

**Forum Nature Area Level Spreader Monitoring Project**

**Total Budget:**  
**\$62,250.00**  
**(Please see Budget Details)**

**Submitted To:**  
Tom Wellman: City of Columbia Public Works

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## **Background**

Stormwater flow serves as an important transport mechanism for non-point source pollutants, including suspended solids, nutrients, fertilizers, bacteria, and trace metals (Tsihrintzis and Hamid 1998, Xiao et al. 2007). Impervious surfaces serve as conduits for flow, replacing soils and vegetation that would otherwise attenuate runoff and transport of pollutants (Tabacchi et al. 2000). Urban peak discharge events also degrade water quality through physical alterations to the stream channel. Channels typically broaden and deepen in response to increased volume, velocity, and frequency of peak discharge in urban environments (Bledsoe and Watson 2001, Galster et al. 2008), leading to channel instability and accelerated channel erosion (Olsen et al. 1997). Changes in the timing, frequency, and magnitude of stream flow have significant impacts on freshwater ecosystem function (Postel 2000). Channel simplification as a consequence of increased peak discharge frequency also degrades stream habitat diversity and biotic integrity (Cianfrani et al. 2006).

There is a broadly recognized need to improve the state of knowledge related to Best Management Practices (BMP) efficacy to enhance land managers ability to recommend appropriate and cost effective BMP solutions for slowing, storing, and bioremediation of stormwater in rapidly urbanizing areas. With this in mind, and as part of the ongoing Collaborative Adaptive Management (CAM) process in Hinkson Creek Watershed, a Level Spreader was installed in 2014 to divert water from a small un-named tributary to Hinkson Creek (approximately 115-acre drainage area) and spread the water over an area of Hinkson Creek Floodplain in the Forum Nature Area. The area where the water is spread has been replanted with trees that will improve infiltration and increase transpiration (consumptive water use). The intent of this BMP is to focus on smaller runoff events (i.e. 1-yr storms). It is anticipated that the BMP will a) clean the water, b) reduce immediate runoff to Hinkson Creek, and c) increase localized baseflow to the creek.

## **Objectives**

As per the original CAM Proposal, <http://helpthehinkson.org/documents/ProjectProposal1.pdf>, a monitoring project will be implemented to study the long-term efficacy of the level spreader BMP. The monitoring project will use multiple sensors to determine a) the amount of water flowing through the level spreader, b) the overflow from the level spreader, and c) an array of soil moisture sensors to quantitatively characterize the change in soil infiltration, and soil moisture over time as the small floodplain forest becomes reestablished. While the initial monitoring period is planned for 5 years, a much longer period of time is recommended (i.e. 10 or more years).

## **Study Outcomes**

Study outcomes will provide quantitative information about level spreader efficacy, which will better inform the City and HCW stakeholders the appropriateness of this relatively low cost solution to urban runoff peak flows and water quality.

## Not to Exceed Budget

The PI will provide approximately \$2500 worth of instrumentation for the initial installation of the hydroclimate site, including a tri-pod, guy kit, and cross arm and bracket (not included in budget below). The PI will also take his fall 2014 Hydrologic Measurement Techniques course students to the site where they will map the site, create a grid design, and quantify a) infiltration capacity, compaction, and soil water content (and possibly other variables) during the semester. This work may be repeated at interim points and the end of the study to quantify any changes over time. This constitutes a great deal of savings in terms of instrumentation that the PI already possesses, and student labor.

The proposed work will provide support for a field technician, or partial salary for a Graduate Research Assistant, or other research associate in the Interdisciplinary Hydrology Laboratory of the PI. The research associate will help with instrument installations, weekly to bi-weekly site visits and maintenance, data collection, post-processing and data analysis, modeling and / or provide interim reports (upon request up to twice annually).

Budget	Yr1	Yr2	Yr3	Yr4	Yr5	Total
Hydrometeorological Station	\$ 10,000	\$ -	\$ -	\$ -	\$ -	\$ 10,000
Pressure Transducers (flow)	\$ 2,250	\$ -	\$ -	\$ -	\$ -	\$ 2,250
Instrument Maintenance	\$ 2,000	\$ 2,000	\$ 2,000	\$ 2,000	\$ 2,000	\$ 10,000
Student Labor	\$ 8,000	\$ 8,000	\$ 8,000	\$ 8,000	\$ 8,000	\$ 40,000
Total	\$ 22,250	\$ 10,000	\$ 10,000	\$ 10,000	\$ 10,000	\$ 62,250

## Literature Cited

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