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Proposed method for assessing amount of existing detention in study area

To accurately account for all existing stormwater mitigation facilities in a large area requires substantial amount of resources. The level of detailed needed to make a complete assessment requires defined drainage areas, facility designs, and maintenance records to name some key features. For this study, a surrogate approached is proposed to provide guidance on which drainage areas may be more attenuated resulting from existing facilities that are not explicitly identified in this study.

Method

Using the developed watershed models (i.e. 30 model domains), conventional Level 2 (i.e. match durations to forested conditions from 50% of 2-year through 50-year) flow control facilities will be designed as inline at the mouth of each model domain. These facilities will receive all flows within the stream reach from the model domain and will be sized to match a forested landscape.

Each model domain will have a *Forested* scenario model built that will account for the variable types of surficial geology originally defined during development and calibration of the models to create the inflow time series.

As mentioned in the watershed modeling report, there were eight different possible assigned distributions of effective impervious surfaces to implicitly account for stormwater facilities and effectiveness of impervious surfaces in highly permeable soils. Because there are different amounts of development within a model domain, using these calibrated EIA values is not directly comparable among the different model domains. To make them comparable, the sized Level 2 facility for each model domain will be divided by the total area as defined in effective impervious surfaces. This will result in units of length of storage associated to the EIA areas:

$(\text{Level 2 pond: acre*ft}) / (\text{EIA: acres}) = (\text{Normalized mitigation: feet})$, then convert to inches.

The larger the amount of inches for a model domain, the more likely stormwater facilities are non-existent, or failing from age, or designed to past design standards inferior to current King County Level 2 standards. Conversely, the smaller the amount of inches the more likely there are existing stormwater facilities performing with some level of effectiveness, and/or there are more areas of high permeable soils reducing effectiveness of impervious surfaces.

The Level 2 facility will be sized with zero infiltration, 4-ft of depth, 3:1 side slopes. Given how some of the model domains are quite large to be considered like a development draining to a single stormwater facility, the hydrograph time series (existing and forested) will be divided by the basin area as measured in square miles. The resulting sized Level 2 pond will then be scaled back up using the same multiplier keeping the depth and side slopes at the respect designs. The ponds will be assumed square in geometry.

Summary of results

Domain	EIA (acres)	Level 2 (acre*ft)	Basin Area (square miles)	Equivalent Storage (inches)
Black River				
Covington				
Crisp				
Des Moines				
Joes				
Lakota				
Duwam Lcl1				
Mill/Mullen				
Hamm				
Jenkins				
Massey				
McSorley				
Miller				
Walker				
Newaukum				
Olson				
Big Soos				
Browns Point				
Christy				
Coal				
Deep				
Duwam Lcl2				
Green Lcl1				
Green Lcl2				
Green Lcl3				
Green Lcl4				
Green Lcl5				
LPS1				
LPS2				
Salmon				

Application of Results

- Provided added guidance prioritizing drainage areas for retrofit given the distribution of forecasted retrofit versus mitigated are similar within the study area.
 - Focus on the worse basins and give priority to basins with higher levels of missing infrastructure?
 - Save the good ones and give priority to basins with more intact infrastructure?
- Identify areas with High EIA areas but has small amount of inches have substantial infrastructure in place and focus on “completing” that basin?
- ???

Possible challenges

- Will dividing by the basin area in square miles be enough for the larger basins?
- Trying to keep things simple, all runoff is routed to ponds. Should forested land cover be removed?
- Results will be by model domain, not jurisdiction.
- Model domains with large areas of outwash soils will appear more mitigated...not sure if that is a problem or not.
- ??

Schedule

- Preliminary Results – Early November 2013
- Draft technical memorandum- middle November 2013
- Final tech memo end of November 2013