

**401 Permit Decision-Making
Sea-Tac International Airport, Third Runway**

FINAL DRAFT MEETING NOTES

LOW FLOW ANALYSIS

**May 9, 2001
1:00 – 4:00**

These final draft meeting notes have been prepared by Kate Snider, Floyd & Snider Inc.

ATTENDEES

Ann Kenny, Dept. of Ecology
Dave Garland, Dept. of Ecology
Kelly Whiting, King County
Keith Smith, Port of Seattle
Joe Brascher, AquaTerra
Pony Ellington, Pacific Groundwater Group
Kate Snider, Floyd & Snider Inc.

MEETING SCOPE AND AGENDA

This meeting was scheduled as a follow up meeting to the Low Flow meeting of April 25. The purpose of the meeting was to:

- 1) describe the proposed process forward to address Ecology's concern regarding extrapolation of one modeling section across the length of the embankment to determine embankment seepage;
- 2) confirm that the revised HSPF modeling approach as determined at the 4/25 meeting is consistent with revisions proposed above;
- 3) determine process and schedule expectations.

EMBANKMENT SEEPAGE CALCULATIONS

Ecology has expressed concern regarding the representativeness of the technique used in the low flow document in which one modeling section was extrapolated across the length of the embankment to determine embankment seepage.

To address this concern, embankment seepage calculations will be revised as follows:

- The embankment will be segmented into 25-foot square cells, and an average depth calculated for each cell. The Hydrus model will be run on each of these 25-foot square cells of fill at their accurate depths.

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- The Hydrus results in aggregate will provide a more accurate calculation of input to the drain layer at the base of the embankment. Ecology concurs that this approach addresses D. Garland's concern re: representativeness of the embankment seepage modeling approach. Utilization of this revised approach as described in these meeting minutes will eliminate the need to perform a comparative analysis of revised results compared to the results of the previous coarser modeling approach.

REVISED HSPF MODELLING APPROACH, RELATIONSHIP TO EMBANKMENT SEEPAGE CALCULATIONS

Three components will be aggregated to evaluate potential project impacts to low stream flow:

- 1) Embankment seepage calculations using Hydrus-Slice modeling technique
- 2) HSPF basin modeling, adjusted to coordinate with embankment seepage calculations
- 3) Consideration of non-hydrologic affects.

The following approach was determined at this meeting:

1. Embankment seepage modeling will be re-run -
 - Three modeling segments will be used: one representative of the embankment fill in the Walker basin, one representative of the northern portion of fill in the Miller basin; and one representative of the southern, deeper portion of embankment fill in the Miller basin.
 - The Hydrus work in these modeling segments will utilize the 25-foot square cell approach described in the first section of this memo (Hydrus is used to determine vertical flows to the drain layer at the base of the fill).
 - The Slice model used in each of these three modeling segments will have different Slice variables to address differences in material properties and geometry (Slice is used to determine horizontal flow within the drain layer to the toe of the embankment).
 - As determined in the 4/25 meeting, daily precipitation records will be used as input to Hydrus – different precipitation records will be used for the Miller and Walker watersheds.
 - As determined in the 4/25 meeting, Hydrus precipitation input will be modeled to fall on the permeable areas of the embankment only. Precipitation values will be proportionately "scaled up" to address rainfall to impermeable areas.
 - All other adjustments to the embankment seepage modeling determined in the 4/25 meeting will be made.

- Embankment seepage modeling will produce daily time series output for the four years identified as the dry years (1991 – 1994), for each of the following:
 - Embankment discharge – Miller Basin
 - Embankment discharge – Walker Basin
 - "Seepage through till" – Miller Basin
 - "Seepage through till" – Walker Basin

Per the 4/25 meeting notes, the "seepage through till" values will be used as a component of the HSPF modeling.

2. HSPF modeling will be re-run as determined in the 4/25 meeting. The following clarifications were made:
 - The area of precipitation input removed from HSPF will be equivalent to the area of precipitation modeled in Hydrus
3. Daily time series output for the 1991-1994 dry years will be aggregated for embankment seepage and HSPF modeling results (as well as adjustments for non-hydrologic affects). This time series information will be evaluated to determine potential project low-flow impacts.

PROCESS FORWARD

The process forward consists of the following steps:

1. Pacific Groundwater and Aquaterra confirm/coordinate re: total surface area and impervious area modeled in Hydrus (for both Miller and Walker basins).
2. Aquaterra provides Pacific Groundwater with precipitation records to use for Hydrus input
3. Pacific Groundwater performs Hydrus and Slice modeling as defined in these meeting notes, and produces daily time series output for embankment discharge and "seepage through till" as described above. This time series output is provided to Aquaterra
4. Aquaterra compiles time series output from HSPF and embankment seepage for evaluation (in conjunction with non-hydrologic affects) to determine potential project impact to low stream flow.
5. This work allows confirmation of the low flow mitigation proposal, and preparation of a revised low-stream flow document.

Additionally, the Port is checking on the status of the work identified at the April 4th meeting regarding non-hydrologic effects (page 2, Checklist Group 6, number 5 of the 4/4/01 meeting notes).

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EXPECTED SCHEDULE

Conversation between the Port, consulting team and Ecology identified the following points relative to schedule:

- Pacific Groundwater estimates 7-10 weeks to reach the conclusion of Step 3 listed above (data to Aquaterra - no formal report). Specific schedule within the 7-10 week range is dependent on availability constraints.
- It is assumed based on previous discussion that completion of Step 4 above would take another 1 week – total of 8-11 week estimate until quantification of low stream flow impact.
- The schedule may be shortened by 1 week if Pacific Groundwater and Aquaterra utilize HSPF to determine rainfall to root zone quantities, as input to Hydrus.

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