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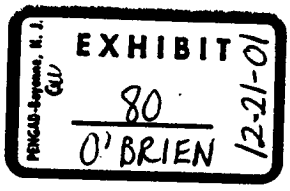

BEFORE THE POLLUTION CONTROL HEARINGS BOARD
STATE OF WASHINGTON

AIRPORT COMMUNITIES COALITION, Appellant, v. STATE OF WASHINGTON, DEPARTMENT OF ECOLOGY; and PORT OF SEATTLE, Respondents.	PCHB No. 01-133 DECLARATION OF EDWARD O'BRIEN

Edward O'Brien declares as follows:

1. I am over the age of 18, am competent to testify, and have personal knowledge of the facts stated herein.

2. I have been employed by the Department of Ecology (Ecology) since 1979, and for most of that time I have worked in the Water Quality Program. For the last 10 years I have been working on stormwater issues for the Water Quality Program. I have worked on the three primary categories of stormwater management – industrial, municipal and construction.

3. I am familiar with the Stormwater Management Manual for Puget Sound issued by Ecology in February of 1992 (1992 Manual). A revised draft of the manual specific was issued in August of 1999 and then again in August of 2000 (1999 Draft Manual). After

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thorough review and comment, the final version of the western Washington stormwater manual was issued by Ecology on September 27, 2001.

4. I worked extensively with the 1992 Manual, the 1999 Draft Manual and am very familiar with the final version of the manual that was recently issued. I work with the stormwater manuals on a daily basis.

5. I am also familiar with the 1998 King County Surface Water Design Manual (King County Design Manual). This manual is similar to the Ecology stormwater manuals, except that it was prepared and issued by King County.

6. These manuals are used by Ecology, other state and federal agencies, Indian Tribes, local governments, stormwater permittees and members of the public to gain an understanding of stormwater issues and management. More specifically, the manuals are used by local governments and Tribes to develop stormwater control regulations and ordinances. They are used by Ecology staff, permittees and technical consultants to develop stormwater discharge permits.

7. All of the manuals describe how development, particularly the addition of impervious surfaces, alters the natural hydrologic cycle. Very simply, removing natural vegetation and replacing it with buildings or other impervious surfaces will result in two major impacts. The first is elevated concentrations of pollutants in stormwater runoff. Typically, stormwater runoff from developed areas, as compared with runoff from undisturbed areas, contains elevated levels of turbidity, oils and grease and other conventional and nonconventional pollutants.

8. The second major impact is the alteration of the natural hydrologic cycle. Again, very simply, development tends to result in far less precipitation infiltrating into soils and from there to groundwater. Instead, because of the addition of impervious surfaces much of the precipitation runs off into area surface waters, be they wetlands, lakes or streams. When large areas are developed and made impervious, peak flows in surface waters are magnified

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significantly from predevelopment conditions. These high flows can cause erosion, stream channel alteration and habitat damage.

9. A corresponding impact of development and the addition of impervious surfaces is a reduction in low summer flows. Precipitation that infiltrates to groundwater tends to move slowly through the soil column and some portion of it seeps into and recharges surface water bodies. The portion of groundwater seeps that reach surface water bodies during low flow periods recharge these surface waters at critical times for aquatic organisms. When large percentages of precipitation runs off of developed areas, it does not infiltrate to groundwater, and thus does not recharge surface waters during low flow periods. This can cause low summer flows to be further reduced.

10. The King County Surface Water Design Manual describes these impacts as follows:

> **3.1.1 HYDROLOGIC IMPACTS AND MITIGATIONS**
>
> Human alteration of the landscape, including clearing, grading, paving, building construction, and landscaping, changes the physical and biological features that affect hydrologic processes. Soil compaction and paving reduce the infiltration and storage capacity of soils. This leads to a runoff process called *Horton overland flow* whereby the rainfall rate exceeds the infiltration rate, and the excess precipitation flows downhill over the soil surface. This type of flow rapidly transmits rainfall to the stream or conveyance system, causing much higher peak flow rates than would occur in the unaltered landscape.
>
> Horton overland flow is almost nonexistent in densely vegetated areas, such as forest or shrub land, where the vast majority of rainfall infiltrates into the soil. Some of this infiltrated water is used by plants, and, depending on soil conditions, some of it percolates until it reaches the groundwater table. Sometimes the percolating soil water will encounter a low-permeability soil or rock layer. In this case, it flows laterally as interflow over the low-permeability layer until it reaches a stream channel. Generally, forested lands deliver water to streams by subsurface pathways, which are much slower than the runoff pathways from cleared and landscaped lands. Therefore, urbanization of forest and pasture lands leads to increased stormwater flow volumes and higher peak flow rates.
>
> For these reasons, development without mitigation increases peak stormwater rates, stormwater volumes, and annual basin yields. Furthermore, the reduction of groundwater recharge decreases summer base flows.

King County Design Manual, Section 3.1.1, 1998.

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11. Similarly, in the 1992 Manual the effects of development are described as follows:

> Runoff that was previously slowly released to streams through interflow now runs quickly off the surface directly into the streams. This increases both the velocity and total quantity of flow causing streambank erosion and general habitat destruction. Sediment from increasingly eroded and unstable stream banks and cleared areas is deposited downstream filling ponds, streambeds and stormwater facilities. An additional consequence is that summer base flows are greatly reduced because of a lack of interflow. . . .

1992 Manual, Volume I-1.1.

12. All of the manuals include discussions of "best management practices" (BMPs). BMPs are recommended stormwater management practices addressing the various adverse impacts of uncontrolled stormwater, including pollutant loadings and changes to the hydrologic cycle.

13. When Ecology began requiring the active management of stormwater in the late 1980s and the early 1990s, the focus was to remove pollutants from the water column. However, from the beginning, the hydrologic impacts described above were recognized as a significant problem. Over time, it became commonplace to require the collection, detention and treatment of stormwater to remove pollutants from the water column and to reduce the impact of high flood flows.

14. Early in the development of the stormwater management program, Ecology also recognized the importance of mitigating low flow impacts. For example, infiltration of collected stormwater has been an important part of stormwater management since at least the issuance of the 1992 manual. Infiltration is listed in both the 1992 and the current manual as a preferred BMP because of its beneficial impact on both pollutant loadings and its beneficial impact on low summer flows. The 1992 manual states that infiltration is "Ecology's highest priority" BMP, because of multiple benefits, including "groundwater recharge." 1992 Manual, Volume I, Section I-4.2, Classification of BMPs. In addition, Volume III of the 1992 manual addressing runoff controls states: "Benefits of infiltration include preservation of baseflow in

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streams, recharge of groundwater, [and] reduction of peak runoff flows . . . ." Volume III, Section III-3.1.

15. Avoiding or mitigating for low flow impacts caused by new development is becoming an increasingly important focus of Ecology's Water Quality Program. While it is not possible to completely avoid impacts to natural hydrologic cycles, we are looking for techniques and strategies to minimize these impacts as much as possible.

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

DATED this 1st day of October, 2001 at Olympia, Washington.

EDWARD O'BRIEN

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