LOI # 5

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Organization: Washington Stormwater Center, Washington State University

Study Title: Examining the treatment potential of road runoff by stormwater ponds

Which topics from the SWG's priority list (Appendix A) do you propose to address?

1, 8, & 9

What type of project is being proposed?

Environmental sampling study

Short description of the proposed project

Stormwater ponds are ubiquitous components of stormwater conveyance systems in the Puget Sound. Within King County alone, it is estimated that there are over 1000 ponds. Each of these systems, located downstream of high-traffic roadways, intercepting significant 6PPDQ, metal, nutrient, and PAH loads. Despite being widespread, the efficacy of these ponds for removing these contaminants can be highly variable or have not yet been rigorously studied. We propose to measure the stormwater treatment work offered by stormwater ponds by testing six wet-dry-combination detention ponds in King County. Details on pond design (e.g., residence time, geometry, vegetation), along with concomitant environmental, traffic, and land use data, are likely to yield widely applicable insights across the region. All the sites will be within King County's MS4 jurisdiction. We will prioritize site selection upstream of Coho-bearing streams. The drainage area for both types of stormwater systems is anticipated to range between ¼ acre and 10 acres. We aim to measure 6PPDQ, TSS, metals, nutrients, and PAHs at the inlet and outlets of these systems to quantify the treatment efficiency of stormwater ponds for these environmental contaminants. Though this project may be limited in terms of the proportion of pond sites that will be sampled, the results have the potential to be substantial, considering the thousands of stormwater ponds managed by stormwater permittees. Understanding the effectiveness of these ubiquitous stormwater systems will support utility and retrofit planning such as changing hydroperiod or adding filter socks.

What type of information will be collected or analyzed for this proposed study?

Stormwater pond influent and effluent hydrologic and water quality data will be collected during multiple storm events to evaluate removal efficiencies for 6PPD-quinone, total and dissolved metals, nutrients, TSS, and PAHs) will be recorded to help interpret performance variability.

Existing information, including pond as-builts, stormwater conveyance network data, drainage delineations, contributing impervious area, land use, and traffic volumes, will be compiled to characterize each pond's design and context. Vegetation cover, pond geometry, and residence time will be measured or estimated where data are not available. By focusing on King County ponds, these data can be efficiently collected and cross-referenced with the County's asset management database and GIS layers.

Requests for existing information from King County Water and Land Resources Division (anticipated within the first project quarter) will support site selection and contextual analysis.

What are the anticipated measurable outcomes and key deliverables that will be produced by the proposed study and how will they be used by Permittees and the Washington State Department of Ecology?

This project will quantify the treatment effectiveness of stormwater ponds for a suite of roadway-derived contaminants and relate performance to pond design and watershed characteristics.

Key deliverables will include:

1) A technical memorandum summarizing pond performance data and estimated removal efficiencies by contaminant class.

2) An evaluation linking treatment performance to pond type, geometry, vegetation, and residence time.

3) A regional summary report with recommendations for how pond retrofit, or maintenance practices could improve treatment of 6PPDQ and co-occurring pollutants.

4) A data package suitable for integration into Ecology's stormwater effectiveness database.

These results will directly inform municipal stormwater programs, improve asset management prioritization, and support Ecology's evaluation of BMP performance for future guidance updates.

List the permittees or agencies you are proposing to coordinate with.

King County Water and Land Resources Division (WLRD) - Science Section - Chelsea Mitchell, Toxicologist

King County Water and Land Resources Division (WLRD) - Stormwater Services Section – Angela Gallardo, Section Manager

King County Road Services Division - José Carrasquero, Environmental Unit Manager