



GREEN-DUWAMISH POLLUTANT LOADING ASSESSMENT TECHNICAL ADVISORY COMMITTEE

TECHNICAL ADVISORY COMMITTEE MEETING #8

- October 5, 2016

Tukwila Community Center
12424 42nd Ave South,
Tukwila, WA 98168

TAC PARTICIPANTS

- Ryan Larson, City of Tukwila
- Kevin Buckley, Seattle Public Utilities
- Shawn Gilbertson, City of Kent (on webinar)
- Joanna Florer, Port of Seattle (on webinar)
- Jana Ratcliff, Washington State Dept. of Transportation (on webinar)
- James Rasmussen, Duwamish River Cleanup Coalition
- Heather Trim, Duwamish River Cleanup Coalition
- Greg Pelletier, Ecology Environmental Assessment Program
- Jeff Stern, King County
- Kristen Kerns, US Army Corps of Engineers (on webinar)

ADDITIONAL MEETING PARTICIPANTS

- Laurie Mann, EPA (on webinar)
- Dino Marshalonis, EPA (on webinar)
- Ben Cope, EPA Office of Water
- Becky Chu, EPA Office of Environmental Cleanup
- Erika Morgan, Councilmember, City of Black Diamond
- Joan Nolan, Ecology Water Quality Program
- Heather Khan, Ecology Water Quality Program
- Rachel McCrea, Ecology Water Quality Program
- Mahbub Alam, Ecology Toxics Cleanup Program
- Ralph Svrjcek, Ecology Water Quality Program
- Bo Li, Ecology Water Quality Program
- Jon Butcher, Tetrattech (on webinar)
- Brian Watson, Tetrattech (on webinar)
- Michelle Schmidt, Tetrattech (on webinar)
- Todd Kennedy, Tetrattech
- Rick Schaefer, Tetrattech

PURPOSE OF THE MEETING

- Update on activities since April 2016
- Discuss setup and development of the LSPC model for hydrology
- Upcoming meeting schedule

MEETING AGENDA



GREEN-DUWAMISH POLLUTANT LOADING ASSESSMENT TECHNICAL ADVISORY COMMITTEE

Time	Topic	Discussion Items	Lead
9:00 a.m.	Welcome and Introductions	<ul style="list-style-type: none"> • Introductions • Review last meeting's progress • Meeting objectives 	<ul style="list-style-type: none"> • Joan Nolan
9:15 a.m.	Project Updates	<ul style="list-style-type: none"> • Final QAPP • PCB Congener Study • USGS Sampling Study 	<ul style="list-style-type: none"> • Bo Li & Ben Cope • Rachel McCrea • Mahbub Alam
10:00 a.m.	Setup and Development of LSPC Model for Hydrology – Part 1	<ul style="list-style-type: none"> • Building the model • Committee discussion 	<ul style="list-style-type: none"> • Tetra Tech • All
10:45 a.m.	Break		
11:00 a.m.	Setup and Development of LSPC Model for Hydrology– Part 2	<ul style="list-style-type: none"> • Current status of hydrology, data gaps, and next steps • Committee discussion 	<ul style="list-style-type: none"> • Tetra Tech • All
11:30 a.m.	Comments from audience		
11:45 a.m.	Next Steps	<ul style="list-style-type: none"> • Next steps in PLA development process • Next steps for TAC / Interested Parties Meeting 	<ul style="list-style-type: none"> • Bo Li • Joan Nolan / Bo Li
11:50 a.m.	Wrap-up	<ul style="list-style-type: none"> • 	Joan Nolan
12:00 p.m.	Adjourn		

WELCOME AND INTRODUCTIONS

Joan Nolan welcomed the TAC members back and went over housekeeping items and introductions which included attendee's joining via phone. Joan reviewed the roles of the TAC, gave a brief overview of meeting goals and objectives, and agenda. Today's primary objective is to introduce and review the status of developing the hydrologic components of the models. TAC members were provided a copy of a technical memo dated Sept 26, 2016 which describes the current status of model development.

PROJECT UPDATES

QAPP FINALIZED

Ben Cope described finalizing the modeling QAPP and thanked TAC members, especially King County, for their detailed comments. Changes made include changes to the upstream boundary of the food web model, removal of PAHs from the food web model parameter list, some LSPC calibration changes, and an added discussion of model uncertainty and acceptance. Reminder that this is a long-term complicated project, and



GREEN-DUWAMISH POLLUTANT LOADING ASSESSMENT TECHNICAL ADVISORY COMMITTEE

the QAPP will be revised in the future to reflect future phases of modelling, such as for water quality. The modelling QAPP was finalized, approved by EPA and posted on Ecology website in July 2016. You can find the final QAPP at:

<http://www.ecy.wa.gov/geographic/GreenDuwamish/Green-DuwamishPLAQapp07112016Signed.pdf>.

In response to questions about funding such a long term project, EPA and Ecology reminded the TAC that model development has been broken into different phases, each phase is a chunk of work that can be broken into different work assignments according to funding opportunities. Current PLA model development work in Fiscal Year 2017 has \$55,000 yet to be spent and approximately \$160,000 more is needed in this fiscal year.

PCB CONGENER ASSESSMENT

Rachel next gave an update on the PCB congener assessment. The PCB Congener Study Phase 1 was done in partnership with Ecology's TCP program and was completed in April 2016. This Study provides an overview of PCBs, including their regulation, sources, environmental affects and analytical considerations. You can find the PCB Congener Study Phase 1 online in Ecology's Lower Duwamish Waterway Source Control Documents at <https://fortress.wa.gov/ecy/gsp/DocViewer.ashx?did=54944>.

The PCB Congener Assessment Phase 2 began in September 2016 under contract with an Ecology prime contractor (Leidos) with Dr. Lisa Rodenburg as a sub-contractor. The primary work of Phase 2 will be to 1) finalize the database of existing PCB congener data in the watershed, 2) assess the existing data sets to determine whether or not they are acceptable for detailed statistical analysis, and 3) provide recommendations to Ecology, EPA and the PLA TAC for which PCB congeners, or suites of PCB congeners, should be modeled in the PLA. We (PLA Project Team) are tentatively expecting to present Phase 2 results to the TAC in March 2017.

The results of the initial data assessment are expected in November 2016. Provided some of the data is usable, the contractors will then perform a multivariate statistical analysis to identify PCB fingerprints by media, the relative contribution in the watershed, and any observable spatial patterns in the Lower Duwamish to assist with near-term source control efforts. It is possible that additional data not currently available may be assessed in a future potential Phase 3.

DUWAMISH RIVER SAMPLING BY USGS.

Mahbub Alam gave an update on the Ecology funded USGS Green River Study which started four years ago. The study is looking at sediment and chemical loads that are coming from the upstream Green River into the Lower Duwamish Waterway. Since the Superfund remedy relies on clean sediments coming from the Green River, it is important to know the quantity and quality of sediments being transported to the LDW. Currently, we are in Phase 3 of the USGS study.

Under Phase 1 of the study, a QAPP was prepared and USGS tested methods for efficiently collecting suspended sediments from a centrifuge. In Phase 1, USGS collected water and suspended sediment samples from 7 events. Streamflow discharge, suspended sediment concentration, and chemical concentrations in whole water and associated with suspended sediment generally were higher during



GREEN-DUWAMISH POLLUTANT LOADING ASSESSMENT TECHNICAL ADVISORY COMMITTEE

storm events than during low-precipitation events. This resulted in higher sediment and chemical loads during the storm than during low-precipitation events. USGS produced a data report from the first phase that can be found here:

http://www.ecy.wa.gov/programs/tcp/sites_brochure/lower_duwamish/USGSGreenRiverLoadingStudy-optimized.pdf .

Under Phase 2 of the study, USGS collected more than 20 samples from different events including baseflow, storm, and dam release events. USGS installed two different continuous gaging stations. The first gage was installed in late 2013 at RM 10.8 (Golf course at Tukwila) and the second gage was installed in early 2015 at RM 6.3 (East Marginal Way Br.). Both gages are recording water level, velocity, temperature, and turbidity in 15 minute interval. The 2nd gage is also recording salinity (specific conductance). There is a discharge rating curve for the 1st gage but a rating curve for the downstream 2nd gage is not available at this time due to complexity of salt water flow reversal. USGS prepared several regression models including calculating suspended sediment concentration (SSC) from turbidity. USGS is measuring SSC, not TSS. SSC is a better measurement. USGS will continue adding data from phase 3 to improve the regression model. For more information on Phase 2, see the [Phase 2 Report](#) and its [Appendices](#).

The MTCA funding issues caused a break in the project for about a year. Phase 3 started in July 2016 when funding became available. Phase 3 continues everything in Phase 2 and adds two new tasks to estimate dissolved PCBs in the water and assess tidal dynamics. Previously, USGS centrifuged the water, discarding the effluent water and keeping only the solids. In this phase, in order to estimate dissolved phase concentration of PCBs, USGS will take centrifuged effluent water and pump it through a 0.45 micron disk filter and then through an XAD2 resin to absorb dissolved PCBs. Both filter and resin will be run for PCB congener analysis at AXYS Analytical, a specialty lab in British Columbia.. Another Phase 3 task is to take salinity and pH data from different reaches upstream of LDW to have a better idea of the tidal influence. The Phase 3 QAPP is available here: <https://fortress.wa.gov/ecy/gsp/DocViewer.ashx?did=58238>.

Mahbub then described what we have we learned so far. During phases 1 and 2, suspended sediment concentrations from discrete sampling events ranged from 6 to 555 mg/L. This reflects a range of flow conditions, including baseflow (or dry weather), storm events (or wet weather), and dam releases. Out of the 27 sampling events during phases 1 and 2, about 10-15 were storm events, 5-8 were dam release events, and another 3-5 were baseline events. There were higher flow volumes during dam release events that might last for couple of days and these events resulted in some of the highest loads during discrete sampling events. Although suspended solids concentrations are low during dam release events, flows are higher, and therefore, the dam release events may generate more sediment load.

Since 15-min continuously recorded turbidity data are available, 15-min suspended sediment concentrations (SSC) for the whole timeframe were calculated from the turbidity vs. suspended sediment concentration regression model. This data could be an input for the PLA model. Note that a minus sign on the SSC concentration means suspended sediments are moving upstream due to tidal influence. This is important for calculating net loading. Phase 3 data (from the 12-15 planned sampling events) will be used to improve the regression calculations.



GREEN-DUWAMISH POLLUTANT LOADING ASSESSMENT TECHNICAL ADVISORY COMMITTEE

Net suspended sediment loads over approximately two years is 110,000 tons/yr. About 71% of the load comes from fines (less than 62.5 microns). This suspended sediment load is below the LDW sediment transport model (STM) estimate of 200,000 ton/yr. Note however that the USGS estimate does not include bed load whereas the LDW STM includes both bed and suspended sediment loads. An initial comparison between chemical concentrations from USGS study phases 1 and 2 and the LDW bedload composition model (BCM) inputs shows that the USGS measured PCB concentration seems to be lower than the PCB concentration used in the BCM model. Other chemicals of interest seem comparable.

Q&A

- Q: Is the centrifuged effluent from Phase 3 being analyzed for dissolved organic carbon (DOC)?
 - A: Yes, it is being analyzed for DOC.
- Q: Are two levels of SS being run or are you just doing a single regression?
 - A: Two different regressions were done with different types of SS, one for SSC and another for SSC-fines (less than 62.5 microns). USGS reported excellent correlation with SSC and turbidity. The coefficient of determination (R-squared) is more than 0.9. There will be a peer reviewed USGS open file report published after Phase 3.
- Q: How is the continuous data available from the USGS?
 - A: You can access real-time data from the USGS stream gage stations [12113415](#) and [12113390](#). Additional data will be made available in a final Phase 3 report.

SETUP AND DEVELOPMENT OF LSPC MODEL FOR HYDROLOGY – PART 1

Todd Kennedy of Tetra Tech presented information regarding the Setup and Development of LSPC Model for Hydrology - Building the Model. Refer to the presentation and the draft technical memo dated September 26, 2016 for details.

<http://www.ecy.wa.gov/geographic/GreenDuwamish/DuwamishModelSetupTM092616Hydro.pdf>

<http://www.ecy.wa.gov/geographic/GreenDuwamish/DuwamishPLA-TACmtg100516TetraTech.pdf>

Comments and suggestions from the TAC and other attendees are listed below.

- Impervious surfaces are currently categorized as roof, road and other. These categories may need further refinement as the model is built, as it will matter for pollutant loading. For example, “other” would include driveways. At this time, TetraTech is retaining the existing 3 categories because it doesn’t make a difference for hydrology.
- Impervious surfaces may not all act the same way. Impervious surfaces that contribute runoff to pervious surfaces will not behave the same as impervious surfaces that are tight-lined to a drainage system. TetraTech is using Elmer and Sutherland equations to estimate the amount of impervious area that is considered “effective” (e.g., contributes runoff to the drainage system for discharge to receiving waters).



GREEN-DUWAMISH POLLUTANT LOADING ASSESSMENT TECHNICAL ADVISORY COMMITTEE

- Potential adjustments need to be made for stormwater BMPs/facilities. Municipal Separate Storm Sewer Maps are available for all permitted jurisdictions in the watershed. Post meeting follow up: the GIS files have been transmitted to TetraTech.

SETUP AND DEVELOPMENT OF LSPC MODEL FOR HYDROLOGY – PART 2

Jon Butcher of Tetra Tech presented information regarding the Setup and Development Building the Model of LSPC Model for Hydrology – Current status of hydrology, data gaps, and next steps. Links for presentations and the draft technical memo are given above.

Comments and suggestions from the TAC and other attendees are listed below.

- Participants discussed local familiarity with and accuracy of PRISM for rainfall projections. PRISM has been used successfully for other projects in Western WA; the product takes data from rain gauges, Doppler and radar and performs regression analysis to obtain better spatial distinctions of rainfall.
- The Black River pump station is represented in the model, but TetraTech is doing more research on how the pump station functions and therefore how surface flows will be routed.
- Does the model need to account for hydrologic affects that can't be predicted, like the discharge of water from fighting a barge file or from a water main break? These types of events are within the background noise of the model. Unless it is a planned significant or repetitive event, it would be hard to model.
- Particular concerns with modeling Horseshoe Lake (in Black Diamond) like a bath tub. Residents know the lake goes up and down when the water table goes up and down; when the lake is high, downstream basements flood. Residents believe this lake is hydraulically connected to the River. It's been observed at Black Diamond Lake that the stream is going out of Horseshoe Lake, not coming into Horseshoe Lake. TetraTech suggests that the groundwater component is a major source of uncertainty.
- Steeper drainages may need adjustment because the energy in those channels may result in adding sediment to the system.

COMMENTS FROM THE AUDIENCE

There were no comments from the general audience due to the group being small and all present asking questions throughout the presentations.

NEXT STEPS

TetraTech will continue to refine the hydrology model. If you have comments on the technical memo, please send those comments to Bo or Joan by Monday, October 31, 2016.



GREEN-DUWAMISH POLLUTANT LOADING ASSESSMENT TECHNICAL ADVISORY COMMITTEE

We are preparing for another TAC and Interested Party meeting in February or March 2017. We are considering hosting the TAC meeting and the Interested Parties meeting on the same day. Topics to be discussed include the final hydrologic model performance and the results of the PCB congener assessment phase 2.

- Suggestion to expand Interested Party outreach to include more industry representatives (e.g., perform outreach to Dave Gehring of the [Manufacturing Industrial Council \(MIC\)](#)).

Project Team Action items:

- Consider including the Lake Washington PCB data (collected by King County) in the PCB congener assessment.
 - Note that this data set is currently outside the geographic scope of the PCB congener assessment contract work.
- Provide links to the PCB congener assessment phase 1
 - Done; see link above.
- Provide an example of a multivariate factor analysis project similar to the PCB congener assessment Phase 2.
- Provide links to the USGS Phase 3 QAPP and Phase 1 and Phase 2 data reports, as well as the USGS station information.
 - Done; see link above.
- Consult the LDW seep study for potential information regarding groundwater in the LDW.
 - Seep study (http://www.ldwg.org/rifs_docs4.htm#seep) provided to TetraTech for their consideration.
- Consult the Duwamish hydrogeologic pathways work (circa 1998) for additional information on groundwater in the LDW.
 - Project information provided to TetraTech for consideration.
- Consult the Wild Fish Conservancy and Trout Unlimited for information about stream flow conditions that they might have observed when they did stream typing work for salmon recovery purposes.
- Put PLA TAC Meeting #8 presentations on PLA website.
- Send out Meeting #8 meeting summary to TAC for review; post final copy on PLA website.
- Update/Replace all TAC member and PLA Project Team table tents so that future meetings will have all names available.

TAC homework:

- Provide comments on the draft technical memo to Bo Li by October 31, 2016.
- Review the meeting #8 summary notes and provide edits before November 28, 2016.
- Identify and provide any additional hydrologic data that TT may use.