

Letter of intent (LOI)

Interested parties should submit a Letter of Intent (LOI) on or before February 28, 2020 for each individual proposal. Letter of intent should include applicant contact information and seven questions about proposed study. More details about SAM study selection process, eligibility and funding availability can be found in SAM REF guidelines in SAM Effectiveness webpage.

Email address *

rbneum@uw.edu

Applicant contact information

Applicant Full Name *

Rebecca Neumann

Organization *

University of Washington

Phone number *

206-221-2298

Proposed Study Information

1. Proposed Study Title *

Evaluating Effectiveness of Bioretention Cells on Treating Highly Polluted Bridge Runoff

2. Which topic(s) from the SWG's priority list do you propose to address? *

The proposed study topic should be in the SWG's priority list

#11. Gather data about eligible Structural Stormwater Control (SSC) project types to inform future requirements and/or implementation

3. Select type of project being proposed *

- Survey
- Literature Review & Synthesis
- Environmental Sampling Study
- Other

4. Short Description of the Proposed Study *

250 word limit: describe how results will assess effectiveness and advance regional understanding and permittees' implementation of specific stormwater management approaches

This study will sample runoff from a portion of Seattle's Aurora Bridge, State Highway 99, before and after filtering by bioretention treatment trains (one completed, two others due for completion in the next two months). Samples collected from an Aurora Bridge downspout in 2017 exhibited concentrations of total suspended solids, total and dissolved metals, and total petroleum hydrocarbon fractions extremely elevated in comparison to data from highways around the nation, including nearby local freeways. The bioretention cells were designed and constructed specifically to treat this runoff stream. The Aurora Bridge is 88 years old; has never before had any stormwater management facilities; and drains directly into the Lake Washington Ship Canal, a passage for adult and juvenile migrating salmon. Monitoring of these voluntary bioretention projects that uniquely filter bridge runoff will:

- assess the capacity of bioretention systems to address high runoff pollutant loads from bridges, which traditionally discharge directly into receiving waters;
- focus attention on stormwater pollution from highway bridge runoff, and possible solutions provided by SSC projects; and
- assess pollutant loading and breakdown in bioretention soils receiving high pollutant loading.

Results will advance regional understanding for both Permittees and Permitters of potential bioretention applications to treat bridge runoff and document the advantages and limitations of bioretention for use in high pollutant conditions.

5. What type information will be collected or analyzed for this proposed study? *

If existing permittees' data are needed, specify the type, and the expected timing of a request for existing information from Permittees

- Continuous flow monitoring and sampling of stormwater runoff before (taken from downspouts from bridge) and after treatment through bioretention cells, in a range of storm sizes over the course of a year. Sample analyses will include: solids, metals, and nutrients in composite samples and pH, indicator bacteria, and total petroleum hydrocarbon fractions in grab samples.
 - Sampling and analyses of baseline soils taken from the bioretention cells before the system is online and at the end of the monitoring period, with replicate samples collected over depth to ensure representativeness and data reliability. Analyses will include texture, organic content, metals and nutrients in different soil extractions that operationally define element-solid associations and environmental availability, and total petroleum hydrocarbon fractions.
 - Sampling and analyses of key vegetation species over the monitoring period to assess uptake of toxic elements and plant health. Metrics of interest measured periodically during the study will include aboveground biomass growth, photosynthetic activity and transpiration rate. Destructive sampling will be conducted at the start and end of the monitoring period to measure concentration of nutrients, metals and hydrocarbons within plant tissue. Replicate plant samples will be taken to ensure statistical robustness of data.
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6. 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? *

- Analyses and interpretation of water quality, plant and soil data that will inform design of Structural Stormwater Controls in high pollutant loading conditions, potentially with recommendations for sizing in sloped and flat terrain, as well as soil and plant types.
- A paper, potentially published in an academic journal and/or regional publication, describing the unique bioretention treatment facilities designed for bridge runoff treatment, and evaluation of their efficacy.
- Presentation at a local, regional and/or national conference to disseminate the findings.

7. Permittees or agencies you are proposing to coordinate with (provide staff names and contact information, if known) *

Enter "NA" if not applicable.

We will coordinate with:

- Salmon Safe, which has provided the Science Advisement on development of the Aurora Bridge Bioretention projects. Contact: Ellen Southard: ellen@sitestorynw.com
- Clean Lake Union and the Nature Conservancy, sponsors of the Aurora Bridge Bioretention projects. Contacts: Mark Gray: markg@scga.com ; Jeremy Febus, Jeremy.Febus@kpff.com
- Potentially with Ecology's TAPE program, in documenting a variation on the Bioretention SSC for use in treating high pollutant bridge runoff
- Others as appropriate and become known

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