainages, respectively. New impervious surface will change the hydrology and stormwater runoff patterns of land draining from Seattle-Tacoma International Airport (STIA). During rainstorms, increased volumes of stormwater will drain to Miller, Walker and Des Moines Creeks that, if unmitigated, would cause peak flows in the stream to increase. Stream flows in the summertime during periods of low rainfall will also be reduced if left unmitigated.

10. The Port's NPDES permit requires the Port to develop appropriate facilities and systems to capture, detain, treat and release stormwater generated at the MPU to address these impacts. The water quality certification issued by Ecology for the MPU project adds additional

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stormwater mitigation requirements. Following is a general description of the stormwater management system developed by the Port to comply with Ecology's regulatory requirements.

11. Rain that falls on the third runway will run off from the new pavement across 75 feet of gently sloping infield grass to newly constructed catch basins. The infield grassy areas are referred to as "filter strips," an approved water quality BMP that removes particulates from stormwater before it is collected in the aforementioned catch basins. Precipitation that falls directly on the filter strips, along with some of the runoff from the impervious areas, infiltrates into the ground. Much of this pervious area surrounding the third runway is new embankment material, which is several feet thick and wide. The rainfall and runoff that infiltrates into the new embankment has been modeled, as described in the Low Streamflow Analysis, to determine the rate and volume at which this stormwater moves through the embankment and flows to Miller and Walker Creeks (there is little new embankment in Des Moines Creek basin). In Miller Creek, there is sufficient water infiltrated into the new embankment to fully mitigate the low flow impacts of new impervious area.

12. Stormwater runoff from the runway that does not infiltrate into the ground or embankment will be collected in catch basins that convey the stormwater to detention facilities including ponds and vaults. Stormwater collected in the detention facilities will be slowly released at carefully developed flow rates, as required by Ecology's and King County's continuous flow analysis methods, to avoid peak flow impacts. As described below, detention times up to 89 days are possible when the stormwater management facility is filled to the design level. In addition, some of the stormwater collected in the vaults will be detained for a slightly longer period of time and slowly released to Walker and Des Moines Creeks during the summer months when it is anticipated that the MPU projects will periodically reduce low summer flows.

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13. The purpose of mitigating high flow and low flow impacts is the same – to mimic pre-development conditions, to maintain streamflows to protect aquatic habitat and aquatic organisms, and to ensure that water quality standards will be met.

14. In developing the MPU stormwater management plan, it was necessary to determine how the proposed development and its new impervious surfaces would affect volumes and flow rates of stormwater and, correspondingly, flows in affected streams. Both high flow and low flow impacts were calculated using state of the art computer modeling. The modeling process is described in detail in paragraphs 8 - 24 of my declaration and the SMP and in the Low Flow Analysis attached thereto, which was filed in opposition to ACC's motion for stay.

15. It is important to understand that the projected low flow impacts to be mitigated are minimal. The Low Flow Analysis shows that the predicted change in water depth during low flow conditions caused by MPU projects is 0.4 inches and 0.1 inches for Des Moines and Walker Creeks, respectively. There is no predicted change to flow depth in Miller Creek.

The Port's Stormwater Management Plan Controls for Peak Flow, Low Flow, and Water Quality Impacts.

16. Peak flow impacts resulting from new and existing impervious surface will be mitigated by capturing all stormwater runoff and detaining it in 344.1 acre-feet of stormwater detention storage. As described above, the detained peak flow stormwater will be released over time at prescribed rates so as to avoid erosion, scouring and habitat damage associated with uncontrolled stormwater discharges.

17. Low flow impacts from new impervious surfaces will be offset by three methods: (1) seepage of infiltrated stormwater from the new third runway embankment (Miller and Walker Creeks); (2) detention of stormwater in underground vaults and release of stored stormwater during

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the summer low flow season (Des Moines and Walker Creeks); and (3) retirement of existing water uses (Miller Creek). The paragraphs below describe the first and the second methods in greater detail.

18. The first method by which low flow impacts will be mitigated is the infiltration of stormwater into the third runway embankment. The infiltrated stormwater will move through the embankment relatively slowly, and some of it will emerge as seeps that will, in turn, flow into Walker and Miller Creek. It is anticipated that the maximum flow of infiltrated stormwater will reach Miller Creek in July, or approximately six to seven months after maximum precipitation. Because this seepage will reduce the overall low flow impact of the MPU project on Walker Creek, and mitigate these impacts altogether in Miller Creek, less mitigation water will be needed through releases from other detention facilities.

19. The second method for offsetting low flow impacts is detention and release of collected stormwater. Low flow impacts in Des Moines Creek and Walker not mitigated by seepage from the embankment will be mitigated by retaining a small portion (32.0 acre-feet, or approximately 9% of the total collected volume of detained stormwater – 376.1 acre/feet) and releasing it to area streams during low flow periods. Detained stormwater will be discharged continuously into the affected streams during the normal low stream flow period for each of the streams. This slow release of detained water will replicate the timing and amount of storm water base flow that came from the soil before project construction. The amount of low flow releases has been determined based on site-specific hydrologic modeling, which predicts the impact on area streams from the construction of the MPU improvements.

20. Stormwater from the airport runways is treated using BMPs listed in the Ecology and King County manuals. The primary components of the treatment system are filter strips and

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bioswales. Filter strips allow stormwater runoff to sheet flow over large grassy areas. Flow velocity is slowed by the grass, thereby enhancing the settling of particulates. The vegetation also traps particles. Some stormwater infiltrates into the ground, further filtering the particles. Metals and organic compounds are removed as these pollutants bind to the organic material in the soil. Bioswales are grassy, flat-bottomed swales that receive runoff after it has been collected in a detention facility. Although flow depths and path lengths are typically greater than for filter strips, the pollution removal mechanisms are the same. Vaults and ponds also treat stormwater by allowing for additional settling and removal of particulates.

21. In my opinion, the stormwater management system for STIA described above and in the SMP and Low Streamflow Analysis reports will adequately mitigate the peak flow, low flow, and water quality impacts of the proposed MPU projects. In addition, existing stormwater impacts from built areas at STIA and surrounding developed areas recently acquired by the Port will be retrofit with new stormwater management systems to mitigate existing stormwater impacts in the streams surrounding STIA.

Managing Low Flow Impacts is Part of Washington's Stormwater Management Regimes

22. The Airport Communities Coalition (ACC) asserts that managing stormwater so as to avoid low flow impacts is unusual and unprecedented. This is not consistent with my understanding of Washington's stormwater regulatory requirements, nor is it consistent with my professional experience.

23. Ecology's 2001 Stormwater Manual recognizes that creation of impervious surfaces diminishes base flows, and that the objectives of stormwater management include mitigating this impact. The Ecology Manual contains the following requirements and statements:

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"Stormwater Controls for New Development and Redevelopment ... (must) seek to achieve no net detrimental change in natural surface runoff and infiltration." (Page 1-7);

"...changes in natural hydrology ... (cause) reduced stream flows and wetlands water levels..." (Page 1-17);

"Projects shall employ On-site Stormwater Management BMPs to infiltrate, disperse, and retain stormwater runoff onsite to the maximum extent feasible ... to reduce the hydrologic disruption of developed sites."(Page 2-25);

"Based upon gross level applications of continuous runoff modeling and assumptions concerning minimum flows needed to maintain beneficial uses, watersheds must retain the majority of their natural vegetation cover and soils, and developments must meet the Flow Control Minimum Requirement of this chapter, in order to avoid significant natural resource degradation in lowland streams." (underline added) (Page 2-25);

"Stormwater treatment facilities shall be selected in accordance with the process identified in Chapter 4 of Volume I" (Page 2-27)

Step 1 under "Select Flow Control BMPs and Facilities" in Chapter 4 of Volume I requires that one should "determine whether you can infiltrate." (Page 4-2)

It is clear from the Ecology Manual that maintaining natural hydrology, mitigating low flow impacts, and utilizing infiltration are essential objectives of stormwater management and that low flow impacts and mitigation should be considered when developing a stormwater management plan.

Infiltration and Detention are the Preferred Methods of Controlling Stormwater Flows

24. Infiltration is listed in Ecology's Manual as the preferred stormwater flow control method because it most closely resembles natural recharge conditions. When stormwater is infiltrated, it is collected and allowed to move through the soil so it recharges groundwater and reduces the potential for low flow impacts. Infiltration is not an appropriate stormwater management technique in all areas, such as sites where the soils have poor infiltration characteristics or high water tables. In these instances, especially locations where low flow reduction could cause adverse impacts, alternate low flow mitigation is needed. One such alternative is the collection and detention of runoff, which is then slowly released to avoid flow impacts. This is the alternative required by Ecology to mitigate impacts – both high flow and low flow – in Walker and Des Moines Creek.

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25. Infiltration (when feasible for the site as described above) and controlled release from designed control structures are meant to accomplish exactly the same objective. Both are intended to hold a large volume of stormwater for a period of time, and slowly release it to area surface water bodies. When water is released through control structures, such as an orifice plate in a pipe, the water is directly released to surface water. When water is "released" from a pond or vault via infiltration, it leaks through the soil and gradually travels to a seep or surface water body, such as a stream.

26. Infiltration is not feasible in the Walker Creek and Des Moines Creek watersheds at the locations where low flow mitigation is needed. This is due primarily to the poor infiltration characteristics of the soil. Instead, this stormwater will be detained in vaults and ponds and then be released to the streams at approximately the same time and in approximately the same amount that the natural system would have provided water to the stream (natural hydrologic systems are very complex and it is difficult to exactly mimic natural flow patterns). This delayed release is an appropriate surrogate for infiltration systems, which also result in delayed release.

Retention of Stormwater is a BMP of Stormwater Management

27. In addition to flow controls described above, the Ecology Manual requires that BMPs designed to reduce pollutant concentrations be applied to all new development and redevelopment. Prolonged detention and infiltration are two of these treatment BMPs, but there are many more, and several of these require lengthy detention of collected stormwater. Wetponds, wetvaults, and constructed wetlands are all Ecology-approved BMPs that can be used for water quality mitigation (the Port is not using these water quality BMPs because these techniques attract wildlife, which is dangerous at an airport). Each of these techniques relies on a permanent pool of stored water to provide stormwater treatment.

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28. Water in a wetpond, for example, is displaced by new stormwater coming into the wetpond, but a permanent pool of water is always left in the pond. The permanent pool of water in the wetpond can only leave the pond by infiltration, evaporation, or transpiration, and this loss must be continually replaced by additional stormwater to maintain the design pool depth. Wetponds, wetvaults, and constructed wetlands have been allowed for stormwater management for several years and many have been constructed. To my knowledge, a water right has not been required for this commonly used stormwater management facility which permanently retains stormwater. In fact, to my knowledge, a water right has never been required in Washington to manage stormwater.

Even the Port's Peak Flow Plan Detains Stormwater for Extended Periods

29. ACC asserts that storing stormwater for delayed release to mitigate low streamflow impacts requires a prolonged detention period that is inconsistent with typical stormwater management plans. However, several of the Port's peak flow stormwater facilities will detain stormwater for more than 50 percent of the year, and can take up to three months to drain after a design storm event.

30. To meet peak flow control requirements, several of these detention facilities have very low prescribed flow release rates. This means that the ponds and vaults detain stormwater for much of the year to avoid peak flow impacts. The following table shows that three proposed peak flow ponds (one from each watershed) will be storing stormwater more than 62 percent of the time. Contrary to popular perception, it rains on average about 13 percent of the time at Sea-Tac Airport (source: Perrich 1992). That means about 50 percent or more of the time in an average year, the peak flow detention facilities listed below will have stormwater stored for slow release beyond the duration

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of the storm event. Thus, the proposed peak flow ponds or vaults store water for a significant portion of the year.

Facility	Percent of Time with Stormwater in Storage
Miller Creek	
SDW1B Pond	73%
Walker Creek	
SDW2 Pond	66%
Des Moines Creek	
SDS3 Vault	62%

31. ACC also asserts that the Port's stormwater management system is different from typical systems because of its "precise, prolonged and exacting release rates." However, the release rates apply not only to low flow mitigation, but also to peak flow mitigation. When the ponds or vaults collect water from the design storm, the amount of time that it takes to release the detained stormwater is considerable precisely because the release rate is exacting, precise and prolonged. As explained above, this is because the goal of the stormwater management system is to mimic predevelopment conditions. Therefore, stormwater release rates are carefully prescribed so that streamflows do not exceed the levels experienced before the development occurred. For example, when detention Pond SDW1B (located in the Miller Creek basin) is filled to its design level (53.6 acre-feet), it will take 89 days to discharge all of the water, *assuming no additional runoff enters the pond during this period.* In Walker Creek and Des Moines Creek for the facilities in the table above, the discharge time is 17 days and 15 days, respectively.

32. The new (2001) Ecology stormwater Manual requires the use of "continuous flow modeling" instead of the previously preferred "event modeling" whenever the receiving waters are biologically significant. Continuous flow modeling will, in most cases, result in significantly greater detention times for peak flow control purposes. There are no standards in either the Ecology Manual

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or the King County Manual that require the discharge of detained stormwater within a certain time period. In fact, the manuals allow permanent storage of stormwater in wetponds and continual refilling of these ponds to replace water lost through evaporation or infiltration. In my opinion, the Port's stormwater management system, including the low streamflow mitigation, does not unnaturally delay the release of stormwater beyond the time required to mitigate stormwater impacts from MPU projects.

Treatment of Stormwater is Required and Often Involves Lengthy Detention Periods

33. Stormwater treatment is a required BMP under the Ecology and King County stormwater manuals. When impervious surfaces are constructed, they are typically used by motor vehicles or industrial activity. The activities commonly generate pollutants, such as zinc or copper, that are collected on the impervious surfaces. These collected pollutants are "washed off" by precipitation and discharged by stormwater into surface waters. The purpose of water quality BMPs is to remove these pollutants before they can be discharged into surface waters, where they can harm fish and other aquatic organisms. One mechanism by which these systems work is through particulate removal, where pollutants that are attached to particulates are settled out of the stormwater in pools of still water.

34. Typical settling facilities identified in the stormwater treatment BMPs include bodies of deep (up to eight feet), still water, also known as wetponds or wetvaults, where suspended particulates are allowed to settle when the movement and turbulence of water can no longer provide the energy to keep these particulates suspended. Wetponds are typically located after detention ponds, with grassy slopes, three to eight feet deep, with a "baffle" or other means to prevent water flowing into the pond from stirring up settled particulates.

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35. The pool of water in a wetpond (or wetvault or constructed wetland) is filled and maintained by stormwater runoff from the project site. This is intended to be a permanent pool of water for use exclusively to remove pollutants from stormwater runoff. Thus, treatment may require lengthy or even indeterminate detention periods. Wetponds, wetvaults, and constructed wetlands, all approved Ecology and King County stormwater BMPs, have been constructed throughout the region absent, to my knowledge, a water right. Each of these facilities *permanently* requires a pre-determined amount of stormwater runoff for the purpose of mitigating runoff impacts from development.

Conclusion

36. The Port's proposal for managing stormwater to meet the requirements of its NPDES permit and the Water Quality Certification follows the approach and intent of the Ecology and King County Stormwater Manuals. The Port has selected and applied BMPs in a manner consistent with the Manuals. Stormwater detention will be provided to mitigate the impacts of new impervious surface on peak flows as well as for low flow impacts. Low flow mitigation has been provided in a manner that is consistent with the intent of the Manuals to "achieve no net detrimental change in natural surface runoff and infiltration." Where infiltration is infeasible, alternate and approved low flow mitigation has been provided.

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

DATED this 11 day of January 2002 at KIRKLAND, Washington.

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