WASHINGTON STATE DEPARTMENT OF ECOLOGY

SEA-TAC RUNWAY FILL

Hydrologic Studies

Project Completion Fact Sheet—June 2000—Volume 1, Number 3

Project Completion Public Workshop

June 27, 2000
7 p.m. to 9 p.m.

Highline Performing Arts Center

401 South 152nd Street,
Burien, Washington
(206) 433-2292

Directions:

I-5 Southbound: From I-5, take exit 154B and follow highway signs that read: Hwy 518 West, Burien, Sea-Tac Airport.

I-5 Northbound: From I-5, take exit 154A and follow highway signs that read: Hwy 518 West, Burien, Sea-Tac Airport.

Follow Highway 518 West to Burien for approximately 3.5 miles. There will be three sets of traffic lights fairly close together. At the third light, turn **left (south) onto First Avenue South** (in front of a BP gas station). At the next traffic light, turn **left (east) onto South 152nd Street**. Go two blocks. The Performing Arts Center is on the right side past Highline High School. Parking lots are on both sides of 152nd Street.

Questions about the Sea-Tac Runway Fill Hydrologic Impact Studies may be directed to:

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If you need this fact sheet in an alternative format, please contact Dave Garland at (425) 649-7031 (Voice) or (425) 649-4259 (Teletype Device for the Deaf [TDD]). Ecology is an Equal Opportunity employer.

Background

The Port of Seattle proposes to construct a fill embankment for a third runway at Seattle-Tacoma International Airport. The volume of fill required for the embankment is reported to be 16.5 million cubic yards. The embankment is proposed to be built of fill soil derived from borrow pits located south of the airport near Des Moines Creek, and from off-site sources that would be determined in the future. A Maury Island gravel mine (about 8 miles south of the airport) has been identified as a possible off-site source of fill.

Under contract with the Department of Ecology, Pacific Groundwater Group and its subconsultants, EarthTech, Inc., and Ecology and Environment, Inc., have evaluated some of the potential impacts of the proposed project, including effects on groundwater, streams, wetlands, and fish. The study area includes the fill area and adjoining wetlands, streams, and aquifers potentially impacted by the proposed runway project, as well as the borrow pit areas proposed for excavation near Des Moines Creek.

Proposed Construction

The proposed runway fill would be more than 150 feet thick in places. Depending on the location along the embankment, the west margin of the fill would be bounded by either a slope or a wall. The west part of the embankment would have grass cover over about 68% of its surface. The remaining 32% would be paved runway and connecting taxiways. Stormwater running off the paved surfaces is proposed to flow into storm drains. The storm drains would convey water under the runways to detention facilities before discharge into Miller, Walker, or Des Moines Creeks. A drainage layer at the bottom of the fill has been designed for water infiltrating the fill to prevent high groundwater pressures near the west wall. This drainage layer is designed to direct groundwater seepage below the base of the wall to the remaining wetlands and Miller Creek.

Geology and Groundwater

Existing data were used to characterize deep geology and groundwater conditions. Team personnel observed shallow geologic and groundwater conditions during drilling of boreholes and collection of groundwater measurements. The study area consists of geologic deposits primarily related to the Vashon glaciation of the Puget Sound Lowland:

- **Recent deposits** of peat and organic, fine-grained soils cover the low elevations in central and upper Miller Creek basin.
- **Vashon recessional outwash** is an extensive deposit of silty sand with gravel and is the uppermost unit along the eastern Miller Creek valley near the airport.
- **Vashon till** is a dense layer of silt, sand, and gravel, which restricts the vertical migration of groundwater and promotes horizontal "interflow" on its upper surface.
- **Vashon advance outwash** is another extensive layer of sand with varying amounts of silt and gravel, usually below the till. This deposit is an important source of water for the wetland headwaters of Walker Creek.
- **Transitional beds and deeper units** consist of silt and clay and restrict the movement of groundwater. Deeper geologic units are recorded in deep well logs for the area, but these units are not as sensitive to local changes in recharge.

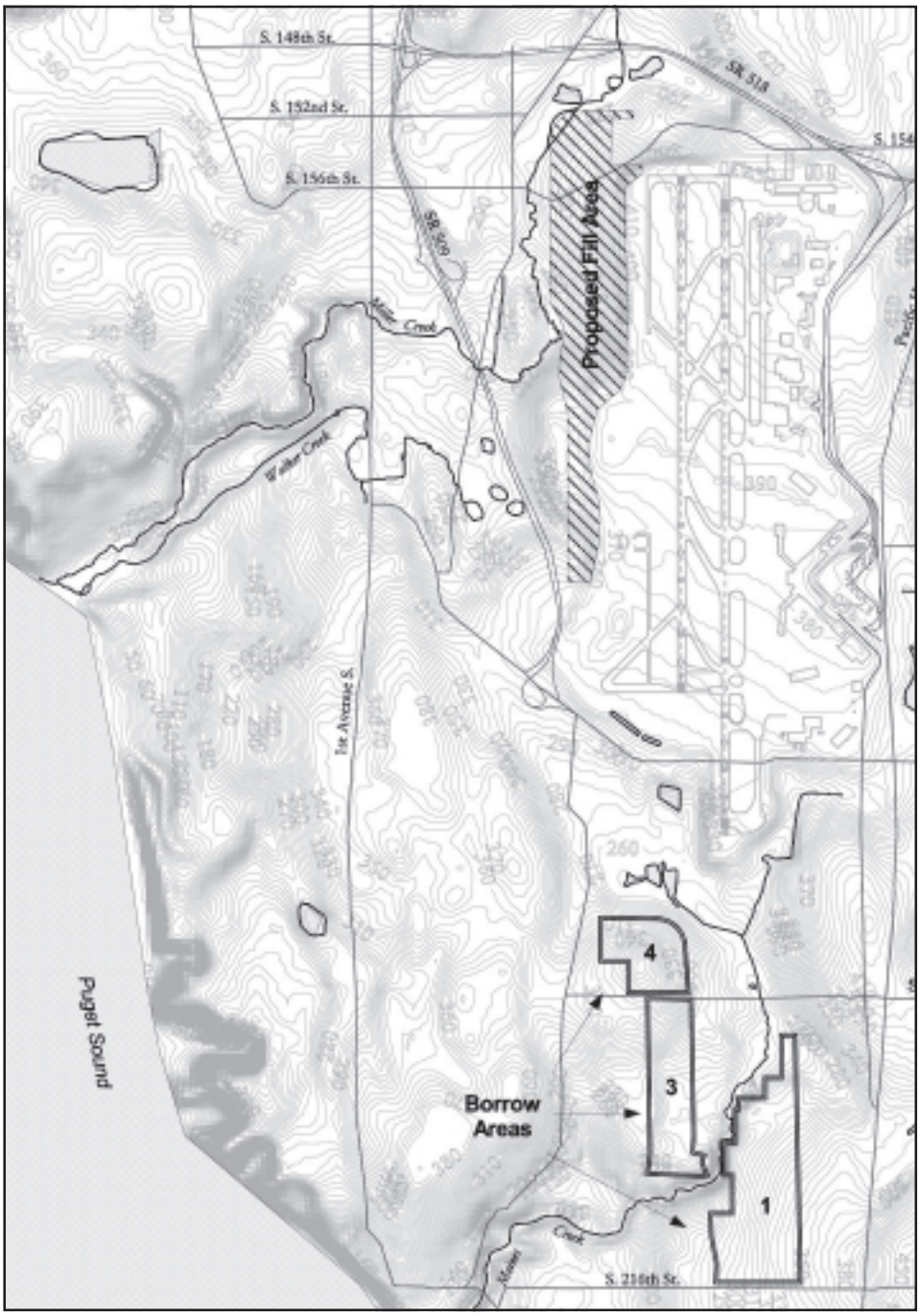
Two groundwater flow regimes, shallow and deep, were identified in the Miller Creek basin. The shallow system involves recent and recessional deposits, and in some areas, Vashon advance outwash. In the recent and recessional deposits, groundwater discharges to the middle reach of Miller Creek and the upper reach of Walker Creek. The uppermost Vashon advance outwash groundwater also may discharge to the creeks, especially in the Walker Creek headwaters. The shallow aquifers in the region are recharged by local precipitation. In the study area, groundwater is recharged by up to an estimated 24 inches of precipitation per year depending largely on covering, soil type, and vegetation. In the residential area acquired by the Port of Seattle, an additional 3 inches of septic discharge per year contribute to groundwater recharge. Groundwater in the deeper system discharges year-round to the lower reaches of streams, to deep wells, and to Puget Sound.

Groundwater Recharge Effects

Changes to groundwater recharge were evaluated along a cross-section of the proposed fill embankment near Miller Creek. The following effects are predicted if the fill embankment is built:

- Groundwater recharge over the cross section would be reduced by an estimated 11% (this number does not apply to all modifications proposed by the Port and may over-estimate the local effect).
- Recharge within the fill would spread out, significantly delaying discharge to local wetlands and Miller Creek west of the embankment.
- Seasonal discharge of water from the embankment to remaining wetlands would be substantially less variable than current flow to the wetlands.
- Deep percolation through till would increase slightly compared to the current condition on a total gallons basis. However, seepage through the till would represent a substantially larger *percentage* of recharge under the built condition.

The timing changes generally would benefit remaining local wetlands and would slightly moderate seasonal low base flows and temperatures in Miller Creek. However, local groundwater quantities would be reduced on an average annual basis because of the runway impervious area.



Surface Water

Miller and Walker Creeks drain the west side of the airport. The watershed is approximately 9 square miles and originates from Arbor, Reba, Lora, and Burien Lakes; from wetlands associated with the Miller Creek detention facility; and from seeps along the west side of the airport. The Miller Creek watershed contains significant development, resulting in approximately 23% impervious surfaces. An average of 54% of the precipitation discharges through the mouths of Walker and Miller Creeks.

Des Moines Creek drains the south airport area and proposed borrow pit areas. Its watershed covers 5.8 square miles and drops from an elevation of approximately 350 feet to Puget Sound at Des Moines Creek Beach Park. The east fork of Des Moines Creek originates at Bow Lake, where it flows through storm drains for approximately 0.5 mile. The west fork of Des Moines Creek originates at Northwest Ponds, in the northwest corner of the Tyee Valley Golf Course. An average of 41% of precipitation in the Des Moines Creek watershed discharges through the mouth of Des Moines Creek.

Surface Water Management

The Project Team reviewed hydrologic analyses performed by Port consultants, including development of target flows, streamflow model calibration, and design of flow-control facilities. The Port's approach for establishing target flows (based on 10% effective impervious area) and sizing flow-control facilities is reasonable. However, the Miller Creek streamflow model was found to not accurately simulate observed flow volumes, indicating that it is not well-calibrated. Modifications are needed in the model in order to size flow-control facilities and estimate hydrologic impacts with confidence. Because of poor model calibration, the Miller/Walker Creek model was not used for this project. The Des Moines Creek model was found to be more reliable.

Fish Habitat

Anadromous and resident fish live in Miller, Walker, and Des Moines Creeks, despite urbanization. Adult coho and chum salmon use of Miller and Walker Creeks was verified up to First Avenue South and in Des Moines Creek up to Marine View Drive. Juvenile coho and a small population of resident cutthroat trout are distributed throughout both watersheds. Water quality data collected from Miller and Walker Creeks for this project indicate that low dissolved oxygen levels may limit fish production in upper portions of the watershed. Steelhead and pink salmon runs have been reported on Des Moines Creek, and no fisheries water quality concerns were identified for the creek. The bull trout and chinook salmon are threatened or endangered aquatic species that occur in some Puget Sound streams. However, neither of the species were observed nor conclusively documented in the local streams. The bull trout was not expected to be present in Miller, Walker, or Des Moines Creeks, based on habitat preferences. Conclusive records were not found to confirm reports of chinook salmon presence in Miller Creek.

No direct effects on fish habitat are expected in Walker or Des Moines Creeks due to construction. Miller Creek would be relocated in the Vacca Farm area, providing a net gain in habitat including a mixture of pools and riffles, gravel and cobble substrate, riparian vegetation, and replacement of woody debris. If indirect effects from construction activities degrade habitat quality, resident populations of cutthroat trout and anadromous coho salmon would likely decline.

Wetland Ecology

The fill activities associated with the improvement projects would result in permanent loss of 13.88 acres of wetlands and temporary loss of 1.86 acres in the Miller Creek watershed. Of equal importance to the wetland acreage loss would be a loss of wetland function. The study considered the effectiveness and opportunity for wetlands to improve water quality, to provide suitable habitat, and to function as flood plains.

The proposed runway construction would affect local wildlife by reducing habitat size and availability. To prevent a significant decline in local populations, mitigation would be required to provide additional habitat on site. However, the extent to which on-site habitat could be provided is limited because the Federal Aviation Administration limits development of avian habitat within 10,000 feet of existing facilities to minimize aircraft bird strike hazard.

Wetland Mitigation

Wetland mitigation for the proposed airport improvement projects must consider permanent and temporary wetland losses within the Miller Creek watershed. The Port proposes the following on-site wetland mitigation measures:

- Removing existing development;
- Establishing a vegetated buffer, and enhancing wetlands along Miller Creek;
- Enhancing or restoring wetlands within the Des Moines Creek watershed;
- Excavating the flood plain to compensate for lost flood storage;
- Developing stormwater management facilities; and
- Restoring and enhancing 11 acres of farmland and farmed wetlands.

For wetland impacts that cannot be mitigated within the watershed, an off-site mitigation plan, including development of a 67-acre site near Auburn, was developed. The overall mitigation plan was designed reasonably to compensate for wetland impacts. As part of the implementation of this mitigation plan, construction oversight and long-term monitoring would be necessary to ensure and verify the adequacy of the plan. King County and the State of Washington have conducted studies and concluded that constructed wetland mitigation projects are not a guaranteed success, and that closer regulatory oversight is merited for longer periods to monitor mitigation projects.

Borrow Pit Impacts on Shallow Groundwater and Wetlands

Recharge to the shallow regional aquifer is expected to increase slightly (less than 0.05 cubic foot per second), because of mining in the borrow pit areas located south of the airport. Because the shallow regional aquifer contributes base flow to Des Moines Creek and helps dampen streamflow fluctuations due to precipitation events, the small change in recharge conditions may be slightly beneficial to streamflows. Several depressional and slope wetlands near Des Moines Creek may be affected negatively by excavation in Borrow Pit Areas 3 and 4. The excavation may redirect some of the perched groundwater flow, which currently discharges to the wetlands.

Possible Contaminated Fill

The Project Team analyzed available data regarding the metals chemistry and the ecological risk of the potential Maury Island fill. Based on this analysis, metals in the Maury Island fill being considered for fill should not pose an unacceptable risk to humans or the environment.

Construction Period (Temporary) Impacts

The Project Team generally agrees with the Port's Stormwater Management Plan approach for temporary erosion and sedimentation control measures. However, embankment construction of the magnitude and duration of the third runway project is subject to a range of climatic events and human errors, and an uncontrolled release of stormwater runoff from the disturbed site is probable despite proper implementation of Best Management Practices.

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