Notes from Management Team Meeting
WRIA 9 Stormwater Retrofit Plan

December 4, 2013, King Street Center

Attendees: Jim Simmonds, King County; Chris Thorn, City of Auburn; Elissa Ostergaard, King County; Dr. Rich Horner, University of Washington; Cathie Scott, King County (note taker); Curtis DeGasperi, King County; Jeff Burkey, King County; Dan Smith, King County; Dave White, King County; Dino Marshalonis, EPA; Mindy Roberts, Ecology; Ed O'Brien, Ecology; David Funke, King County; Erkan Istanbulluoglu, University of Washington; Mark Wilgus, King County; Doug Navetski, King County; Lorin Reinelt, King County; Olivia Wright, King County; Michelle Wilcox, EPA (via telephone)

Introductions and General Update

- Jim Simmonds explained that because of budgetary concerns, he will be facilitating the management team meetings and Cathie Scott (King County) will be taking notes at the meetings. Tamie Kellogg will facilitate the last stakeholder workshop in February.
- Jim passed out the agenda with the project schedule printed on the back of the page. The highlights in the schedule indicate work in progress. The project is expected to end in April or May 2014.
- King County's matching portion of the grant will be higher than expected, by about $10,000 to $20,000 for a total of about $1.35 million. Part of the reason for the increase is that the project is extending into 2014. Michelle said that the overage could be applied to other grants.

SUSTAIN Modeling Results and Draft Report

Olivia Wright distributed a handout and described the draft report on SUSTAIN (System for Urban Stormwater Treatment and Analysis Integration) modeling results. Highlights of the presentation are as follows:

- The purpose of the study was to model the stormwater retrofit needs, costs, and benefits through 2040 for the WRIA 9 study area.
- The BMP (best management practices) treatment train used in the analysis assumes five land use types: agricultural, light urban, medium urban, heavy urban, and transportation. Eighty percent of stormwater from impervious surfaces on properties is directed to bioretention facilities (rain gardens) and then to detention storage that leads to a common outlet. The other 20 percent goes directly to the outlet. Stormwater from light and medium urban areas is held in cisterns before going to bioretention, and pervious pavement is assumed for industrial/commercial parking surfaces in portions of heavy urban areas.
- Design assumptions are the same as those used in the pilot study of the Newaukum basin, except for detention ponds. Using the Western Washington Hydrology Model (WWHm3), sixty detention pond designs were developed for the study area, each to treat 1 acre of runoff, to accommodate different land covers, soil types, slopes, and precipitation in hypothetical catchments.

- Thirty-year lifecycle cost estimates were done for a hypothetical catchment area. The estimates assume a 5 percent real discount rate, which is based on King County recommendations. Land costs for detention ponds are assumed to be higher west and north of State Route 18. Costs are divided into private (development and O&M of BMPS on private property) and public (development and O&M on public property, inspection and enforcement (I&E) for both private and public facilities, and land value costs).
- Best solutions for the hypothetical catchment area were determined based on BMP costs and percent effectiveness (quantified as the percent reduction of the flow exceedance frequency from existing conditions). Best solution costs and indicator values were used to scale up to future conditions in the study area by calculating the weighted average for the 2040 land use cover.
- Public retrofit versus private mitigation costs were estimated for 2040 conditions.
- Sensitivity analyses were conducted for best solution methodology and discount rate. The two alternative methods for determining best solutions for 12 hypothetical catchment areas in the Newaukum basin yielded either a cost increase of $2.7 million or a decrease of $10.9 million compared to the initial analysis. Using a discount rate of 2.18 percent (used by King County Wastewater Treatment Division) rather than 5 percent, resulted in best solution costs that were an average of 25 percent higher to produce similar percent reduction with the same number of BMP units. The discount rate sensitivity analysis was conducted for four hypothetical catchments with commercial and high density residential development with high and low precipitation and costs.
- Cost estimates are presented for two options: initial construction of all BMPs and even distribution of construction over 30 years. Costs are broken down by type of BMP unit. Total estimated lifecycle study area costs are about $25 billion for the initial construction option and $12.6 billion for the distribute construction option. Costs are broken down by public and private contributions and by jurisdiction.
- The best solutions option for the hypothetical catchment scaled to the future land use study area would reduce the high pulse count (HPC), from 23 to 5, high pulse rate (HPR) from 273 to 95, and two-year peak mean winter base flow ratio (PEAK:BASE) from 92 to 7. A 99 percent probability was predicted in the improvement of benthic index of biotic integrity (B-IBI) scores based on PEAK:BASE averaged for the study area. Indicator results were broken down by jurisdiction.
- Next steps include adjusting retrofit costs to account for existing stormwater detention facilities, evaluating potential cost implications of climate change within the same future time horizon, and extrapolating cost to the Puget Sound Basin.

Questions, comments, and recommendations from the team were as follows:

- **Discount rate sensitivity analysis.** Using a 2.18 percent discount rate increases costs but does have much impact on effectiveness and optimization. The BMP solutions in the four hypothetical catchments were only slightly different than with the 5 percent discount rate. The main impact is on when to build and on O&M costs. The number of roadside bioretention units

depends on the amount of road in the catchment. Team members questioned the fact that there was no porous parking listed for any of the catchments (and for the entire study area when scaled up) and that this could send the wrong message to the region. It was explained that the analysis found that porous parking was not as cost-effective as bioretention. Moreover, this is a planning-scale analysis, not site- or catchment-specific. Property owners may choose porous pavement on their parcels.

Action: Olivia said that only two model runs were made for the analysis. More runs may be needed.

- **Programmatic costs.** Members asked why the O&M and I&E costs were so high. Jim Simmonds said that programmatic costs (costs to operate the program) can be as much as four times higher than capital costs. The pilot study report documents an analysis that was done on programmatic costs. Capital costs for the initial construction option are higher because the discount rate is higher than inflation. Another reason to distribute implementation over time is that technology will continue to improve.
- **Initial versus distributed construction.** Questions were raised about whether to consider the initial construction option in the analysis. It seems unrealistic to assume that all BMPs would be constructed in the same year.
- **Presentation of indicator results for study area (HPC, HPR, PEAK:BASE, TSS).** Members suggested that the charts include a fourth bar to show current conditions, not just predevelopment, future with no BMPs, and post-BMPs. The analysis should include information on what it would cost to maintain current conditions (not allow them to get worse), how much of future conditions is part of only new development and redevelopment, and the impacts and benefits of this development.

  Action: Jim Simmonds will look into adding these items to the analysis.
- **Potential I-IBI improvement.** The table that shows potential for I-IBI improvement by jurisdiction is confusing to some members. They suggest that a range be shown that includes current, future with no action, and future with BMPs. The table should be made more accessible to readers, including definition of terms. Another suggestion is that some stream points be included. Jim said that adding these points may be possible on the catchment level but not on a larger scale because the model will not allow stacking of streams from catchment to catchment (cannot account for stream routing). Another suggestion is to include the copper and zinc study (risk assessment) in addition to I-IBI.
- **Detention pond sizing and numbers.** A 60-by-60 foot pond size was used in the analysis, and then the number of ponds needed per acres was calculated. The analysis was not done on a regional scale. It was suggested that the total volume of detention could be used, rather than the number of ponds. The need should be expressed as a range that reflects the uncertainty.
- **Presentation of information.** Team members recommended that priorities be set for information in the report and that the report be organized accordingly. For example, benefits could be presented before costs and costs for the distributed construction option could be presented before costs for the initial construction option.

Action: Submit written comments on the SUSTAIN report to Olivia by December 13.

Assessment of Stormwater Mitigation by 2040 for New and Redevelopment—Draft Report

Jeff Burkey distributed a handout and described the draft report on projected mitigation through 2040 as part of new and redevelopment:

- The results of this assessment were incorporated into the SUSTAIN modeling.
- Fourteen land use categories were considered, divided into not-developed and developed. The developed categories were listed in order of level of disturbance, from high to low.
- It is projected that about one-third of the land in the study area will have stormwater management by 2040. Population growth does not produce as much sprawl as in the past, and development to accommodate the growth will include stormwater management.
- If an existing land use was projected to move up one category, it was assumed that stormwater mitigation would be required as part of the new or redevelopment. If the same category was retained, stormwater mitigation was not assumed.
- The number of number of undisturbed, unmitigated, and mitigated acres on private and public lands by 2040 was projected for each jurisdiction in the study area. The information was also presented in terms of percentages and by the percent of growth per year in unmitigated and mitigated areas. The average growth rate in the study area is 1 percent for unmitigated lands and 1.6 percent for mitigated lands.

Questions, comments, and recommendations from the team were as follows:

- Recommendation: Make information in tables and text consistent with each other in the report.
- Recommendation: Point out that development can be beneficial in terms of stormwater management (one-third of land will be improved).
- Recommendation: Take one line from each table to walk the audience through the analysis. (Raises the larger question of how to present technical data to nontechnical audiences.) Although this report is considered as background to the SUSTAIN report, it is important information and must be understandable.
- Ecology is under pressure to reduce stormwater management requirements for redevelopment; however, King County's requirements based on impervious surfaces may be more stringent than Ecology's.

Action: Submit written comments on the mitigation report to Jeff by December 11.

Proposed Approach to Analyzing Uncertainty of Climate Change Impacts on Mitigation Needs

Jeff Burkey distributed a handout and described the proposal to assess the impacts of climate change on identified stormwater management needs:

- The analysis will focus on changes in precipitation over time, using historical and projected extreme precipitation events. Research has found that the biggest changes will likely occur in larger storms.
- Summary statistics will be developed on a 24-hour duration event based on annual maximums for changes (delta) between historical and future simulations at the 95, 99, and 100 percentiles.
- The 1-hour precipitation time series for Emission Scenario A1B, a mid-level scenario used in 20 global climate change models (GCMs) and in two GCMs downscaled through regional climate models (RCMs), and Ecology's WWHM2012 software will be used to size ponds for historical (30 years of historical data) and future climatic conditions. Pond design is based on quantity (large events) only—not quality.
- The relative difference between pond volumes can be scaled using the ratio of changes between the summary statistics and the same statistics for the 1-hour time series.
- A draft report will be ready in late December or early January.

Questions, comments, and recommendations from the team were as follows:

- A bigger delta could be obtained with a series of small storms.
- Why not use a 3-hour time series? Jeff said he is trying to minimize the effort. The purpose is to understand the uncertainty of all the models, not how they could affect the WRIA 9 study results. One suggestion is to create an artificial run based on the 1-hour series for a 3-hour series.
- A Level 2 analysis will be used, similar to that used in the SUSTAIN analysis.

Proposed Approaches to Assessing Amount of Existing Detention in Study Area

Jeff Burkey distributed a handout, and he and Dr. Horner described the proposed approach to account for existing stormwater mitigation facilities in the study area:

- Dr. Horner is researching data on type and volume of BMPs in the Des Moines, Miller/Walker, and Covington creek basins to get a sense of a sample area for estimating BMPs in the whole study area. He needs access to King County data, especially for Soos Creek. Another source of information may be imap.

  Action: Dr. Horner will prepare a proposed approach for estimating BMPS in the study area.
- Jeff described his draft approach:
  - Calculate area weighted average HPCs for the watershed models (30 model domains).
  - Compute HPCs for existing conditions at the mouth of the model domains using calibrated HSPF output.

- Use a selected basin with assumed relatively low amounts of stormwater infrastructure (Newaukum), output the model at five drainage scales along the mainstem with HPC computed at each point.
- Scale the model domain results using a simple regression of HPC to drainage area.
- Determine the amount of mitigation needed based on where existing conditions fall on the scale between unmitigated and mitigated.

Action: Jeff and Dr. Horner will continue to work on study approaches and then will complete the assessment and prepare a draft technical memorandum by the end of January.

Status of Final Report

Jim said that they have prepared an outline for the final report. The report will be written for multiple audiences. A draft will be ready before the next project management team meeting on January 16. All five reports will be ready for stakeholder review by late January or early February.

Fourth and Final Public Workshop

The last public workshop is planned for February 25. Jim asked members if other days of that week would be more preferable.

Action: Jim will set the date for the workshop and inform members of the date and place.