MARYLAND DEPARTMENT OF TRANPORTATION

STATE HIGHWAY ADMINISTRATION

RESEARCH REPORT

THE EFFECTIVENESS OF SOIL DECOMPACTION FOR STORMWATER MANAGEMENT

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16. Abstract

Compacted and highly disturbed urban soils are a pervasive feature of modern constructed landscapes. This research advances the integration of cost-effective practices that improve soil structure, restore infiltration, and reduce stormwater runoff to support 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. Observed soil moisture dynamics monitored in the field confirmed modeling predictions and represent a unique contribution of the research that enhances the credibility of our 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 landuses in SHA's managed landholdings.

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The Effectiveness of Soil Decompaction for Stormwater Management

Project SHA/UMBC/2-01 MD-DOT SHA

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Abstract

Compacted and highly disturbed urban soils are a pervasive feature of modern constructed landscapes. Standard practices for rapid vegetation establishment on sites associated with mass grading routinely result in a "pervious" landscape with compacted soils that impair infiltration capacity, constrain plant root growth, reduce soil water holding capacity, and limit the reservoir of plant-available nutrients in the shallow root zone. The lost hydrologic function of the pervious landscape can be reliably restored by renovating disturbed soil profiles through soil decompaction combined with aggressive organic compost amendment. When properly planned and efficiently staged, this superior sustainable landscaping practice can be cost-effectively implemented through minor modifications to standard grading and landscaping practices.

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. 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 our 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 landuses in SHA's managed landholdings.