ENCLOSURE A

WETLAND CLASSES FOUND IN THE PROJECT AREA
(See Table 1 (on-site) and Table 3 (on and off-site) in Appendix C for project impacts categorized by Cowardin/HGM)

The following wetland classes, per COWARDIN (1979) and Hydrogeomorphic (HGM) are found within the project and mitigation areas. For the purpose of this document these wetland classes are described below with the corresponding wetland number impacted by the project. A description of each wetland is contained in the Port's wetland delineation for the project area (Port of Seattle, December 2000) and the Corps MFR confirming the wetland delineation (dated February 2001). In cases where the wetland contains more than one classification, it is listed under all applicable classes.

A. Cowardin Classification

1. Forested Wetlands (PFO) - these wetlands contain woody vegetation over 20 feet (6 meters) tall (such as alder, cedar, hemlock, black cottonwood, and some species of willows, etc.) and covers at least 30% of the area. In mature forested systems, the deciduous trees are more than 60 years old and the coniferous trees are more than 80 years old.

There are many individual trees within the project area which likely meet the 60-80 year-old criteria for mature forested wetlands, however most of the PFO systems in the project area are younger (average 20-40 years of age).

The following wetlands/wetland complexes in the project area are considered PFO and/or contain PFO components:

Miller Creek Basin: 1, 2, 3, 4, 5, 7, 9, 11, 12, 14, 18, 19, 21, W2, 35, 37, 39, A1, A6, A7, A8, A13, A14, A17, R4b, R5b, R6, R7, R9, R9a, R12, R15a, R15b, R17

Des Moines Creek Basin: 48, B1, 29,30, B5, B6, B7, B9, B10, 52, 53, G7, DMC, IWS, E1, E2, E3

Walker Creek Basin: 43, 44, 25

2. Scrub-shrub Wetlands (PSS) - these wetlands contain woody vegetation less than 20 feet (6 meters) tall (such as most willows, hardhack spirea, dogwood, salmonberry, etc.) and covers at least 30% of the area. The woody plants can be either true shrubs or small trees.
The following wetlands/wetland complexes in the project area are considered PSS and/or contain PSS components:

Miller Creek Basin: 5, 6, 8, 10, 18, 20, 22, 39, 40, A1, A2, A3, A4, A8, A9, A10, A11, A12, A14, A16, A17, A18, R2, R3, R8, R9a, R14a, R15a

Des Moines Creek Basin: B1, B4, B12, B14, B15, 30, B5, B6, B7, 28, 52, G7, DMC

Walker Creek Basin: 43, 44

3. Emergent Wetlands (PEM) - these wetlands contain non-woody vegetation (such as cattails, grasses, sedges, rushes, and herbs, etc.) and covers at least 30% of the area. Emergent wetlands can have deep water (over about 2 feet (60 cm) in depth), or shallow water that may drain so the soils are only moist during the latter part of the growing season.

The following wetlands/wetland complexes in the project area are considered PEM and/or contain PEM components. All the farmed wetlands (FW) and golf course wetlands (except G7) are grouped in this classification:

Miller Creek Basin: 7, 8, 9, 11, 12, 13, 15, 16, 17, 18, 20, 22, W1, W2, FW1-11, 35, 37, 39, 41, A1, A5, A14, A15, A16, A17, A19, R1, R2, R4, R4b, R5, R5b, R6, R6b, R7, R7a, R8, R9a, R11, R13, R14a, R14b, R15a, R15b

Des Moines Creek Basin: 32, 48, B11, B14, 28, 52, G1, G2, G3, G4, G5, G6, G8, DMC

Walker Creek Basin: 43, 23, 24, 26

Auburn Mitigation Site (Green River): All wetlands

4. Aquatic Bed (AB)/Open Water Wetlands (POW) - Aquatic bed wetlands consist of any area of open water containing rooted aquatic plants (such as water lilies, pond weed, etc.). Aquatic vegetation does not have to reach the water surface. The leaves can either be floating or submerged. Open water (POW) is usually associated with AB wetlands.

The following wetlands/wetland complexes in the project area are considered POW with AB components and/or contain POW with AB components.

Miller Creek Basin: 2, 7 (includes Lake Reba), 41, Lora Lake

Des Moines Creek Basin: 28 (includes NW Ponds), WH (a water hazard pond at the golf course)

Walker Creek Basin: 43

5. Riverine Wetlands (R) - The project area also contains riverine wetlands. Under Cowardin, a riverine wetland refers to the creeks, streams, and waterways without emergent vegetation. Miller, Walker, and Des Moines creeks are riverine wetland systems. Riverine systems can be lower perennial (systems with continuous

flow, low gradient, and no tidal influence); upper perennial (systems with continuous flow, high gradient, and no tidal influence) and; intermittent, seasonal, ephemeral (systems in which water does not flow for part of the year). Miller, Walker, and Des Moines creeks are all considered upper perennial streams. Specifically, the National Wetlands Inventory classifies these streams as riverine upper perennial open water permanently flooded (R3OWH).

B. Hydrogeomorphic (HGM) Classification

The wetlands described above under the Cowardin classes can further be grouped into HGM classes. The following HGM classes are found in the project area and their unique characteristics briefly described:

1. Riverine Wetlands. HGM riverine wetlands include PFO, PSS and PEM Cowardin classes. Riverine wetlands occur in floodplains and riparian corridors in association with stream or river channels. They lie in the active floodplain of a river and have important hydrologic links to the water dynamics of the river or stream. The distinguishing characteristic of riverine wetlands in western Washington is they are frequently flooded by overbank flow from the stream or river. Wetlands showing evidence of frequent overbank flooding, even if the flooding is from an intermitten stream or creek, are considered to be in the riverine class. The flooding waters are a major environmental factor influencing the ecosystem in these wetlands. Wetlands in floodplains, that are not frequently flooded, are not classified as riverine. These wetlands function more like slope or depressional wetlands (see below) because the water regime is dominated by groundwater sources, not overbank flow.

There are very few riverine wetlands, strictly defined according to HGM, in the project area. Most of the wetlands adjacent to the creeks and streams within the project area are not frequently flooded wetlands (portions of Wetlands 18, 37, A17, and some fringes of the R wetlands are the exception).

The riverine wetland's proximity to the river facilitates the rapid transfer of floodwaters in and out of the wetland, and the import and export of sediment, nutrients, and organic carbon (both dissolved and particulate). The dominant vegetation in these wetlands may be representative of numerous seral stages, from early successional emergent species, to late successional forest species.

Riverine wetlands are unique because they form migration corridors along rivers and streams and because they process large fluxes of energy and material/nutrients from upstream systems. Riverine wetlands respond to structures and processes operating at continental scales (climate, geology); systemwide river scales (elevation, timing, magnitude, duration of flooding, stream valley landform dynamics); and local scales (slope and moisture gradients, sediment sorting, biotic processes). Flooding of the riverine wetlands affects soil chemistry by producing anaerobic conditions, importing and removing

organic matter, and replenishing mineral nutrients. The plant communities of riverine wetland ecosystems are generally productive and diverse. Riverine wetlands are valuable for many animals seeking refuge, diversity of habitat, and abundant water or that use it as a corridor for migration. Primary productivity in riverine systems is generally higher than in adjacent uplands from the same areas. The riverine wetland ecosystem acts as a nutrient sink for lateral runoff from uplands and as a nutrient transformer for upstream-downstream flows.

Riverine wetlands are likely to be recipients of sediment, both from upslope sources and from overbank flow. Nutrients such as phosphorus and other chemical pollutants adsorbing to particulates are likely to accumulate in riverine wetlands. In addition, these wetlands are also sites for denitrification when soil is saturated for long periods. Riverine wetlands may act as a sediment source due to bank erosion often occurring during periods of high streamflow.

The following wetlands in the project area are considered riverine wetlands or the wetlands contain riverine components:

Miller Creek Basin: 8, Lora Lake, A1, R1, R2, R3, R4, R4b, R5, R5b, R6, R6b, R7, R7a, R8, R9, R9a, R10, R11, R12, R13, R14a, R14b, R15a, R15b, R17, 18, 37a, FW5, FW6

Des Moines Creek Basin: 28, DMC, 51, 52, G8

Walker Creek Basin: 43

2. Depressional Wetlands. HGM depressional wetlands contain PFO, PSS, and PEM Cowardin classes. Near the headwaters of streams and rivers, riverine wetlands are often replaced by depressional or slope wetlands, where the channel (bed) and bank disappear, and overbank flooding grades into surface or groundwater inundation. In headwaters, the dominant source of water becomes surface runoff or groundwater seepage.

Depressional wetlands occur in topographic depressions exhibiting closed contour intervals on three sides and elevations lower than the surrounding landscape. The shape of depressional wetlands can vary, but in all cases the movement of surface water and shallow subsurface water from at least three directions in the surrounding landscape is toward the point of lowest elevation in the depression. Depressional wetlands may be isolated with no surface water inflow or outflow through a defined channel.[1] They may also have permanent or intermittent surface water inflow or outflow in defined channels or as sheetflow

[1] Some of the wetlands within the project area are likely considered “isolated” and no longer regulated under Section 404 of the Clean Water Act. In the interest of time, and because isolated wetlands are regulated by Ecology, the Port decided not to pursue a reinvestigation of wetlands within the project area to determine if they would be considered isolated by the Corps. It is likely that fewer than 1 acre of the total wetlands experiencing impacts would be considered isolated by the Corps.

connecting them to streams, lakes or other wetlands. Depressional wetlands with channels or streams differ from riverine wetlands in that their ecosystem is not significantly modified by over bank flooding events from a stream or river. Headwater wetlands are classified as depressional when overbank flooding is not a major ecological factor.

In contrast to slope wetlands (see below), depressional wetlands typically provide significant water quality benefits if sediment or other pollutant sources enter them. When no outlet is present, depressional wetlands retain sediments as well as the nutrients adsorbed to the sediments. Denitrification can also occur in cases where soil is saturated for long periods.

The following wetlands in the project area are considered depressional wetlands:

Miller Creek Basin: 7, 16, 17, 40, 41a, 41b, A1, A2, A3, A4, A5, A10, A11, A15, A18, A19, 20b, W1, W2, Water W, FW1, FW2, FW3, FW4, FW5, FW6, FW7, FW8, FW9, FW10, FW11, Lora Lake

Des Moines Creek Basin: B1, B4, B5, B6, B7, B11, B12, B14, 28, 29, 30, 32, 51, 53, Water S

Walker Creek Basin: 43, 23, 24, 25, 26

Auburn Mitigation Site (Green River): All wetlands (depressional flow through)

3. Slope Wetlands. HGM slope wetlands contain PFO, PSS, and PEM Cowardin classes. The majority of wetlands in the project area are slope wetlands occurring on hill or valley slopes. Elevation gradients may range from steep hillsides to slight slopes. The principal water sources are usually groundwater seepage and precipitation. Slope wetlands may occur in nearly flat landscapes if groundwater discharge is a dominant source of water and there is flow in one direction. The movement of surface and shallow subsurface water is perpendicular to topographic contour lines. Slope wetlands differ from riverine wetlands by the lack of a defined topographic valley with observable features of bed and bank. Slope wetlands may develop channels but the channels serve only to convey water away from the slope wetland. Slope wetlands usually do not function to store surface water.

Slope wetlands are frequently supported by groundwater seeps with minor inputs of sediment or pollutants from surface water sources. Those slope wetlands receiving storm runoff from streets or other sources provide biofiltration functions, which is dependent on the rate of water flow through these slope wetlands. In some cases this flow may be too rapid for optimal removal of nutrients or pollutants.

Because of the urban/human disturbances adjacent to the airport, ground contours have changed from historic cuts and fills, making a distinction between depressional and slope wetlands difficult.

The following wetlands in the project area are considered slope wetlands given the HGM definition from above:

Miller Creek Basin: 3, 4, 5, 6, 8, 9, 10, 11, 12, 13, 14, 15, 18, 19, 20a, 21, 22, 35, 37, 39, A6, A7, A8, A9, A12, A13, A14, A16, A17

Des Moines Creek Basin: B9, B10, B15, G1, G2, G3, G4, G5, G6, G7, IWSa and b, DMC, E1, E2, E3, 29, 48, 52

Walker Creek Basin: 44a and b