MARYLAND DEPARTMENT OF TRANSPORTATION

STATE HIGHWAY ADMINISTRATION

RESEARCH SUMMARY

THE EFFECTIVENESS OF SOIL DECOMPACTION FOR STORMWATER MANAGEMENT

WHAT WAS THE NEED?

The Maryland Department of Transportation State Highway Administration (MDOT SHA) is interested in finding cost-effective solutions for stormwater management (SWM) of highway runoff in highly urban watersheds with limited right-of-way. The goal is to reduce SWM facility maintenance costs and project right-of-way areas and costs for SWM. The Highway Hydraulics Division is interested in advancing soil decompaction and amendment as an innovative practice to achieve these goals. This research builds on prior research with UMBC that demonstrated dramatic infiltration increases in stabilized pervious land uses in the heavily compacted "pervious" footprint of the old MD Rt. 853 roadbed in Taneytown, MD.

WHAT WAS THE GOAL?

This research advances the integration of cost-effective practices and procedures that improve soil structure, restore infiltration, and reduce stormwater runoff to support regulatory credit for soil decompaction and amendment as an approved stormwater BMP in the State of Maryland. To support the institutional acceptance of soil decompaction and amendment as an approved BMP, this project emphasized two primary complementary contributions: (1) a prototype BMP protocol for the practice, emulating the style of the State Stormwater Manual; and (2) supporting analysis for the consistent determination of a quantitative stormwater credit for decompaction and amendment.

JULY 2021

REPORT NUMBER:
MD-21-SHA/UMBC/2-01

START DATE:
December 16, 2019

COMPLETION DATE:
June 30, 2021

PRINCIPAL INVESTIGATOR:
Stuart S. Schwartz, PhD
University of Maryland
Baltimore County
ss@umbc.edu

WHAT DID THE RESEARCH TEAM DO?

This research developed a prototype protocol to support the institutionalization of soil decompaction and amendment as an approved stormwater BMP in the State of Maryland. The protocol can be used to develop a prototype specification, site-specific soil-specific stormwater credits, and establish requirements and procedures for inspection, acceptance, and maintenance. Performance monitoring data provided credible "ground truth" for the soil physics predictions used to quantify effective curve numbers that can be used to calculate a consistent quantitative stormwater credit for the practice.

WHAT WAS THE OUTCOME?

Observed dynamics of seasonal soil moisture profiles monitored in the field confirmed modeling predictions and represent a unique contribution of the research that significantly enhances the credibility of the model-based approach for soil-specific site-specific stormwater credits. Soil decompaction and amendment can reduce costs for green asset maintenance while significantly expanding the opportunities for cost-effective stormwater management services from the pervious land uses in SHA's managed landholdings Reducing stormwater runoff by reliably restoring infiltration on MDOT SHA's pervious land holdings will lower the costs and accelerate stormwater compliance by reducing the number and size of stormwater management (SWM) facilities needed to meet SWM regulatory requirements. The results from this project advance the institutionalization of this innovative cost-effective practice by developing standard specifications and details for soil decompaction and amendment to guide design, specification, implementation, acceptance, inspection, and maintenance procedures for a new approved BMP. Collectively these elements support the institutional advancement of this practice as an approved BMP in the State of Maryland.

HOW WILL MDOT SHA USE THE RESULTS?

This protocol can be included in the designer's toolbox for consideration on a site-by-site basis. MODT SHA can utilize this research to develop soil-specific specifications for use to earn stormwater credits on site-specific construction projects. MDOT SHA can also establish uniform requirements and procedures for inspection, acceptance, and maintenance of these sites.

LEARN MORE

To view the complete report, click here.