

# JOINT TRANSPORTATION RESEARCH PROGRAM

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## Lack of Data for Predicting Storm Water Pollutant Removal by Post-Construction Best Management Practices

### Introduction

The project objective was to conduct a detailed literature review of storm water pollutants and available mitigation technologies and then synthesize that information so that INDOT can implement project results into standards. All tasks were specifically required to comply with the Rule 13 general permit from the Indiana Department of Environmental Management (IDEM). This project pertains to an after construction obligation due to the fact that INDOT is a Municipal Separate Storm Sewer System (MS4). MS4s have an obligation to install permanent storm water pollution reduction best management practices (BMP) within the right-of-way. This project was conducted to meet IDEM deadlines for Rule 13 general permit compliance and also help expand and deepen the agency's understanding of available storm water pollutant and mitigation technologies.

A literature review of government documents, peer-review and trade industry literature was conducted to ascertain the types of storm water pollutants that are of relevance to Indiana roadways. Several past INDOT storm water BMP related projects and products were also reviewed. Through the analysis of collected information, the pollutants of concern to other transportation agencies, the pollutant's potential for relevance to Indiana roadways, and the field-tested effectiveness of storm water pollution technologies where available. A cost-benefit analysis was conducted for BMP devices being used in Indiana. This project built upon previously supported INDOT efforts to improve storm water quality

and identified data-gaps inhibiting technology selection and performance.

### Findings

- Storm water pollutants considered in this project were grouped into six categories: sediment, nutrients, bacteria, oil and grease, trace metals, and salts. Each category of pollutants has a series of documented impacts in the environment.
- A variety of storm water BMP databases that describe specific BMP testing studies show that the performance of each BMP can be site specific. The same type of BMP may not perform similarly at different sites. Some BMPs actually generate pollutants.
- Very little BMP design, cost, and performance data was obtained during this study from INDOT or municipalities contacted. Follow-up with several municipalities also revealed this type of data was not easily accessible once the projects are completed. INDOT was not unique in its lack of cost data sought for this project. Due to this lack of information the National Cooperative Highway Research Program's recently developed storm water BMP Evaluation Tool could not be applied.
- Manufacturer self-reported BMP device performance data found was not corroborated by independent device testing data found during this study. Reliance on manufacturer reported data greatly overestimated the device's cost benefit. To develop a more applicable CBA storm water treatment device pollutant

removal data is needed. This could be conducted by bench-scale, pilot-scale or field-scale device testing.

## Implementation

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Based on results of this study INDOT should consider the following actions.

1. Establish agency-wide procedures to begin collecting pertinent storm water BMP information from ongoing and planned projects so that (a) the existence of each BMP and its design parameters are documented in a centralized location, easily accessible, and (b) future CBAs can be conducted. An example of the information that is needed can be found in the final report. BMP design and cost data are examples. It is recommended that this information be a required submittal by the installer before final payment on a series of forms.
2. Survey which and how many BMPs are under INDOT control. This survey could identify the types of BMPs that are most commonly used across Indiana enabling INDOT to understand its current stock of BMPs. The survey could also help identify if any BMPs, once installed, precipitated problematic maintenance demands. The degree maintenance has or has not been routinely conducted on those assets could also be determined. This type of survey would be best conducted if all Districts participated.
3. Apply caution when estimating BMP performance based on manufacturer reported data or BMP performance data from other parts of the U.S. As of today, there are no nationally recognized standardized test methods for BMP performance. DOTs and municipalities across Indiana (and the country) are conducting their own investigations to gauge BMP performance

INDOT however should be cautious in that there are various studies in the literature where some “BMPs” have been shown not to be effective at all for removing pollutants and some “BMPs” generate pollutants. BMP performance is highly influenced by a variety of design, location, and environmental factors. Some BMPs may not remove detectable amounts of pollutants when storm water that it is treating contains a low level of pollutants to begin with.

4. Types of BMPs in Indiana be prioritized then down selected for a field investigation to determine pollutant removal effectiveness. Monitoring should be carried out over a 1- to 3-year period to be in line with other BMP field studies conducted across the U.S. At the same time BMP design and cost data should be collected for those assets so that a more rigorous CBA can be conducted. Planned roadway construction activities provide an opportune time to institute new data collection policy and being field monitoring

## Recommended Citation for Report

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