

VILLANOVA URBAN STORMWATER PARTNERSHIP

MONITORING AND MODELING THE HEADWATERS OF THE EAST BRANCH OF INDIAN CREEK

BACKGROUND

The William Penn Foundation has awarded a grant to the Villanova Urban Stormwater Partnership (VUSP) to monitor and model stormwater improvements. This includes intensively monitoring and modeling a swale system that will be installed along Windsor Ave next to Narberth Park in Narberth, PA. This site is located at the headwaters of the East Branch of Indian Creek, in the Cobbs Creek Watershed. VUSP is working closely with the Lower Merion Conservancy, Narberth Township, and Whitman, Requardt & Associates to ensure that instrumentation is compatible with SCM designs. To date, various instruments have been installed to collect baseline (e.g. pre-construction) data.



EQUIPMENT

- **Stevens Vaisala Weather Station:** This single instrument measures precipitation, wind speed, wind direction, temperature, humidity, and barometric pressure, enabling our team to accurately portray climate conditions in our models
- **Stevens Tipping Bucket and Pyranometer:** These instruments measure precipitation and solar radiation, respectively, and will further our team's understanding of climate conditions on-site
- **Stevens Soil Moisture Meters:** Installed at 10, 35, 65, and 91 cm below ground surface, these instruments measure soil moisture, temperature and conductivity.
- **Unidata Flow Meter #1:** Located directly downstream of the proposed swale system, this flow meter measures the creek's depth, velocity, and temperature. These data will allow our team to evaluate the effect of implemented SCMs on the East Branch of Indian Creek headwaters.
- **Unidata Flow Meter #2:** Located upstream of the watershed outfall, this instrument enables our team to determine how installed SCMs affect the creek as a whole.
- **Global Water Instruments Flow Meter:** This portable flow meter is used to supplement data from the Unidata flow meters, particularly during base flows.

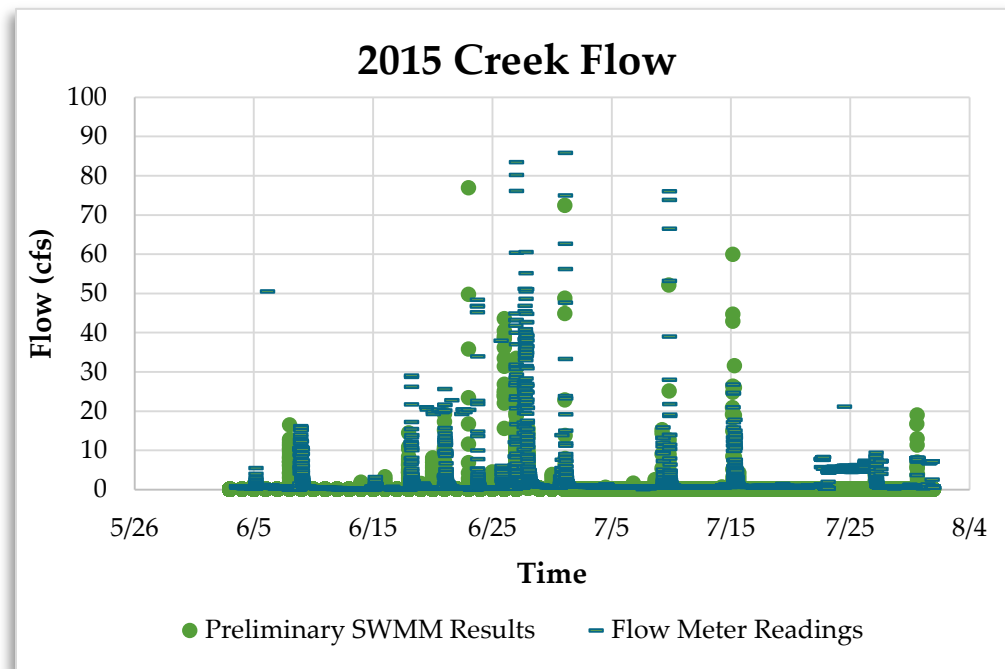


(From Left to Right) Unidata Flow Meter #2, Global Water Instruments Flow Meter, and Vaisala Weather Station

MODELING

Our team is using the Environmental Protection Agency's (EPA) Storm Water Management Model (SWMM) to determine how the implementation of SCMs affect water quantity in the East Branch of Indian Creek. To create the SWMM model, VUSP is working closely with Temple University. This is to ensure that our model is compatible with those constructed by Temple University for other Delaware River Watershed Initiative projects.

The graph below displays our preliminary model's predictions for flow at Narberth Park versus the data collected by our flow meter on-site (Unidata Flow Meter #1). Ultimately, our team's goal is to use the SWMM model to quantify how many stormwater control measures installed at the headwaters of the East Branch of Indian Creek are required to see a measureable improvement in downstream flow regimes. In doing so, our research aims to evaluate the effectiveness of the headwaters approach to stream restoration.



FOR MORE INFORMATION



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THE VILLANOVA URBAN STORMWATER PARTNERSHIP'S MISSION IS TO ADVANCE THE EVOLVING FIELD OF SUSTAINABLE STORMWATER MANAGEMENT AND TO FOSTER THE DEVELOPMENT OF PUBLIC AND PRIVATE PARTNERSHIPS THROUGH RESEARCH.