Stormwater Retrofit Project Management Team Meeting
September 19, 2013 9:00 am to 12:00 pm
King Street Center, North and South Wind Room, 7th Floor

Attendance:

Jim Simmonds, King County (KC); Project Lead
Tamie Kellogg, Kellogg Consulting; Facilitator
Emily Santee, Floyd|Snider; Recorder
Jeff Burkey, KC
Curtis DeGasperi, KC
Dan Smith, KC
Dave Funk, KC
Derek Stuart, NHC
Ed O'Brien, Department of Ecology (Ecology)
Erkan Istanbulluoglu, University of Washington (UW)
Mark Wilgus, KC
Michelle Wilcox, Environmental Protection Agency (EPA)
Mindy Roberts, Ecology
Olivia Wright, UW
Rich Horner, UW

Introductions.
Jim Simmonds presents the new schedule to the group: EPA has granted an extension to the project. The project and all associated reports will need to be completed by June, 2014, with close out of grant by September 2014. Most reports will go to the stakeholders in January. The next stakeholder workshop will be in February. There will be PMT meetings in both December 2013 and January 2014.

Jim Simmonds updates the team on his recent visit with the Miller Walker Creek basin planning committee, who are considering adding flow control standards. Little Bear Creek in Snohomish County may also benefit from WRIA9 project team outreach; Jim Simmonds will coordinate a meeting with its managers.

Modeling Status.
Olivia Wright updates the team on the SUSTAIN modeling approach and preliminary results. 135 hypothetical catchments were modeled, representing 5 generic land uses, 3 soil types, 2 slopes, 3 precipitation zones, and 2 land costs. Catchments with forested land uses were not optimized using the SUSTAIN model; they were included as a representation of baseline conditions. The "best solution" for each run was identified by selecting the most effective solution with the lowest cost; generally this was determined by choosing a less expensive solution that was at the "knee" of the cost-effectiveness curve and that was still within 5% of the effectiveness of the most effective solution. >95% effectiveness was selected somewhat arbitrarily; Olivia will analyze how sensitive the end results are with respect to the percentage of the maximum effectiveness selected for use.

The maximum cost is roughly $280 million per square mile; the "best solution" cost is somewhat lower. Results are presented by land use type; for each scenario, the number and cost of rain gardens is the driving factor in the range of the modeled retrofit costs. The project team recommends the following modifications to the presentation of results:

- Note on the slides that the costs displayed on the results slides are *per hundred acres*.
- The final costs slide for Newaukum basin should include the *area of the basin* and an *analysis of the impact the percentage used to identify the "best solution" has on total cost*. For example, the results could be presented as follows: The model predicts that the Newaukum basin retrofit costs are $28.8 million for 277 acres if the >95% effectiveness "best solution" is implemented; compared to **X** dollars for 277 acres if the >90% effectiveness "best solution" is implemented, or **X** dollars for 277 acres if the most effective solution is selected regardless of cost. This type of analysis should be done for the hypothetical catchments appearing in the Newaukum basin, but would not need to

be completed for all 135 catchments modeled; nor would the analysis require 1,000 simulations as was previously modeled (700 simulations should be sufficient).

Olivia will provide the project team with a draft report by the end of November; it will be discussed at the December PMT meeting.

Land Use Analysis for Redevelopment Estimate.
Jeff Burkey summarizes his draft report on the rationale and methods that were used to predict the retrofit needs (and/or mitigation strategies that would be required) as future populations grow and land use changes. Of three population growth/land use change datasets available, only one proved useful for the analysis. One dataset's use was restricted because of confidentiality agreements, while the permitting dataset was not robust enough to be useful. Therefore, the bulk of Jeff's analysis uses the LCCM/UrbanSim simulation outputs to evaluate how much of the improved landscape will require mitigation.

Mitigation/retrofits are required if there is an increase in land use/land cover (LULC) disturbance, e.g. grasslands converted to low development areas. A greater amount of retrofitting (in relation to mitigation) is expected to be required in more populated areas. The report will focus on the overall trends and will document (but not lead with) the exceptions to the general trends. There are still uncertainties with respect to costs that could result in differences between observed and predicted retrofit costs. The following assumptions were made, and could affect the interpretation of the results:

- A few hundred acres in the far southwest of the study area has limited data; it was assumed to be all private land.
- Agricultural lands converted to grass lands (or pasture converted to lawn) will invoke mitigation as part of the redevelopment rather than retrofitting. Mitigation refers to addition of flow control standards. Agricultural lands are <5% of total land use of the basin; so this decision is not expected to be as influential as the decisions made with respect to urban areas.
- The airport is defined as private; if it is instead described as public, this could have a significant impact on retrofit costs for that catchment.

Redeveloped land use analysis doesn't include any retrofitting or mitigation that has already been implemented. However, this analysis helps private entities estimate how much of the costs for retrofit that they will bear as compared to how much of the cost will be borne by the public. The analysis is not intended to take the place of specific analysis on the distribution of public-versus-private cost allocation for individual catchments; jurisdictions will be expected to complete more detailed analysis.

Assessment of the Impacts of Climate Change.
Jeff Burkey presents the project team's proposed approach to the uncertainty analysis to be completed with respect to precipitation-related impacts of climate change. The approach centers around how rainfall will change over time, as predicted by various climate change models, in the attempt to answer the question: will increased precipitation/snow melt require additional redevelopment even if land use doesn't change? Approximately half[1] of the rainfall in this region runs off into the watershed with existing land use, so even a relatively small net increase in storm water volume during wet months (November, March) is likely to have a significant impact on required detention and/or mitigation volumes. Most models predict higher rainfall volumes

[1] This approximation includes infiltration (base flow).

can be expected in November and March than current rainfall volumes; otherwise the models' predictions of rainfall volumes vary. Because of this variability and the time constraints associated with the project, the project team notes that climate change analysis will not include evaluation of rain-on-snow impacts of climate change in the lowlands.

The variability of rainfall over several years makes it difficult to represent future conditions with respect to 2007 conditions accurately; to isolate the net effect of increased rainfall it is likely easier to determine a scalar factor representing the average future condition, and to multiply the 2007 conditions by this factor. Mindy Roberts at Ecology volunteers to discuss normalization procedures for the predicted precipitation volumes in further detail with Jeff if desired.

This project strives to understand the uncertainty of future precipitation volumes as applied to the retrofit needs analysis for planning purposes, rather than performing SUSTAIN modeling with variable amounts of precipitation. The output is expected to be a short technical memo that describes how this uncertainty could impact the total costs and design of the retrofitted systems. Jim Simmonds will discuss the scope with Michelle Wilcox at EPA. It may be desirable to bring in climate change experts at EPA to help ensure the project team's assumptions and interpretations are reasonable.

Accounting for Existing Facility by Basin

So far, the project team has assumed that there are no existing detention/retrofitted facilities within the project area; however, it is known that several sub-basins have completed significant retrofit projects. Uncertainty analysis will be completed to attempt to quantify the differences between the projected need for the sub-basin and the sub-basins actual need using watershed HSPF models that will reflect areas with significant existing facilities. The goal of this analysis is to estimate the relative amount of existing infrastructure that is present in each basin, without having to count and evaluate the effectiveness of each of the existing facilities throughout the project area. Areas with a larger number of existing facilities are expected to have a lower need for new facilities and therefore a lower cost to retrofit than the cost predicted in the SUSTAIN model prediction.

One of the model calibration factors is the amount of assumed effective impervious areas (EIA) in the basin, which is not directly comparable between the different model domains; this variable was adjusted when necessary for the various land use types. Areas with more pervious soils are less likely to have existing facilities, but the effect of pervious land may be similar to the presence of infrastructure. This will need to be accounted for in some way in the analysis, but a proposed approach has not yet been determined.

There is an existing King County database of existing infrastructure for some creeks; it may be possible to use Des Moines or another well-understood basin to determine the impact of the calibration assumptions with respect to the actual inventory of facilities, but time constraints prohibit this level of detail in the analysis. Instead, it is suggested to describe in the report that some areas (e.g. Soos Creek and Des Moines Creek) may be ahead of the curve with respect to retrofit needs; and to qualitatively describe the need for new stormwater infrastructure with respect to (re)development year. For example, areas that are developed prior to 1990 have the most need for new infrastructure, and therefore the greatest redevelopment costs; and those areas developed after 2010 have the least need for new infrastructure and therefore have the lowest redevelopment costs. The approach and specificity of the analysis is perceived to be important to stakeholders and jurisdictions; Jim Simmonds and Rich Horner will discuss these issues with representatives from key jurisdictions.

Outline of Final Report.
Jim Simmonds presents the outline for the final project report. Jim will complete the draft project report by the end of the year. The style and content of the report will be accessible to a stormwater expert who is not as familiar with modeling (e.g. non-profit workers, stormwater managers). The conclusions of the technical reports will be referenced in the project report in sections 2-4, but the project report is intended to be non-technical in nature. Sections 5-6 will focus on steps that can be taken to restore streams, both by catchment/basin and by facility type.

In response to a concern that the "cost estimates" section of the report will focus on the overall cost, which is not helpful to politicians, Jim notes that the report will focus on unit costs for individual jurisdictions, though some scaled costs will be discussed as well. Additionally, the report will focus on costs for: each major area; typical capital expenditures over 30 years; and annual operating expenditures over 30 years. The report will present ranges of costs whenever possible, particularly because the range of costs predicted by Olivia's SUSTAIN modeling for the various land use types vary by a factor of 20. The project team suggests that Jim consider expressing how the costs change as the percentage effectiveness of the solution is increased, while noting that this may not always be practical on a jurisdiction-wide scale.

Uncertainty analysis pertaining to future land use/population growth retrofit and mitigation needs will be specifically incorporated into the report; however, the uncertainty analysis pertaining to the effects of climate change will not be incorporated. Jim has not yet determined how or if the existing facility uncertainty analysis will be incorporated.

Please mark your calendars for these important upcoming meetings:

The next PMT meeting will be Wednesday, December 4, 2013.

A follow-up PMT meeting will be held on Thursday, January 16, 2014.

The next stakeholder meeting will be held on Tuesday, February 25, 2014.

In addition to these PMT meetings, the group will hold smaller sub-group meetings to further refine the scope and methods for the reports that Jeff Burkey is preparing. Please contact Jim SImmonds if you'd like to be involved in this work.