
**WSDOT NPDES Municipal Stormwater Permit
Monitoring Status Report
Water Year 2021**

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Prepared by

Stormwater Monitoring and Research Program
Environmental Services Office
Washington State Department of Transportation



**Washington State
Department of Transportation**

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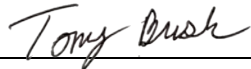
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Stormwater Monitoring Report

Water Year 2021

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Tony Bush, Stormwater Branch Manager
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1 Introduction

1.1 Permit Overview

On March 6, 2019, the Washington State Department of Ecology (Ecology) reissued a National Pollutant Discharge Elimination System (NPDES) and State Waste Discharge Municipal Stormwater General Permit (permit) (Ecology 2019) to the Washington State Department of Transportation (WSDOT), effective April 5, 2019, to April 5, 2024. Under Special Condition S7.D. of the permit, WSDOT must begin new highway and facilities effectiveness studies that are approximately the same level of monitoring effort and cost as the previous studies that were reported on in October 2019.

Stormwater monitoring provides feedback to WSDOT for inclusion in its Highway Runoff Manual (HRM) (WSDOT, 2019). WSDOT's stormwater management approach utilizes BMPs to help meet the permit requirement to "reduce pollutants in discharges to the maximum extent practicable" (Ecology, 2019). The monitoring program evaluates performance of BMPs using guidance in the Technology Assessment Protocol – Ecology (TAPE) (Ecology, 2018) as required by S7.C of the permit.

Under Special Conditions S7.H and S8.B. of the permit, monitoring reports are required for information collected at the department's stormwater monitoring sites. The following report is meant to satisfy these requirements and provides a summary of monitoring activities completed in Water Year 2021 (WY21) from October 1, 2020, through September 30, 2021.

2 Monitoring Program Implementation

2.1 Highway Study

WSDOT, in consultation with Ecology, selected a biofiltration swale longevity study to fulfill the highway BMP effectiveness monitoring study requirements. The goal of the study is to determine if highway biofiltration swales provide treatment beyond their effective life, which is defined in the HRM as 5-20 years age. The results of this study are intended to inform future maintenance and replacement schedules of biofiltration swales. Program implementation during WY21 included site selection and study design activities, which are described below.

WSDOT selected two biofiltration swale study sites (Figure 1) based on the design guidelines listed below. Table 1 gives an overview of the sites selected. Additional site selection criteria for this study, accounting for characteristics of both monitoring locations, are:

Highway biofiltration swales:

1. Safely accessible for WSDOT staff and provide access that will not put the traveling public at undue risk.
2. Within the WSDOT right-of-way.
3. Biofiltration swale constructed prior to the year 2000.
4. Site characteristics, including shape, slope, soil composition, that are representative of 1995 HRM specifications for biofiltration swales.
5. At a location that regularly receives enough precipitation and subsequent stormwater runoff to maintain a reasonable monitoring timeline.
6. Inlet and outlet are monitorable for hydrology and chemistry without altering the function of the biofiltration swale and moving it beyond HRM specification.

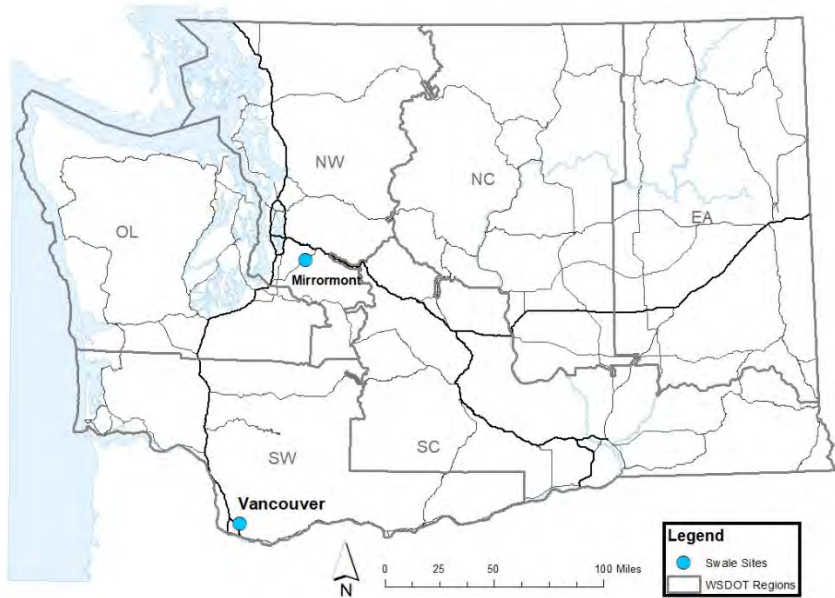


Figure 1. Highway Study Site Locations

Table 1. Highway BMP monitoring locations and Traffic/Roadway Conditions

Highway	Site Name	Highway Conditions	
		Annual Average Daily Traffic	Location Condition
SR 500/503 Interchange	Vancouver	503: 41,000	Intersection with Traffic Light
		500: 20,000	
SR 18	Mirrormont	27,000	Suburban Highway with Off Ramp

Vancouver

The Vancouver biofiltration swale is located at milepost 7.00 on State Route (SR) 500 and treats stormwater from the intersection of SR 500 and SR 503. The biofiltration swale was built for Clark County in 1999 and came under WSDOT ownership in 2005 when Padden Park Way became SR 500.

The biofiltration swale is located northeast of the intersection and receives runoff from a 1-acre drainage area. The stormwater conveyance system is highlighted in Figure 2. The drainage area was ground-checked through multiple site observations during storm events, including heavy rain events. The biofiltration swale does not receive water from local roads or any non-WSDOT property.



Figure 2. Vancouver biofiltration swale monitoring site and associated drainage features

Construction and installation of monitoring equipment took place during water year 21. Supply chain and other covid-19 related delays pushed the sample start date to October 28, 2021.



Figure 3. Vancouver bioswale effluent

Mirrormont

The Mirrormont biofiltration swale is located at milepost 20.48 on SR 18 and treats stormwater from SR 18 mainline lanes. The Mirrormont biofiltration swale was built to 1995 HRM standards in 1999.

The biofiltration swale is located on an offramp north of mainline SR 18 and receives runoff from a 3.5-acre impervious drainage area. The stormwater conveyance system is highlighted in Figure 3. The drainage area was ground-checked through multiple site observations during storm events, including heavy rain events. The biofiltration swale does not receive water from local roads or any non-WSDOT property.



Figure 4. Mirrormont biofiltration swale monitoring site and associated drainage features

Construction and installation of monitoring equipment took place during water year 21. Supply chain and other covid-19 related delays pushed the sample start date to October 28, 2021.



Figure 5 Mirrormont Influent Monitoring Equipment

2.2 Facility Study

WSDOT, in consultation with Ecology, selected compost-amended biofiltration swale (CABS) studies to fulfill the facility BMP effectiveness study permit requirements. The goal of the study is to test if shortened biofiltration swales, as compared to the minimum HRM swale length, will adequately treat runoff. The results may inform changes to the HRM specifications to allow for shortened swales that may be used in more locations without room for traditionally sized biofiltration swales. Program implementation during WY21 included site selection and study design activities.

WSDOT selected the two bioswales study sites, one facility is in Western Washington, and one is in Eastern Washington. The Eastern Washington CABS is testing a shortened swale with a sediment basin installed prior to the swale influent to remove excess sediment. The Western Washington CABS is also testing a shortened swale in a two-phase study.

The two CABS study sites (Figure 4) were selected based on the design guidelines listed below. Additional site selection criteria for this study, accounting for characteristics of both monitoring locations, are:

Facility CABS:

1. Safely accessible for WSDOT staff and provide access that will not put the traveling public at undue risk.
2. Within the WSDOT owned and operated facility.
3. CABS built to HRM standard except length (Eastern and Western Washington CABS) and pre-swale sedimentation basin (Eastern Washington CABS only).
4. At a location that regularly receives enough precipitation and subsequent stormwater runoff to maintain a reasonable monitoring timeline.
5. Inlet and outlet are monitorable for hydrology and chemistry without altering the function of the swale and moving it beyond HRM specification.
6. Facility activities represent standard maintenance activities and practices (see Table 2).

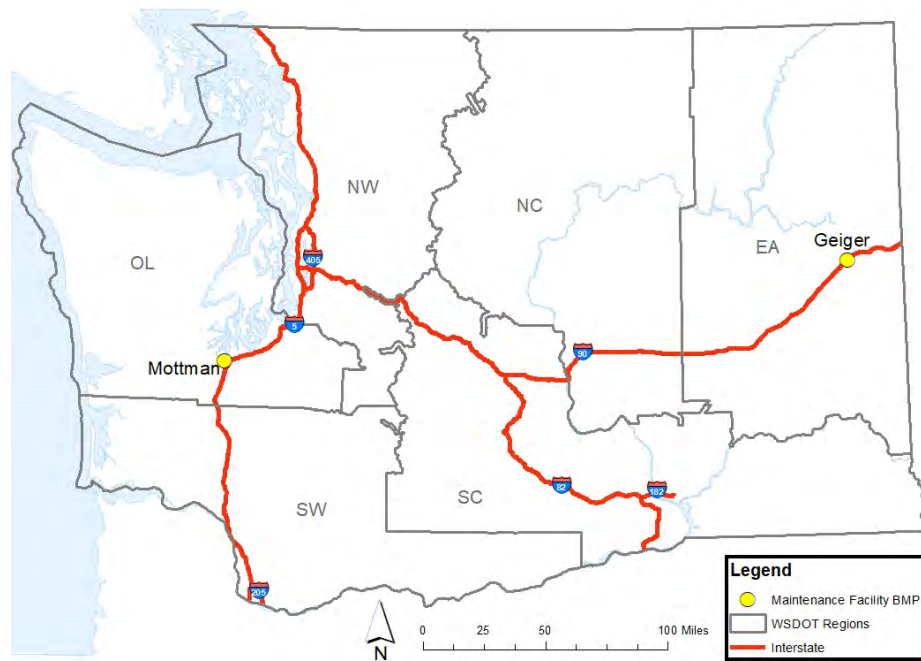


Figure 6. Facility Study Site Locations

Table 2. Maintenance facility monitoring locations and materials/activities

Region	Facility	Activities														
		Galvanized Metals	Treated Lumber	Prewash Pad	Sand	Salt	Deicer	Highway Sweepings Storage	Landscaping	Truck Parking	Storage Buildings	Maintenance Buildings	Transportation Equipment Fund Shop	Offices	Fuel Island	Herbicide/Fertilizer
Olympic	Mottman	x		x	x	x		x		x	x	x		x		
Eastern	Geiger		x	x	x					x	x	x	x	x	x	x

Mottman

The Western Washington CABs is located at the Mottman Maintenance Facility (Mottman) at 2120 R.W. Johnson Blvd. SW in Tumwater. The Mottman CABs is a retrofit of an existing swale located at the facility.

The Mottman CABS is located east of the site’s primary maintenance activities and receives runoff from a 1.23-acre drainage area highlighted in Figure 5. The delineated drainage area was ground-checked through multiple site observations during storm events, including heavy rain events. The CABS does not receive all the Mottman Maintenance Facility’s stormwater runoff, which is directed to multiple points. This study only addresses the Mottman pollutants generated in the immediate drainage area.



Figure 7. Mottman CABS monitoring site and associated drainage area

The previous swale at Mottman was removed and new soil, compost, and seed was installed. The effluent pipe that drains the swale to the nearby pond was lowered, this brought the swale into current HRM guidance for slope specifications.

Construction and installation of monitoring equipment took place during water year 21. Supply chain and other covid-19 related delays pushed the sample start date to October 28, 2021.



Figure 8 Mottman Effluent

Geiger

The Eastern Washington CABS is located at the Geiger Maintenance Facility near the Spokane International Airport at 7211 West Westbow Boulevard, west of the City of Spokane. The Geiger CABS is a retrofit of an existing swale with a siltation basin installed prior to the swale influent.

Figure 6 shows the 1.18-acre drainage area. The delineated drainage area was ground-checked through multiple site observations during storm events, including heavy rain events. The CABS does not receive all the Geiger Maintenance Facility's stormwater runoff, which is directed to multiple points. This study only addresses the pollutants generated in the immediate drainage area.



Figure 9. Geiger CABS monitoring site and associated drainage area

Siltation basin was designed by WSDOT and installed. Swale was reconstructed to compensate for the loss of length because of the basin. New soil and seed were added to the swale. Compost will be added, and vegetation establishment will take place over water year 22.



Figure 10 Geiger Influent with Siltation Basin

Literature Cited

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