

Green-Duwamish Pollutant Loading Assessment

Watershed Model Development Update 10/23/17

EPA's existing contract with TetraTech for this project will expire in March 2018. All remaining funds are focused on transitioning the project and project files to Ecology for future use. One key question that must be resolved in order to direct use of TetraTech's remaining budget is: **Which watershed model should the project use (LSPC or HSPF)?**

Based on the October 2014 Technical Approach, and the 2016 Modeling QAPP, TetraTech implemented hydrodynamic model set-up using LSPC. LSPC is a model that was developed by TetraTech. The publicly available version does not include the coding improvements TetraTech made to LSPC in order to complete the PLA's hydrodynamic model. TetraTech will not provide the current LSPC code to Ecology due to proprietary concerns and the EPA contract does not require them to provide us the LSPC code. TetraTech built the LSPC hydrodynamic model using original HSPF files from King County.

The Ecology-EPA Project Team, in coordination with modelers from City of Seattle, King County, and TetraTech, have prepared a comparison between LSPC and HSPF (below).

Comparison between LSPC and HSPF models

LSPC Pros:

1. Model files are already set up.
2. Faster run times for low to moderately complex models.
3. It has a function to model land use change over time.
4. Supports flexible assignment of meteorological stations; can apply variable rainfall within model domain.
5. Convenient model organization and data processing (associated with no array size limitations, having a linked database, enhanced user interface, and ability to include all of the watersheds under one common system resulting in less round-off error).
6. Can represent irrigation.
7. Tailored to interface with EFDC (receiving water model).
8. Can simulate bank erosion as a result of flow, not just sheer stress.
9. Can define multiple types of sediment particle sizes.

LSPC Cons:

1. The code is not publicly available.
2. Will need additional training for Ecology staff and potential local government modeling team members who are not familiar with LSPC.
3. Pollutant transformation routines are not available and would have to be built into the code. It currently only models decay. TetraTech had planned to add this capability to LSPC as part of this project; the lack of this capability represents a significant obstacle to using LSPC.
4. Can't simulate both build up/wash off and a sediment associated value at the same time.
5. Uncertain how LSPC will evolve in the future.
6. Ecology would need a contract with TetraTech to make coding changes.

HSPF Pros:

1. Modelers from Ecology, Seattle and King County are familiar with HSPF.
2. The code is publicly available.
3. It is widely accepted and used model by agencies and consultants.
4. More routines are available to perform pollutant transformations.
5. Has detailed pesticide routines, and soil moisture by layers.
6. Can readily program model code.
7. More flexible small routine changes.
8. More options for sediment transport (depth and storage, not just depth) and overland flow.
9. Can simulate both build up/wash off and a sediment associated value at the same time.

HSPF Cons:

1. Will require additional time for TT to convert it back to HSPF.
2. HSPF has a limit on the number of simultaneous constituents, though this limit may not be a constraint for the PLA. LSPC has no limit, although in practice the number of constituents run in LSPC could be limited by run times because the model run times may increase dramatically depending on how many constituents are run at the same time.
3. Has only 3 categories of sediment particle sizes: sand and 2 cohesives. LSPC allows for more categories of particle sizes, although this is not likely to be needed for the PLA.
4. Might lose some functions from LSPC.
5. Need to develop messages to Technical Advisory Committee and Interested Parties about model change.

Based on this information, the Project Team recommends converting the watershed model back to HSPF format.

Why make this decision now?

- As the LSPC model becomes more complex (with sediment transport, etc.), it becomes more difficult to convert to HSPF.
- Available existing budget in the EPA TetraTech contract will fund the conversion.