

# Washington State Department of Transportation

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## Stormwater Features Inventory: Standard Operating Procedures for Stormwater Discharge Point Inventory

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Version 1.0

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Washington State  
Department of Transportation

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Stormwater discharge point inventory work is conducted in response to requirements of WSDOT's NPDES Municipal Stormwater Permit (Ecology, 2009). Instructions presented herein are adapted from published product information or were developed by in-house technical experts. Their primary purpose is for internal use by WSDOT's Stormwater Features Inventory Group. Described procedures may vary from those used by other WSDOT groups.

WSDOT's stormwater discharge point inventory data collection procedures do not supplant official published definitions or methods.

Distribution of this document does not constitute an endorsement of a particular procedure or method. Any reference to specific equipment, software, manufacturers, or suppliers is for descriptive purposes only and does not constitute an endorsement of a particular product or service by the authors or WSDOT.

Although WSDOT follows these standard operating procedures in most cases, there may be instances in which WSDOT uses an alternative methodology, procedure, or process.





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## Acronyms and Abbreviations

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AOI	area of interest
As-builts	as-built contract plan sets or sheets
BMP	best management practice
CAE	computer aided engineering
CFR	Code of Federal Relations
Coordinator	Stormwater & Watersheds Program, Stormwater Features Inventory Coordinator
Crew Lead	Stormwater & Watersheds Program, Stormwater Features Inventory Field Crew Lead
CSS	combined sewer system
Data Administrator	Environmental Information Program, Environmental GIS/GPS Data Steward
Data Steward	Stormwater and Watersheds Program, SFID Lead/Data Steward
Ecology	Washington State Department of Ecology
Esri	Environmental Systems Research Institute, Inc.®
ESO	Washington State Department of Transportation, Environmental Services Office
Field Lead	Stormwater and Watersheds Program, Stormwater Features Inventory Field Lead
GIS	Geographic Information System
GNSS	Global Navigation Satellite Systems
GPS	Global Positioning System
INC	incoming discharge point
INC/MF	incoming discharge point with a mixed flow flag
INC/TG	incoming discharge point with a through going note
LS	land surface discharge point
MS	managed system discharge point, MS4 or private
MS3	municipal separate storm sewer
MS4	municipal separate storm sewer system
MS/MF	managed system discharge point with a mixed flow flag
MS/TG	managed system discharge point with a through going note
mxd	map exchange document file format
NPDES	National Pollutant Discharge Elimination System

PDF	Portable Document Format
permit	Washington State Department of Transportation Municipal Stormwater Permit, National Pollution Discharge Elimination System and State Waste Discharge Permit for Large and Medium Municipal Separate Storm Sewer Systems
RCW	Revised Code of Washington
SFI	Stormwater Features Inventory
SFID	Stormwater Features Inventory Database
SR	state route
SOP	standard operating procedures
SUB	subsurface discharge point
SW	surface water discharge point
SW/MF	surface water discharge point
TMDL	total maximum daily load
TMDL Lead	Stormwater and Watersheds Program, TMDL Lead
WAC	Washington Administrative Code
WSDOT	Washington State Department of Transportation



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# Stormwater Features Inventory: Standard Operating Procedures for Stormwater Discharge Point Inventory

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## 1-0 Background

The *Stormwater Features Inventory: Standard Operating Procedures for Stormwater Discharge Point Inventory* was developed in response to WSDOT's 2009 NPDES Municipal Stormwater Permit (permit), issued by the Washington State Department of Ecology (Ecology). Among other elements, the permit requires WSDOT to maintain an ongoing storm sewer system mapping program for areas within the permit's jurisdictional boundaries. The purpose of this standard operating procedure (SOP) is to provide WSDOT field staff with descriptive methods for conducting field-based stormwater discharge point inventory.

This document outlines standard WSDOT procedures for all field activities that include data collection and documentation of stormwater discharge points. The intent is for this document to supplement WSDOT's *Stormwater Features Inventory Database: Standard Operating Procedures for Office Data Collection* (WSDOT, 2012b); *Stormwater Features Inventory Database: Feature and Attribute Definitions* (WSDOT, 2012a); and *Standard Operating Procedures For Potential Pollutant Source Identification In Total Maximum Daily Load Areas* (WSDOT, 2013).

Stormwater features inventory activities are managed through WSDOT's Environmental Services Office (ESO), Stormwater and Watersheds Program. Associated operational procedures are administered by the Stormwater Features Inventory (SFI) Group. Associated technical systems are administered by WSDOT's ESO, Environmental Information Program, with direction from the Stormwater and Watersheds Program.

**Note:** The *Stormwater Features Inventory: Standard Operating Procedures for Stormwater Discharge Point Inventory* is a version-controlled document and is subject to modifications that reflect ongoing agency needs.

## 2-0 Personnel Qualifications/Responsibilities

As a member of the field staff, you must be familiar with these standard operating procedures and other related SOPs for stormwater field data collection. Using SOPs will help ensure you collect all data efficiently, safely, and consistently. You must complete hands-on training using this SOP to ensure your understanding of the materials presented herein.

The SFI Field Lead (Field Lead) and SFI Crew Lead (Crew Lead) who are directing data collection should be knowledgeable about all aspects of the program requirements to ensure credible and useable data are collected. You will be briefed by the Field Lead, Crew Lead, or SFI Coordinator (Coordinator) on data collection goals and objectives prior to arrival in the field.

You should be comfortable with operating mapping-grade survey equipment. It is required that you:

- Have a strong understanding of basic survey principles, including the fundamentals of the Global Positioning System (GPS/GNSS).
- Be receptive to working in adverse field conditions (weather- and site-specific) and be able to troubleshoot field and equipment problems.
- Be able to independently assess local highway conditions, determine the required level of traffic control, and apply approved traffic control plans.

Other training requirements may be necessary depending on situations encountered at each site.

## **3-0 Planning and Coordination**

Prior to beginning stormwater system discharge point inventory work, you should conduct planning and coordination activities for the area of interest (AOI). These activities ensure there is full communication between the Field Lead, inventory crews, project engineers, and WSDOT staff, and that field work will be performed in a safe and effective manner.

The Field Lead or Crew Lead is responsible for coordinating the following inventory planning tasks.

### **3-0.1 Inventory Schedule and Plan**

A schedule and plan for discharge point inventory work will be developed by the Field Lead to reflect priority areas or highway segments. This plan should be reviewed and approved by the Coordinator prior to implementation. If significant changes in inventory locations or schedules occur, the Field Lead and/or Crew Lead is responsible for updating the plan and notifying all parties of inventory plan changes.

### **3-0.2 Basemap**

A basemap will be compiled by the Field Lead or Coordinator to help define the highway segment(s) to be assessed. This will assist the crew in field orientation and note taking during field work. This map should be produced in hard copy for field use and depict the highway segments to be surveyed as well as any additional pertinent information. Examples of additional feature information include the presence of state and local roads, streams, wetlands, or other water bodies, and other highway features such as previous discharge point inventories and milepost markers.

### **3-0.3 Region Contacts**

Once priority highway segments and a timeline are established, contact the WSDOT region Maintenance Superintendents and region Environmental Services staff to determine the maintenance area where work will be performed. If work takes place within a total maximum daily load (TMDL) area, the WSDOT Stormwater and Watersheds Program TMDL Lead (TMDL Lead) should be notified by either the Field Lead or Coordinator. Communications should include a statement of plans for field work and identify special safety precautions or maintenance requirements that may be requested from the region points of contact. Open

lines of communication should be maintained by the Field Lead or Coordinator and region contacts should receive a status update on a regular basis.

## **4-0 Safety**

When you conduct stormwater field work, follow all WSDOT safety procedures and protocols as defined in the WSDOT [Safety Procedures and Guidelines Manual](#) and all other formal statewide or region-specific safety-related manuals, guidelines, memos, etc. Preplan all traffic control, in adherence to the federal [Manual on Uniform Traffic Control Devices for Streets and Highways](#), and following the WSDOT [Work Zone Traffic Control Guidelines](#).

You can find additional guidance for safety procedures and protocols, as well as recommended traffic control plans, in the WSDOT *Stormwater Features Inventory: Standard Operating Procedures for Field Safety* (WSDOT, 2013).

## **5-0 Standard Data Collection Equipment**

A variety of tools, supplies, and equipment will be required for nearly all field operations. Each piece of equipment is considered an asset of the state and should be cared for accordingly.

### **5-0.1 Care of Equipment**

You must take proper care of the equipment used in order for it to function as intended. If you leave equipment wet and dirty at the end of the day, metal components (such as the data port or battery contacts) can corrode, thus degrading performance or even ruining the device. Metal measuring equipment can rust or roughen beyond usability.

At the end of each day in the field, wipe down, dry off, or otherwise clean all equipment and set batteries to charge overnight. If you used the equipment in rainy weather, detach cables and leave the plug/data port covers open overnight to allow for drying. Don't leave any valuable survey equipment in the vehicle overnight. The Performance Management Program annual review for all WSDOT field personnel should include a component for proper care of field equipment.

### **5-0.2 Data Collection Equipment List**

Following is a list of standard items required for stormwater field work. You may need additional equipment depending on the specific field area or inventory requirements. Proper planning should be conducted to tailor this list for each project. For stormwater features inventory data collection, each field crew should have the following equipment available and ready for travel at a minimum including:

- Trimble® GeoExplorer® 6000 Series GeoXT™ handheld GPS/GNSS unit (hand-held computer, antenna, range pole, cables, stylus, spare battery, etc.)
- Laser range finder
- Digital camera
- Chargers for camera, laptop, and GPS/GNSS unit (if traveling overnight)

- Cell phone and/or two-way radios
- Rite-in-the-Rain® field survey books
- Mechanical pencils, erasers, straight edge, stencil, etc.
- Base maps/field maps
- Covered clipboard
- Magnetic compass
- Spotlight/powerful flashlight
- 4 lb. sledgehammer
- Shovel
- Manhole lid opening tool(s)
- Machete or brush clippers
- Measuring tape, graduated in inches

## **6-0 Field Data Collection Procedures**

The following field data collection procedures are intended to ensure consistent quality of stormwater features inventory data, which may be collected by multiple crews in various regions of the state. The final data deliverable is accompanied by corresponding metadata. By following the protocols contained herein, an end user will have the metadata necessary to know the relative uniformity, completeness, and accuracy of the data being used.

### **6-0.1 Conveyance System Evaluation**

Due to the complex nature of stormwater conveyance systems, **assess each assigned segment on foot, and not from the vehicle.** This ensures you don't overlook smaller conveyances and that you adequately evaluate heavily vegetated areas.

### **6-0.2 Point Occupation**

You should physically occupy the stormwater discharge point location during the time point location data is collected. This ensures maximum accuracy. You should occupy each point collected for a minimum of 10 seconds (or epochs), whether for a discrete point feature or for a vertex as part of a linear feature.

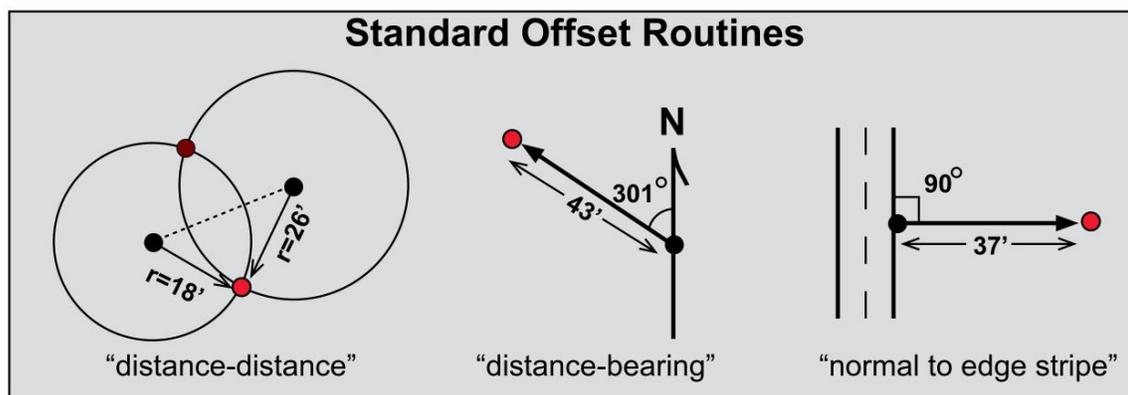
Do not use "dynamic" logging techniques. If collecting data using the Trimble® GeoExplorer® 6000 Series GeoXT™ handheld, using ArcPad® 10.0 with service pack 1 and GPSCorrect™ 3.20 software, set it to automatically collect the standard epochs. When collecting data using the Trimble® GeoExplorer® 6000 Series GeoXT™ handheld, using TerraSync™ 5.10 software, the epoch count is user controlled.

### **6-0.3 Offset Routines**

The "point occupation" requirement has some field limitations. If there is no reasonably safe access to the point, or if heavy tree canopy prevents adequate satellite reception, perform an

offset routine to document the location. Examples of preferred offset routines are depicted in [Figure 1](#) and, in order of preference, include:

1. **“distance-distance”** – Two reference points are collected. A distance from each point to the feature is measured using a range finder or other measuring device. These values are entered in the Trimble® GeoExplorer® 6000 Series GeoXT™ handheld data collector where the feature position is calculated. This method is typically used when the bearing to the feature is not known but the distances are. For example, when you are using a range finder without a compass.
2. **“distance-bearing”** – A single reference point is collected. The distance from the reference point to the feature is measured using a range finder or other measuring device. A compass bearing to the feature from the reference point is measured using a magnetic compass. These values are entered into the Trimble® GeoExplorer® 6000 Series GeoXT™ handheld data collector where the feature location is then calculated.
3. **“normal-to-edge stripe”** – A single reference point is collected at the highway shoulder, near the edge of pavement, in a location that is in line with the feature as oriented roughly normal to the edge stripe. The distance from the reference point to the feature is measured using a range finder or other measuring device. This distance is recorded in a data field for the feature and the point is manually moved during data editing.



**Note:** The black dot indicates a “reference” location. The red dot indicates the calculated feature location.

**Figure 1** Example of three offset routines preferred for use during stormwater discharge point data collection.

It should be generally understood that conducting an offset routine might introduce a greater potential for error and affect data accuracy. Calculate distances measured by electronic devices *at least twice* to ensure the proper target was acquired and no environmental or atmospheric interference affected the measurement. Use a magnetic compass with extreme care and only in the absence of local magnetic anomalies and electrical sources (magnetic rocks, guardrail, vehicles, suspended or buried high-voltage power lines, reinforcing steel in concrete structures such as bridge columns and concrete barriers, etc.). Calibrate high-quality digital compasses regularly to account for local disturbances (see [Table 1](#)).

**Table 1 Recommended separation distances when using a magnetic compass.**

Types of Possible Interference	Separation Distances
High-tension power lines	180 feet
Field vehicle	60 feet
Telephone wires and barbed wire	35 feet
Pry bar	6.5 feet
Steel hard hat, machete, metal field notebook	1.5 feet

## 7-0 Boundaries of Responsibility

The department is responsible for all stormwater leaving the WSDOT right of way, including infiltration of stormwater into the ground. This includes the boundaries of WSDOT’s highways, maintenance facilities, ferry terminals, rest areas, and park and ride lots. In most cases, you will cease system mapping and data collection when the flow path crosses these lines. You will typically map this point as an incoming or outgoing “discharge” point.

You can identify and determine the right of way boundary using legal survey maps or general field indicators. The method used will depend on specific parameters of each mapping/inventory project. For projects where accuracy is of high importance, you should review right of way plan sheets through various WSDOT region or Headquarters data repositories. For further information on office research using region or Headquarters data repositories, see the document titled *Stormwater Features Inventory Database: Standard Operating Procedures for Office Data Collection* (WSDOT, 2012b).

In most instances, you should assess the approximate right of way boundary using field indicators. Use field indicators with care and in the following order of precedence:

1. Right of way fence (hog and barbed wire is most common, but private fences should also be considered).
2. Toe of slope or slope catch (the line where the roadway embankment or cut meets the natural ground surface).
3. Vegetation line/maintenance clearing line.

When present, you may also use physical survey markers such as property corner or right of way boundary stakes to confirm or question the assumed boundary. However, you should not use them exclusively, since they may be out of date or incorrect. When there is concern about using field indicators, or if they are deemed to be insufficient, record a detailed note with the data point record to document justification for the point location.

## 8-0 Naming Convention for Discharge Points

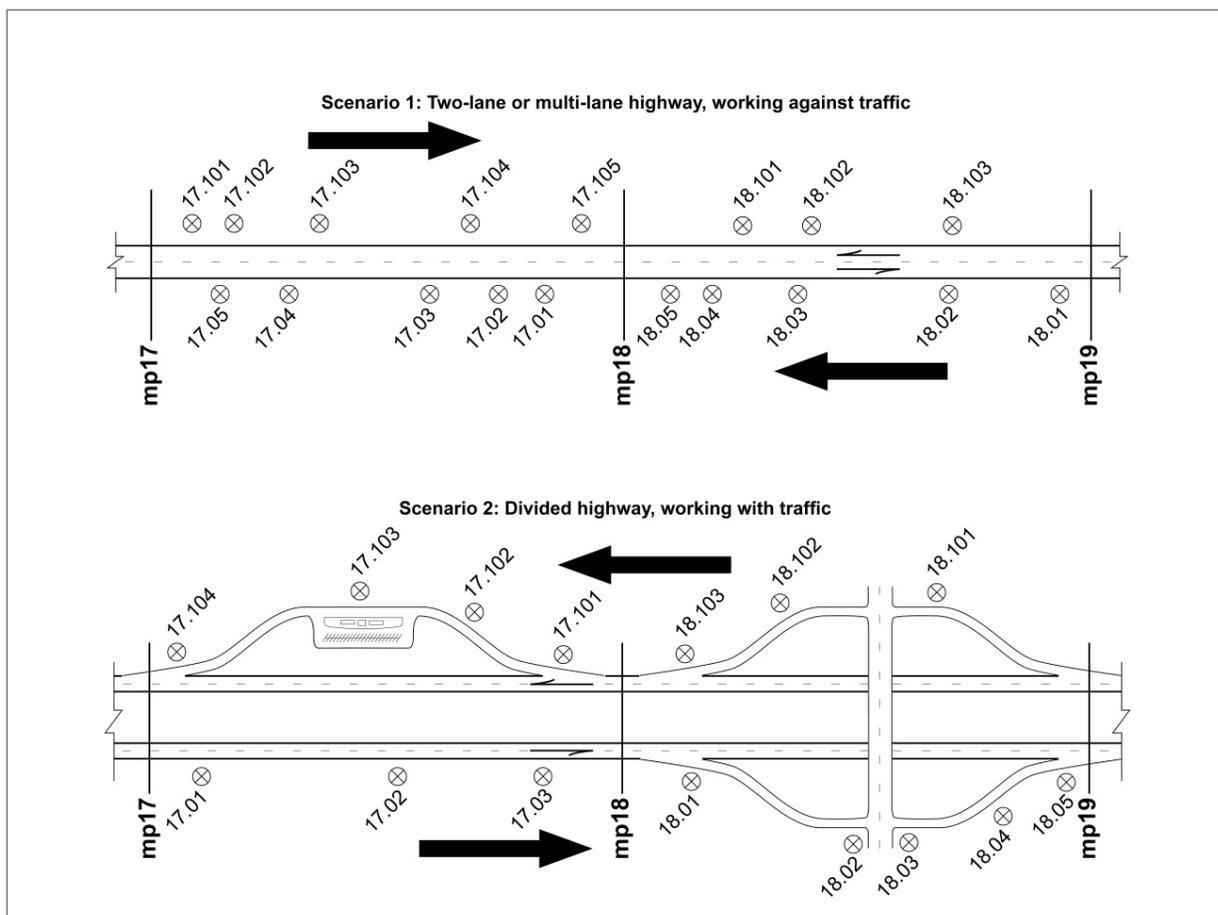
The field crew will assign a unique feature name to each discharge point documented on a given highway. This name serves to provide an additional step of organization for field data collection processes and for photograph association.

These processes use highway linear referencing to assign a numerical integer (1, 2, 3...10) to each discharge point by incorporating the highway mile where the point is located (see Figure 2). The numeric highway mile value is then followed by decimals indicating the unique discharge point number for the area.

Please note:

- Two decimal places are used for discharge points documented on the *increasing* side of the highway.
- Three decimal places are used for discharge points documented on the *decreasing* side of the highway.

This method allows for documentation of up to 99 distinct discharge point locations on each side of the highway for each highway mile.



**Note:** Arrows indicate the direction of field crew progress for different highway types.

**Figure 2** Discharge point labeling example.

For example, all discharge points located between milepost (MP) 17 and MP 18 will be assigned the number “17.xx” (increasing) or “17.1xx” (decreasing). As the field crew moves in the increasing direction along the increasing side of the highway, each discharge point is given another number based on the order in which they are collected (see [Figure 2](#), Scenario 2). Beginning at MP 17, the discharge points are named 17.01 (first), 17.02 (second), 17.03 (third), 17.04, 17.05...17.27 (twenty-seventh).

Following this example, moving in the decreasing direction, on the decreasing side of the highway, the point numbering begins at MP 18 and incrementally increases toward MP 17. Beginning at MP 18, the discharge points are named 17.101 (first), 17.102 (second), 17.103 (third), 17.104, 17.105...17.127 (twenty-seventh).

This name is then assigned a three-digit prefix to indicate the state route (SR) on which it occurs and a Related Route Type (if applicable).

Example: “**002\_17.01**”

- This number indicates the first discharge point collected on the increasing side in mile 17 on SR 002.

Example: “**101\_CO\_90.115**”

- This number indicates the fifteenth discharge point collected on the decreasing side in mile 90 of the US 101 couplet (in this case, in Aberdeen).

For organizational purposes, it’s preferred that you document and label discharge points in order. However, this is not necessary as long as all point locations have a unique discharge point name.

Follow the naming convention as described above, and defined by the highway they are adjacent to, for discharge points collected on:

- Highway ramps
- Property lines of maintenance facilities
- Property lines of rest areas
- Property lines of park and ride lots

## **9-0 Field Notes for Discharge Point Inventory**

Keep a field book to provide a handwritten record of all stormwater data collected by the crew. You can use this information for quality control of the GPS/GNSS data attributes prior to final submission. You should keep an up-to-date photocopy or digital scan copy of this field book in the office in case the book is damaged, destroyed, or lost in the field. Upon completion, a hard copy and a digital copy of this book will become part of the permanent stormwater inventory record.

Organized, complete, and clear field notes are critical components of the data collection process. The sense of scale in the field sketch gives visual representation of facts on the ground, as seen by the field crew. Office personnel reviewing the survey data, field book sketch, and associated photo(s) should be able to logically connect all three.

## 9-0.1 Standard Field Book Format for Discharge Point Inventory

The standard field book format for documenting discharge points is presented in Figure 3. Field book dimensions are standard small format (4½" x 7"). Critical information includes:

- Page numbers
- Date on which the data is being collected
- State route and mileposts for which the data is being collected
- Initials of the field personnel performing the three main tasks of data collection (GPS/GNSS handheld operation, field book, photography)
- Discharge point name
- Discharge type
- Associated field photograph numbers
- Brief description of the discharge point vicinity
- Field sketch

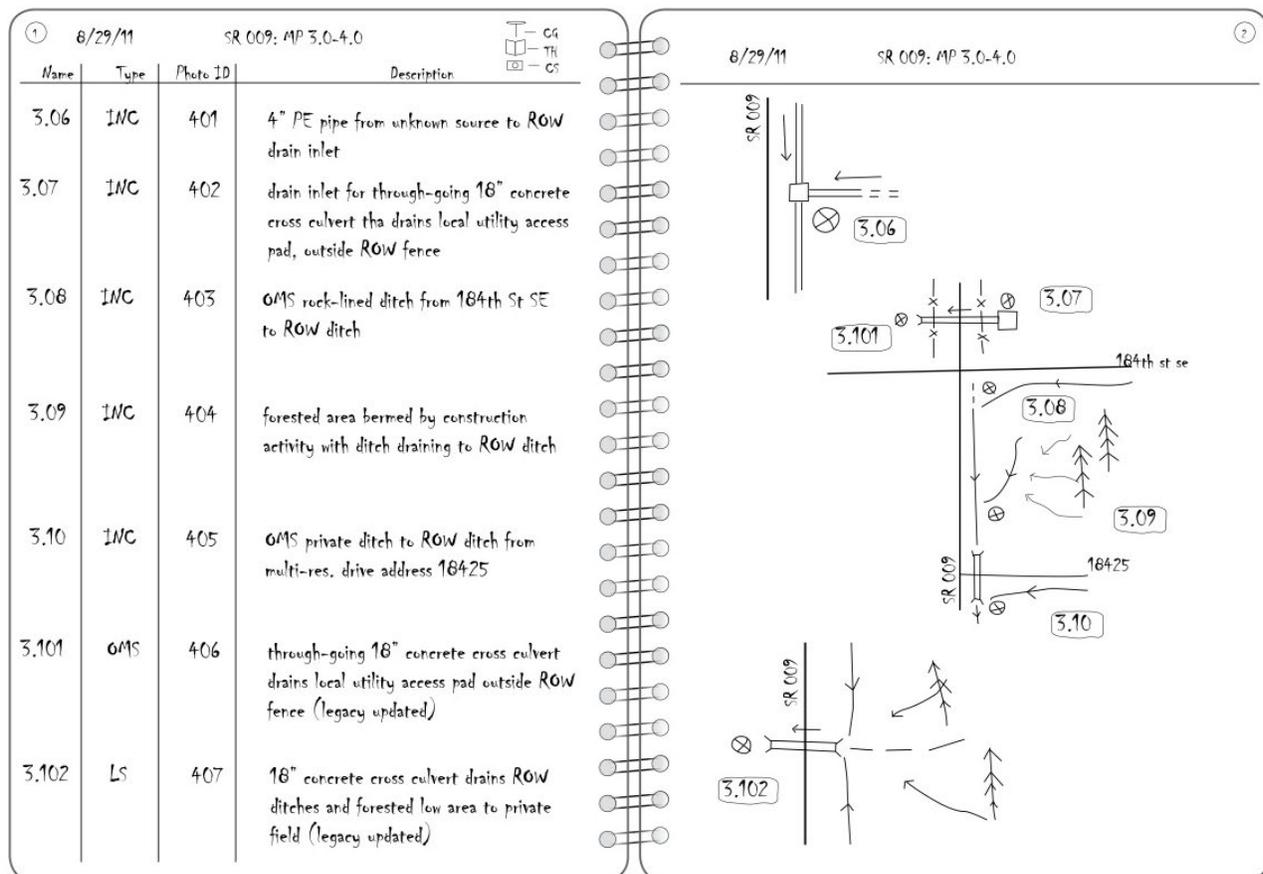


Figure 3 Example of the standard field book format for discharge point inventory.

## 9-0.2 Standard Symbols and Abbreviations for Field Book Notation

Your field book notes should complement the attribute list for the digital data rather than attempt to duplicate it. They should be brief, clear, and descriptive. For a typical stormwater field note, include a description of the source, flow path, and destination of flow. Due to the



## 10-0 Field Photograph Procedures for Discharge Points

Photograph all stormwater discharge points. Assign each photo an identification number and record it in the corresponding feature's attributes. In the final deliverable, these can be digitally linked.

**Take care during photo composition.** The field photograph is the most commonly overlooked or rushed phase of field data collection. A carefully composed photograph can contain an enormous amount of information. Your photo should be able to independently communicate the stormwater scenario and justify the collection of a discharge point.

Reference objects included in the photo, indicating scale and location, are invaluable. These objects can allow for office-based assessment of the conditions, as well as help a third party to locate the point in the field at a later time. In each photo, include critical elements such as perspective on flow paths, pipe ends, drainage structures, and potential pollutant sources.

There are many locations completely covered by vegetation or otherwise obscured. In these instances, a reference photograph with a crew member at the point of interest helps to show where the discharge point is, relative to the highway shoulder, but not the exact nature and condition of the discharge. In these cases, accompany the "vicinity" photo with a "detail" photo.

Set digital camera photo resolution according to the scope of the field activity and purpose of the final dataset. For general field inventory activity, **set photo resolution at 1 mp or below**. This accommodates limited data transfer rates and server storage capacity, while also improving the ultimate user interface for the end user.

Field crews are responsible for assigning the unique picture ID for each photo prior to data submittal. This photo number is then recorded as an attribute in the digital data. Most commonly, the final picture ID is equivalent to the unique photo ID number as assigned by the camera.

## 11-0 Stormwater Discharge Point Definitions

The WSDOT Stormwater Feature Inventory Program makes a distinction between NPDES-defined "outfalls" and WSDOT stormwater "discharge points." The intent is to efficiently and effectively account for the complete WSDOT stormwater system discharge by incorporating the permit requirement for stormwater outfall documentation within the broader range of stormwater discharge points. Various additional permit requirements are met, in part, through documentation of the full range of discharge point subtypes.

Terms that are critical to the discharge point concept include "stormwater," "outfall," and "point source." Definitions for these terms are provided below.

**Stormwater** as defined by the WSDOT NPDES permit means "runoff during and following precipitation and snowmelt events, including surface runoff, drainage, and interflow." Washington State law ([WAC 173-201A-020](#)) adds to this meaning "that portion of precipitation that does not naturally percolate into the ground or evaporate, but flows via overland flow,

interflow, pipes, and other features of a stormwater drainage system into a defined surface water body, or a constructed infiltration facility.”

**Outfall** as defined in the WSDOT NPDES permit means “a point source as defined by [40 CFR 122.26E\(9\)](#) at the point where a municipal separate storm sewer discharges to waters of the State and does not include open conveyances connecting two municipal separate storm sewers, or pipes, tunnels, or other conveyances which connect segments of the same stream or other waters of the State and are used to convey waters of the State.”

**Point source** is distinguished by the Code of Federal Regulations ([40 CFR 122.2](#)) as a location where “runoff is discharged via any discernible, confined, and discrete conveyance, including but not limited to, any pipe, ditch, channel, tunnel, conduit, well, discrete fissure, container, rolling stock, concentrated animal feeding operation, landfill leachate collection system, vessel or other floating craft from which pollutants are or may be discharged. This term does not include return flows from irrigated agriculture or agricultural stormwater runoff.”

Note: Contrary to [40 CFR 122.2](#), Washington State law does not allow irrigation waste water discharge to normal highway ditches ([WAC 468-30-020](#)). Therefore, in the state of Washington, irrigation return flow is treated as a point source discharge.

## 11-0.1 WSDOT Stormwater Discharge Points

For the purpose of the WSDOT stormwater discharge point inventory, a “discharge point” is defined as:

**The point at which WSDOT loses, or obtains, jurisdictional responsibility of concentrated stormwater from a constructed stormwater conveyance. This includes locations where stormwater infiltrates into the ground at the end of a constructed stormwater conveyance, or enters surface waters of the state through a constructed stormwater conveyance.**

*All stormwater conveyance elements (or system of elements) must have a discharge point. All discharge points must have an associated stormwater conveyance element (or system of elements).*

Discharge points can be further characterized under the following subtypes:

- Surface water
- Land surface
- Managed system
- Incoming
- Subsurface

Additional considerations for stormwater discharges include scenarios for:

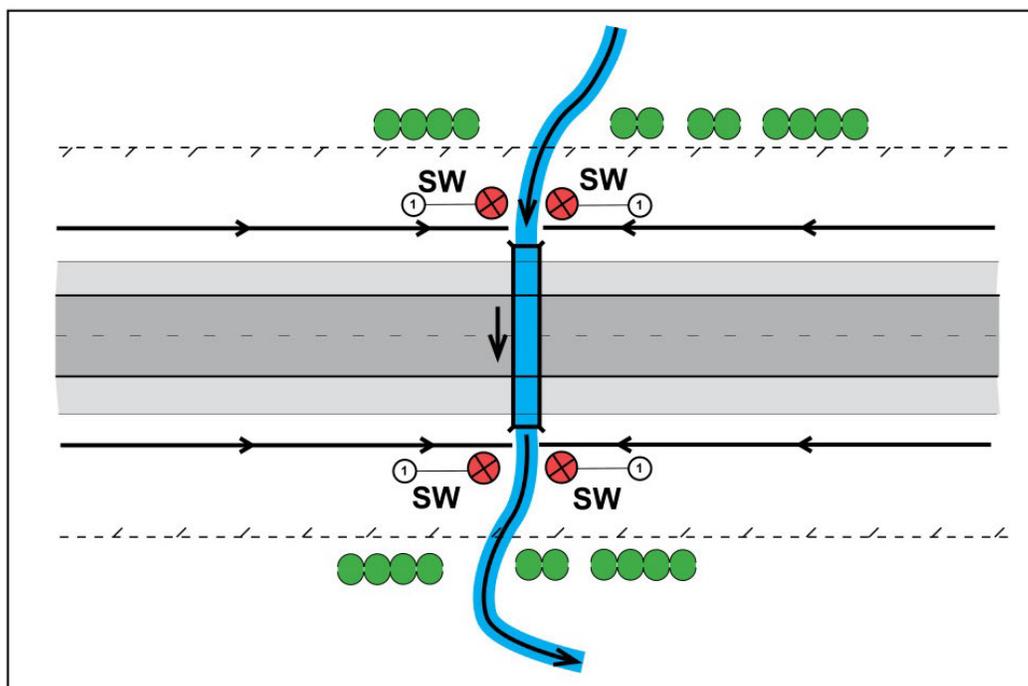
- Through-going systems
- Maintenance concerns

## 11-0.2 Surface Water Discharges

“Surface water discharges” are concentrated stormwater flow, routed through a constructed WSDOT conveyance, which then enters and mixes with a regulated receiving “water body of the state.” To qualify as a surface water-type discharge, the conveyed flow should be discharged directly into or within 50 feet of a qualifying water body (see [Section 11-0.2.1](#)) or can be visually confirmed to be conveyed to and enter the water body in concentrated form at a reasonable distance outside the WSDOT right of way boundary.

### Point Location Notes

- In cases where the WSDOT conveyance discharges stormwater to a water body within the WSDOT right of way, collect the discharge point at the location where the stormwater conveyance meets the water body boundary (see [Figure 5](#); see also [Section 11-0.2.2](#)).
- In cases where the WSDOT conveyance discharges across the right of way boundary and the flow is visually confirmed to enter a water body of the state in concentrated form in excess of 50 feet from the discharge location, collect a surface water-type discharge point at the right of way boundary (see [Figure 6](#)).
- In cases where the discharge enters a stormwater conveyance or system managed by a third party prior to entering the water body of the state, collect a “managed system” discharge point (as discussed in [Section 11-0.4](#)).

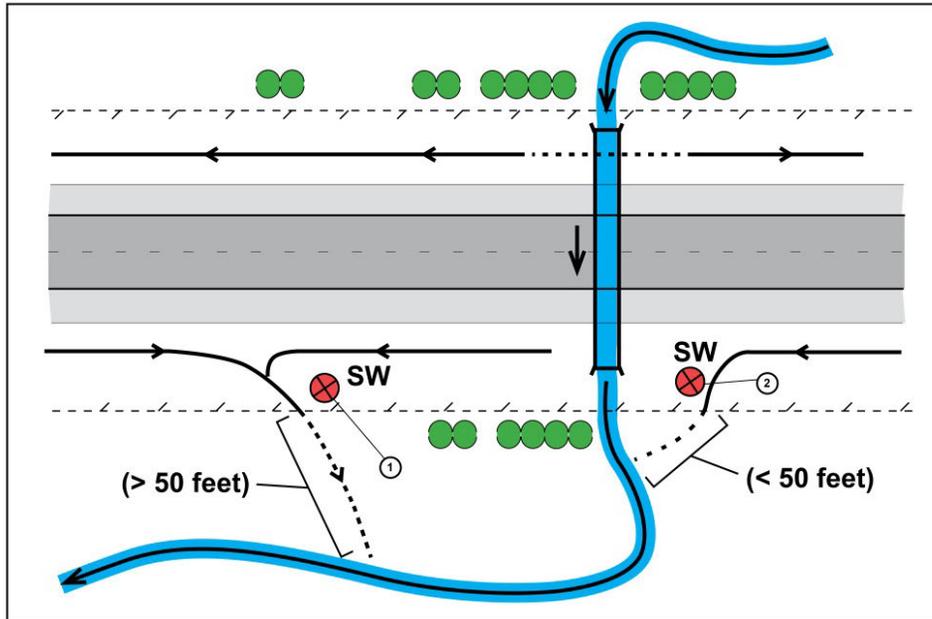


**Scenario:** A through-going stream enters the WSDOT right of way from its apparent natural channel, passes under the roadway prism via cross culvert or bridge, and leaves the right of way in its approximate natural channel.

**Note:**

1. Surface water (SW) discharges are documented at the location at which each of four distinct WSDOT ditches discharge stormwater to the stream.

**Figure 5** Surface water discharge to a through-going stream: Example 1.



Scenario: A through-going stream enters the WSDOT right of way from its apparent natural channel, passes under the roadway prism via cross culvert or bridge, and leaves the right of way in its approximate natural channel. There is no direct physical connection between a WSDOT drainage feature and the stream.

Notes:

1. WSDOT stormwater is visibly confirmed to enter the stream in concentrated form at a distance greater than 50 feet from the right of way boundary. A surface water (SW) discharge is documented at the point at which a WSDOT ditch leaves the right of way.
2. A WSDOT ditch crosses the right of way boundary within 50 feet of the stream. Regardless of whether the stormwater remains concentrated or disperses and infiltrates prior to reaching the stream, a surface water (SW) discharge is documented at the point at which the ditch crosses the right of way boundary.

Figure 6 Surface water discharge to a through-going stream: Example 2.

11-0.2.1 Waters of the State

The WSDOT NPDES permit defines “waters of the state” as including those waters defined as “waters of the United States” in [40 CFR 122.2](#) within the geographic boundaries of Washington State and “waters of the state” as defined in [Chapter 90.48 RCW](#), which includes “lakes, rivers, ponds, streams, inland waters, underground waters, salt waters, and all other surface waters and water courses within the jurisdiction of the state of Washington.”

11-0.2.2 Water Body Boundaries

For the purpose of the WSDOT stormwater discharge inventory, the proximity of a discharge point to a water body of the state should be determined relative to the boundary of the water body as defined below:

- **Waters subject to ebb and flow of the tide – High tide line:** The line of intersection of the land with the water's surface at the maximum height reached by a rising tide. The high tide line may be determined, in the absence of actual data, by a line of oil or scum along shore objects, a more or less continuous deposit of fine shell or debris on the foreshore or berm, other physical markings or characteristics, vegetation lines, tidal gages, or other suitable means that delineate the general height reached by a rising tide.

The line encompasses spring high tides and other high tides that occur with periodic frequency, but does not include storm surges in which there is a departure from the normal or predicted reach of the tide due to the piling up of water against a coast by strong winds such as those accompanying a hurricane or other intense storm (51 FR 41250, Nov. 13, 1986, as amended at 58 FR 45036, Aug. 25, 1993).

- **Inland bodies of water – Ordinary high water mark:** That line on the shore established by the fluctuations of water and indicated by physical characteristics such as clear, natural line impressed on the bank, shelving, changes in the character of soil, destruction of terrestrial vegetation, the presence of litter and debris, or other appropriate means that consider the characteristics of the surrounding areas (51 FR 41250, Nov. 13, 1986, as amended at 58 FR 45036, Aug. 25, 1993).

### **11-0.2.3 Mixed Flow Associated with Surface Water Discharges**

Special considerations are given to waters of the state that are captured and rerouted by a WSDOT, municipal, or private party stormwater conveyance. For the purpose of the WSDOT stormwater discharge inventory, a rerouted water body receiving no stormwater inputs is treated as a pristine water body of the state throughout its complete conveyed course through the WSDOT right of way (see *Headwaters Inc. v. Talent Irrigation District*, 243 F.3d 526; 9th Cir. 2001).

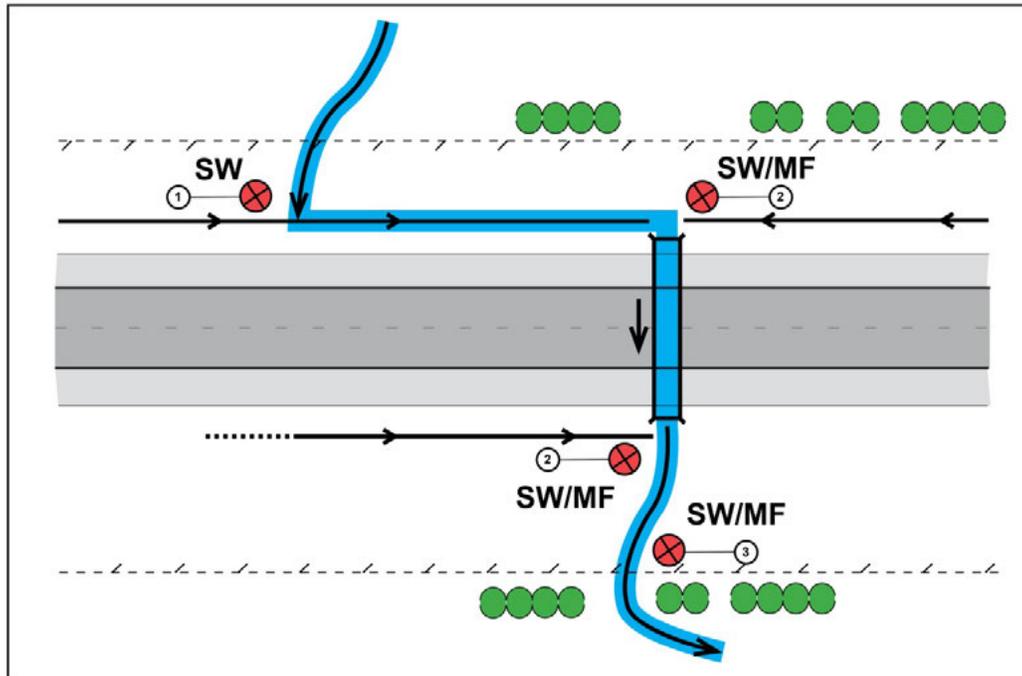
A “rerouted” water body of the state may have had its course altered by one or more constructed stormwater features and thus been removed from its natural channel. Within the WSDOT right of way, these waters are considered “mixed flow,” indicating that the “pristine” water has mixed with WSDOT stormwater runoff.

Regardless of its mixed flow status, record all points at which a constructed conveyance concentrates and discharges stormwater runoff into this rerouted water body of the state as a “surface water” discharge point (see [Figure 7](#)).

In addition, at all points where a new water body of the state enters the WSDOT right of way and mixes with a rerouted stream, record an additional surface water discharge point with a mixed flow flag, indicating that the flow entering and mixing with the new water body includes both waters of the state and WSDOT stormwater.

Record the point where the rerouted water body of the state is discharged from the WSDOT right of way as a surface water discharge point with a mixed flow flag (see [Figure 7](#)). This indicates that at that point, WSDOT is discharging both waters of the state and stormwater runoff. This is also the point where the rerouted stream transitions in definition to a “receiving water” (waters of the state into which regulated stormwater is flowing).

Mixed flow status should not include discharge of a through-going stream that enters and exits a single, uninterrupted cross culvert in its approximate natural channel (as in [Figure 5](#)). In this case, only document surface water discharge points if other constructed conveyances discharge to the stream within the WSDOT right of way.



Scenario: A stream is captured by the WSDOT stormwater system and is rerouted from its apparent natural channel. The rerouted portion of the stream encounters multiple stormwater mixing points during its flow through the WSDOT system. Once the stream has been captured by the WSDOT system, it is considered a “mixed flow” condition, indicating that that stream segment potentially contains both natural water and stormwater. The stream is ultimately routed under the roadway via culvert or bridge and leaves the right of way.

**Notes:**

1. A surface water (SW) discharge is documented at the first location at which a WSDOT ditch discharges stormwater to the pristine stream.
2. Additional surface water with mixed flow (SW/MF) discharge points is documented at the location where WSDOT ditches discharge to the stream.
3. A final surface water with mixed flow (SW/MF) discharge point is documented at the location where the stream leaves the right of way.

**Figure 7 Surface water and surface water/mixed flow discharges to a rerouted stream: Example 1.**

**11-0.2.4 Major Maintenance Concerns Associated with Surface Water Discharges**

Major maintenance concerns regarding WSDOT stormwater conveyance systems should be documented by stormwater field crews and reported to the maintenance group on a regular basis. Many of these maintenance concerns allow only for a land surface or subsurface discharge. Of particular emphasis, however, are maintenance issues that have created a discharge of stormwater directly into a regulated body of water of the state (see *Sierra Club v. Abston Construction Co., Inc.*, 620 F.2d 41; Fifth Cir. 1980). These might include flow that bypasses a drain inlet that is filled with sediment/debris or erosional gullies near bridge abutments conveying flow to the water body.

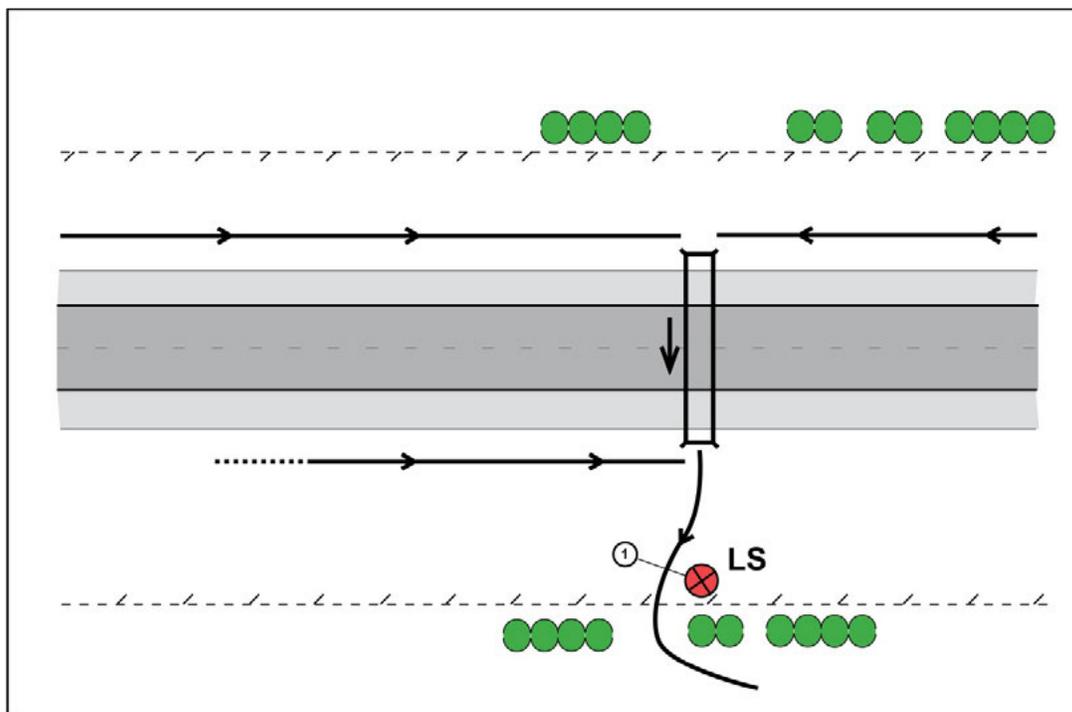
These should be documented as surface water discharges, flagged as major maintenance concerns, and submitted to the WSDOT maintenance group in a timely manner.

### 11-0.3 Land Surface Discharges

“Land Surface discharges” are outgoing concentrated stormwater flow, routed through a constructed conveyance from WSDOT property, that flows over the surface of the land to a field, forest, or landscaped area. To qualify as a land surface-type discharge, the concentrated flow should leave the WSDOT right of way **in excess of 50 feet** from a qualifying “water body of the state” and should not be seen to mix with a water body outside of the right of way. This flow may be conveyed away from the WSDOT right of way by a channel naturally eroded into the land surface or may disperse and infiltrate into the ground outside of the WSDOT right of way.

#### Point Location Note

- Document a land surface discharge at the location at which stormwater flow is crossing the implied right of way boundary (see [Figure 8](#) and [Figure 9](#)).

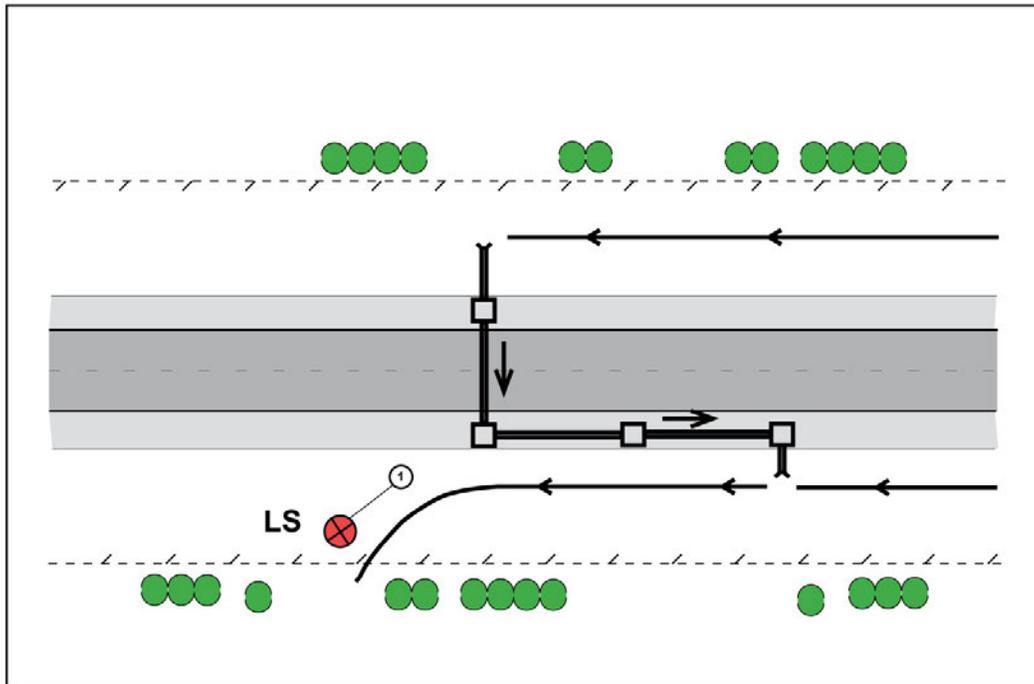


Scenario: A WSDOT drainage network composed of open ditches and a cross culvert pipe conveys flow across the right of way boundary and discharges to the surface of the land.

#### Note:

1. A land surface (LS) discharge point is documented at the location where the WSDOT system crosses the right of way boundary.

Figure 8 Land surface discharge: Example 1.



**Scenario:** A WSDOT drainage network composed of a combination of open ditches and closed pipes and drainage inlet structures conveys flow to the right of way boundary and discharges to the surface of the land.

**Note:**

1. A land surface (LS) discharge is documented at the location where the WSDOT system crosses the right of way boundary.

**Figure 9 Land surface discharge: Example 2.**

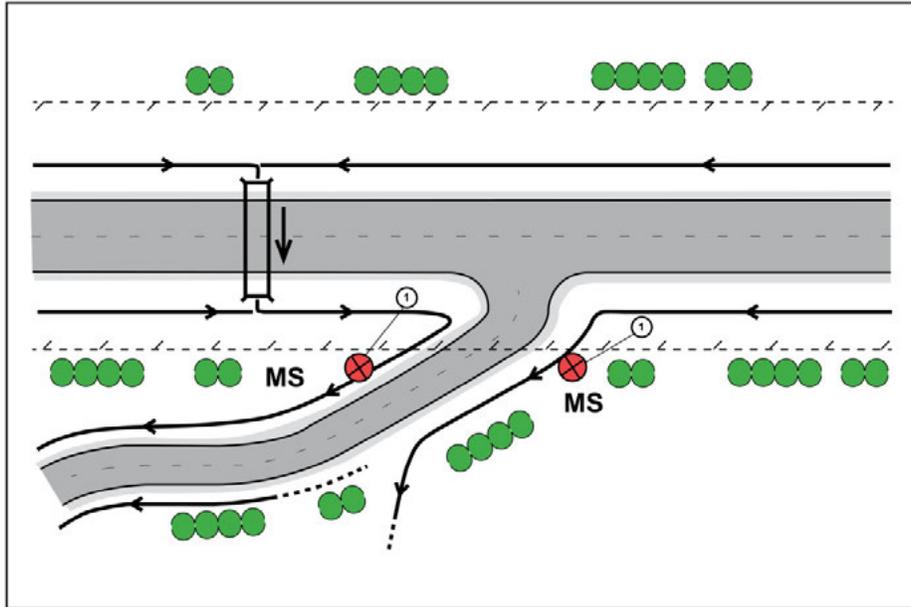
### 11-0.4 Managed System Discharges

A “managed system” discharge is outgoing concentrated stormwater flow routed through a constructed conveyance from WSDOT property that enters and mixes with a managed stormwater drainage network. This network can include both private drainage systems and those managed by a municipality (e.g., MS4, CSS), and it should consist of at least one constructed stormwater conveyance element (see [Figure 10](#), [Figure 11](#), and [Figure 12](#)).

Additionally, document managed system discharge points where third-party municipal storm drain systems pass through without surfacing on the WSDOT right of way (as discussed in [Section 11-0.7.1](#)).

**Point Location Notes**

- In the case of a managed system discharge that is conveyed by a visible open channel or exposed pipe, document the discharge point at the location where the conveyance crosses the implied right of way boundary (and thus transfers responsibility).
- In the case of a managed system discharge that is conveyed by buried pipe or other closed conveyance, document the discharge point at the location of the exposed conveyance inlet or at the outlet where it physically ties to a conveyance or drainage structure that is not owned or operated by WSDOT (rather than the approximate mid-pipe location where the conveyance is projected to cross the right of way boundary).

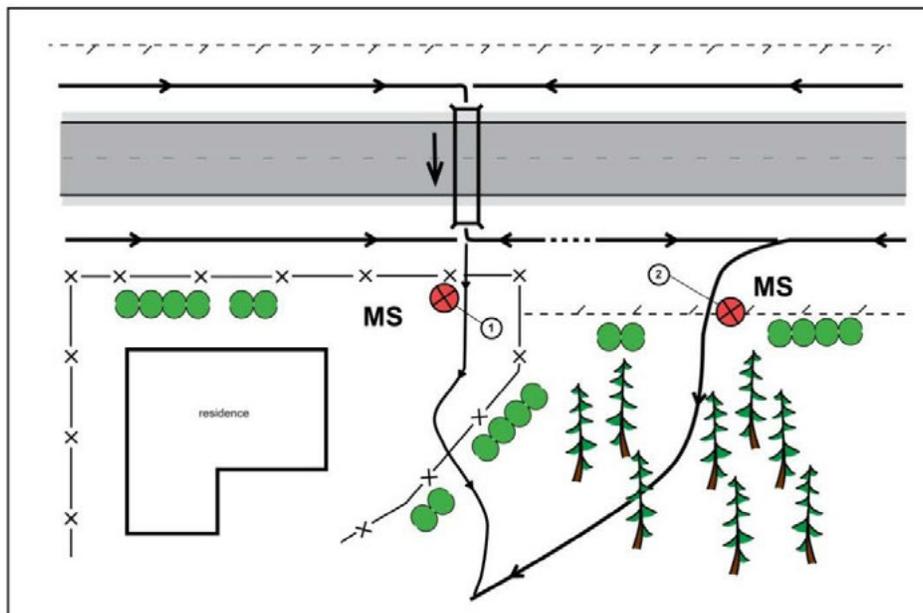


Scenario: A WSDOT drainage network of open ditches and a cross culvert pipe conveys flow to a pair of open ditches that serve a local roadway of a third-party municipality.

Note:

1. A managed system (MS) discharge is documented at the right of way boundary where the WSDOT ditch ownership and/or responsibility transitions to that of the third party.

Figure 10 Managed system discharge: Example 1.

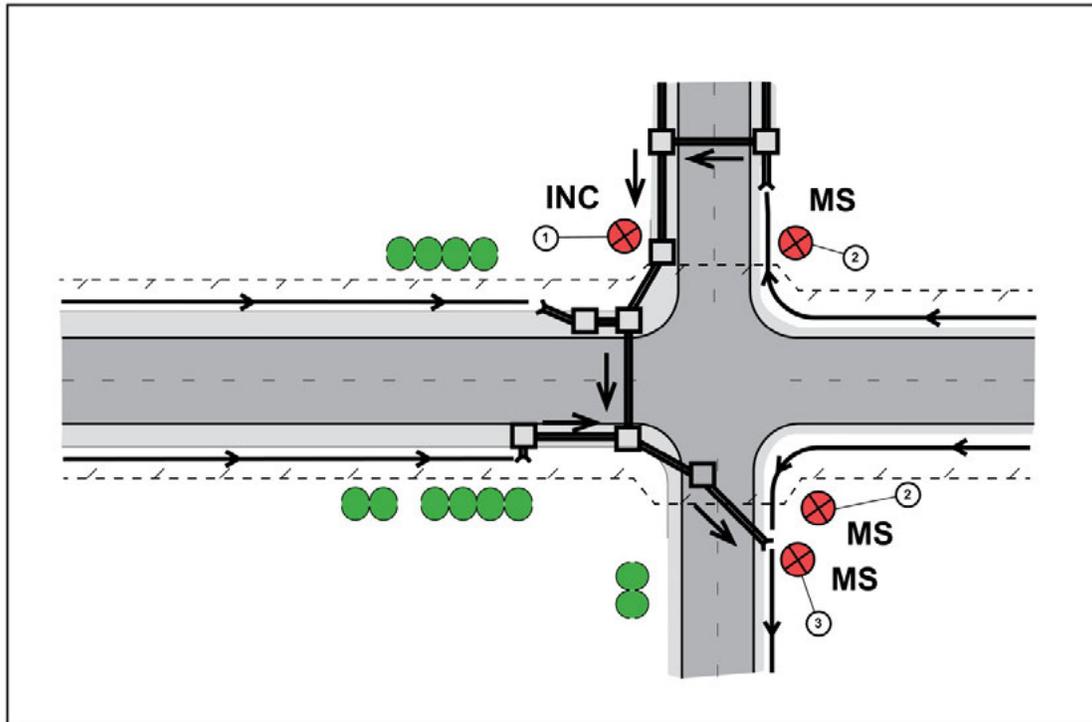


Scenario: A WSDOT drainage network of open ditches and a cross culvert pipe convey flow to ditch lines that were excavated and are maintained by a private party.

Notes:

1. A managed system (MS) discharge is documented at the right of way boundary where the WSDOT system flows to the private ditch line running through a local residence yard, field, or pasture.
2. A managed system (MS) discharge is documented at the right of way boundary where the WSDOT ditch line conveys flow to an excavated ditch that flows through a privately owned forested area.

Figure 11 Managed system discharge: Example 2.



Scenario: A WSDOT drainage network interacts with a local road drainage system through a variety of physical connections.

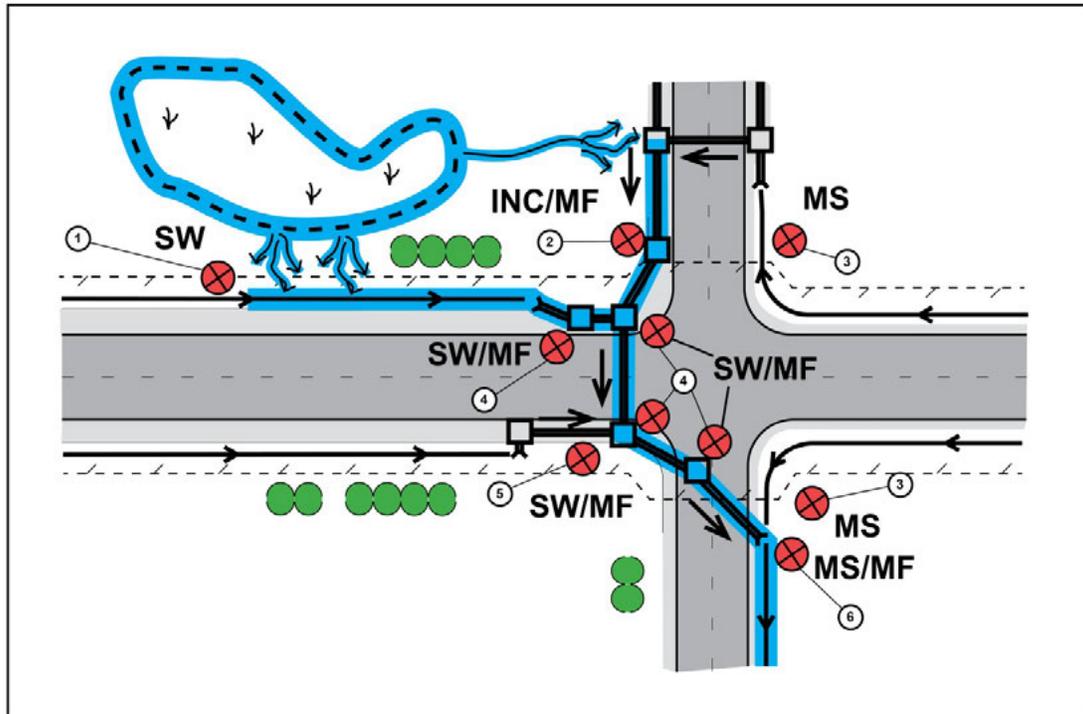
**Notes:**

1. An incoming (INC) discharge point is documented at the location where the local system connects to the WSDOT system. This point is usually collected at the pipe end that ties to a WSDOT-owned or -operated drainage inlet structure, rather than mid-pipe where the line crosses the approximate right of way boundary.
2. A managed system (MS) discharge point is documented at the right of way boundary where the WSDOT ditch ownership/responsibility transitions to that of the local municipality.
3. A managed system (MS) discharge is documented at the location where the WSDOT closed drainage network discharges to the local road drainage system.

**Figure 12 Managed system discharge: Example 3.**

***Mixed Flow Associated with Managed System Discharges***

Streams and other water bodies of the state that have been captured and rerouted by the WSDOT stormwater system are treated as mixed flow (as discussed in [Section 11-0.2.3](#)). If these waters then discharge from the WSDOT system to a managed system, as discussed above, flag the “managed system” discharge type as a mixed flow discharge (see [Figure 13](#)). This indicates that the discharge includes a mixture of both pristine waters of the state and stormwater.



Scenario: This figure depicts a scenario that is similar to Figure 12, but here “wetland” waters are overflowing into a drainage network with multiple owners. The WSDOT system both discharges to, and receives discharge from, the local third-party system. The captured and rerouted natural wetland water encounters multiple stormwater mixing points during its flow through the WSDOT system. Once the natural water has been captured by the WSDOT system, it is considered a “mixed flow” condition, indicating that it potentially contains both “pristine” waters of the state and stormwater. The natural wetland water is ultimately routed under the roadway via a closed drainage system and is discharged to a ditch owned, maintained, and/or operated by the third party.

**Notes:**

1. A surface water (SW) discharge is documented at the first location at which a WSDOT ditch discharges stormwater to the pristine wetland waters.
2. An incoming with mixed-flow (INC/MF) discharge point is documented at the location where the local roadway closed system conveys mixed stormwater and wetland overflow to the WSDOT closed system.
3. A managed system discharge (MS) is documented where the WSDOT ditch crosses the right of way boundary and responsibility transitions to the local roadway jurisdiction.
4. A surface water discharge with mixed flow flag (SW/MF) is documented where a WSDOT grated metal lid on a drainage inlet accepts surface flow that mixes with rerouted wetland overflow.
5. A surface water discharge with mixed flow flag (SW/MF) is documented where a WSDOT ditch flows to a closed system and mixes with rerouted wetland overflow.
6. A managed system discharge with mixed flow (MS/MF) is documented where the mixed rerouted wetland overflow and WSDOT stormwater leave the WSDOT drainage network and enter a local road ditch (MS4).

**Figure 13 Managed system with mixed flow discharge: Example 1.**

### 11-0.5 Incoming Discharges

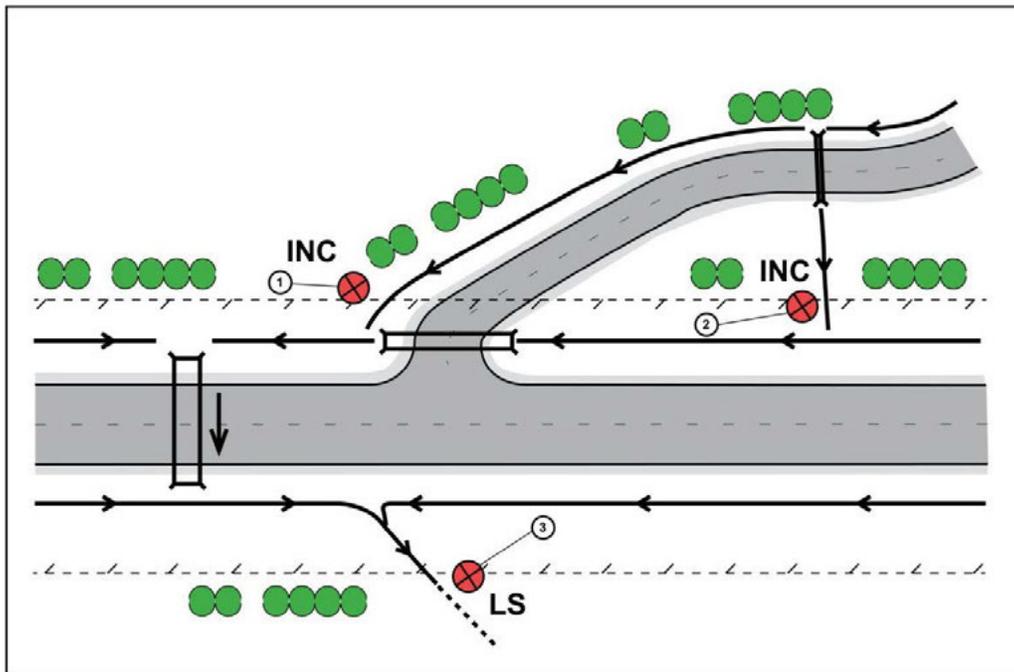
An “incoming” discharge is concentrated stormwater (or other flow) routed through a constructed conveyance that enters WSDOT property from a non-WSDOT-owned or -operated facility or system. This can include a direct connection of a conveyance feature to an element of the WSDOT stormwater network (see Figure 14, Figure 15, and Figure 16; see also Figure 12). In addition, incoming discharges can include an indirect connection of a conveyance feature that routes flow to WSDOT property where that flow disperses and infiltrates to the ground (as

in Figure 15, note 3). To qualify as an incoming-type discharge, the incoming flow should cross the right of way boundary as concentrated flow.

Additionally, document incoming system discharge points where third-party municipal storm drain systems pass through without surfacing on the WSDOT right of way (as discussed in Section 11-0.7.1).

**Point Location Notes**

- The incoming discharge type does not include incoming flow from waters of the state in a natural channel.
- In the case of an incoming discharge that is conveyed by a visible open channel or exposed pipe, document the discharge point at the location at which the conveyance crosses the implied right of way boundary.
- In the case of an incoming discharge that is conveyed by buried pipe, document the discharge point at the location of the exposed conveyance outlet (as in Figure 16, note 2), rather than the approximate location at which the conveyance is projected to cross the right of way boundary.

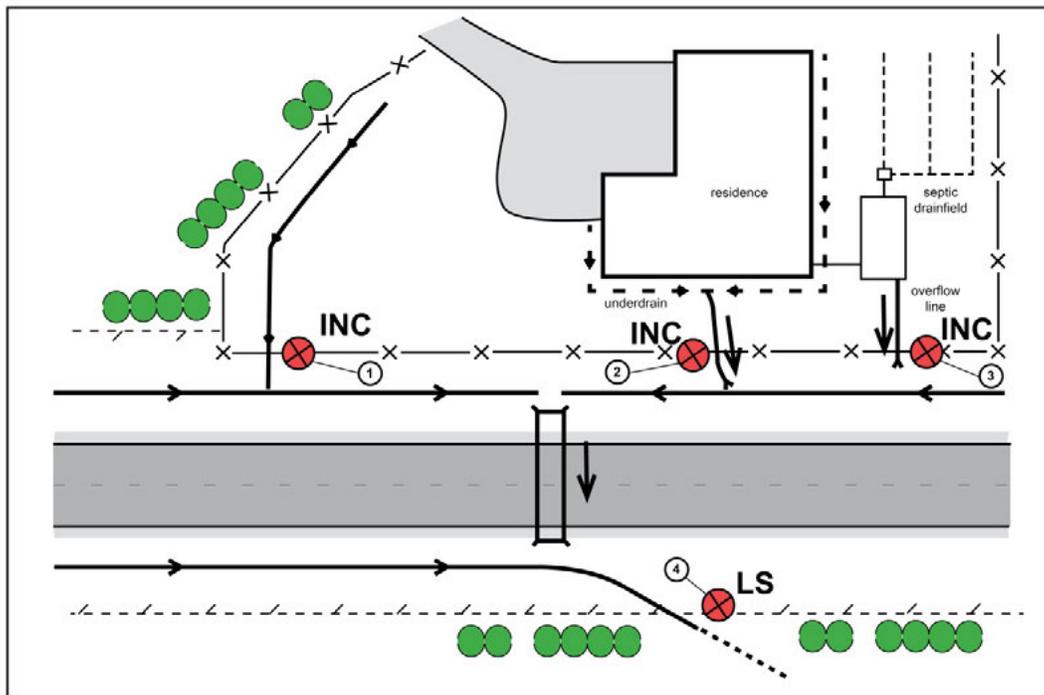


**Scenario:** A local roadway owned or operated by a third party municipality conveys stormwater flow to the WSDOT drainage network.

**Notes:**

1. An incoming (INC) discharge is documented at the right of way boundary where the local roadway ditch transitions to WSDOT responsibility.
2. An incoming (INC) discharge is documented at the right of way boundary where the local roadway drainage network discharges to a land surface condition but the stormwater remains concentrated and enters the WSDOT system. This may be by a direct connection of a constructed and maintained ditch line or may be an eroded channel that conveys flow to the WSDOT ditch.
3. A typical land surface (LS) discharge is documented where the WSDOT system conveys stormwater flow across the right of way boundary and discharges to the surface of the land.

**Figure 14 Incoming discharge: Example 1.**

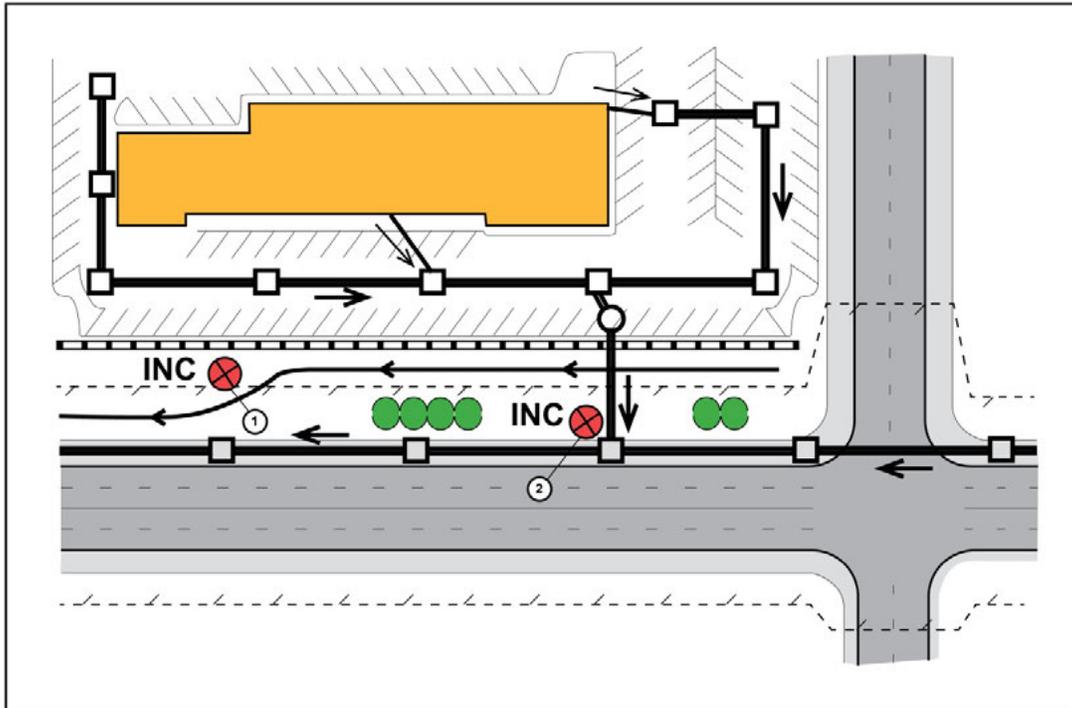


Scenario: A variety of drainage features constructed by a local private party discharge stormwater and other flow to the WSDOT drainage network and to WSDOT property.

Notes:

1. An incoming (INC) discharge is documented at the right of way boundary where a constructed ditch drains a residential or agricultural field or pasture and is physically connected to the WSDOT stormwater system.
2. An incoming (INC) discharge is documented at the exposed end (outlet) of a small diameter pipe that conveys flow from a residential or structural underdrain/footing drain and physically connects to the WSDOT stormwater system.
3. An incoming (INC) discharge point is documented at the exposed pipe outlet of a residential septic system overflow line that drains to WSDOT property.
4. A land surface (LS) discharge is documented where the WSDOT system conveys stormwater flow across the right of way boundary and discharges to the surface of the land.

Figure 15 Incoming discharge: Example 2.



Scenario: A local business drainage network conveys flow to the WSDOT stormwater system.

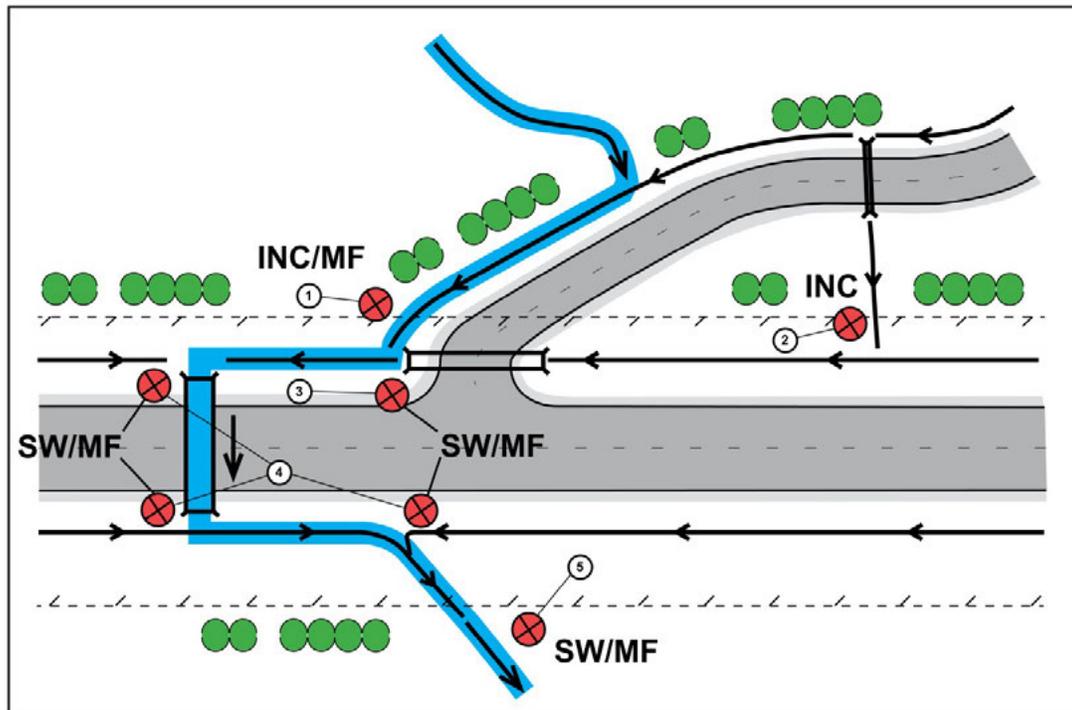
**Notes:**

1. An incoming (INC) discharge is documented at the right of way boundary where a ditch line across the back of a commercial property flows to WSDOT property and transitions to WSDOT ownership or responsibility.
2. An incoming (INC) discharge point is documented at the WSDOT-owned or -operated drainage inlet structure where a pipe from the commercial drainage network physically connects to the WSDOT stormwater system.

**Figure 16 Incoming discharge: Example 3.**

***Mixed Flow Associated with Incoming Discharges***

Streams and other water bodies of the state that have been captured and rerouted by the third-party incoming stormwater system are treated as mixed flow (as discussed in [Section 11-0.2.3](#)). If these waters then discharge from the third-party system to the WSDOT system, flag the incoming discharge type as a mixed flow discharge (see [Figure 17](#) and [Figure 18](#)). These waters are then treated as mixed flow for the duration of their flow through the WSDOT system.

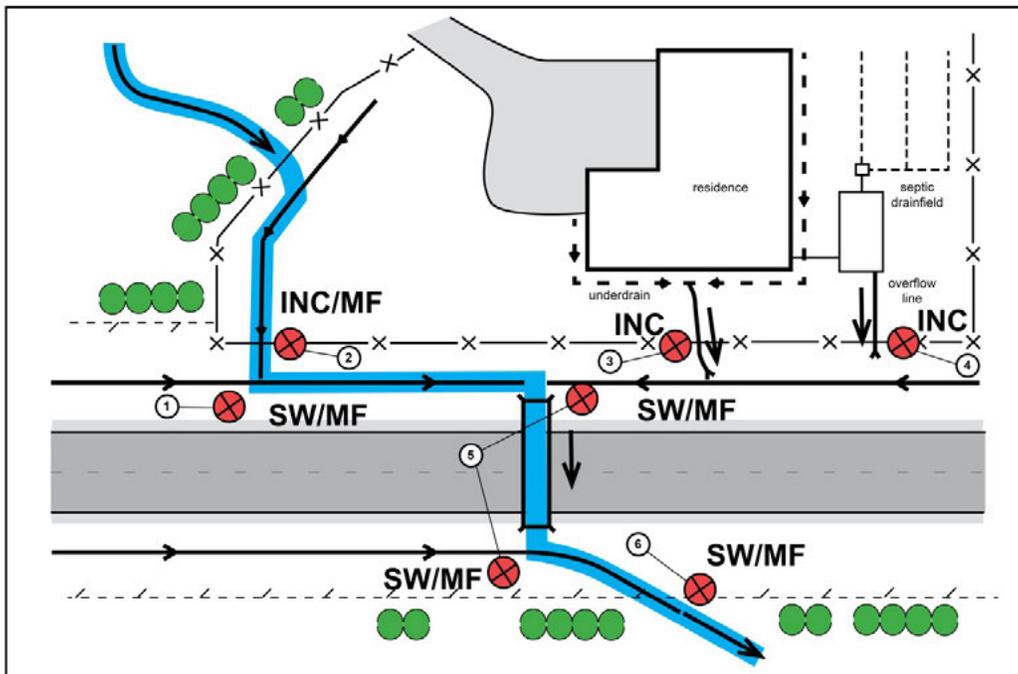


Scenario: This figure depicts a scenario that is similar to Figure 14, but here a stream is captured by the stormwater system of the local roadway. The mixed stream water and third-party stormwater are conveyed to the WSDOT drainage network.

Notes:

1. An incoming with mixed flow (INC/MF) discharge is documented at the right of way boundary where the local roadway ditch transitions to part of the WSDOT-owned or -operated drainage network.
2. An incoming (INC) discharge is documented at the right of way boundary where the local roadway drainage network discharges to a land surface condition but the stormwater remains concentrated and enters the WSDOT system. This may be by a direct connection of a constructed and maintained ditch line or may be an eroded channel that conveys flow to the WSDOT ditch.
3. A surface water with mixed flow (SW/MF) discharge point is documented at the location that stormwater from a WSDOT ditch mixes with a rerouted stream that has entered the WSDOT stormwater system. This is the first point at which WSDOT stormwater mixes with the rerouted stream; however, the stream is already in a mixed flow condition and therefore this is flagged as a mixed flow discharge.
4. Additional surface water with mixed flow (SW/MF) discharge points are documented at the location that the WSDOT ditches discharge stormwater to a rerouted stream that is in a mixed flow condition.
5. A surface water with mixed flow (SW/MF) discharge point is documented at the right of way boundary where the flow of mixed stream water and stormwater ultimately leave the WSDOT system. This is also the location at which the rerouted water body transitions to a receiving water.

Figure 17 Incoming discharge with mixed flow condition: Example 1.



**Scenario:** This figure depicts a scenario that is similar to Figure 15, but here a stream is intercepted by the ditch constructed by a local private party, and it then flows to the WSDOT drainage network.

**Notes:**

1. A surface water with mixed flow (SW/MF) discharge point is documented where stormwater from a WSDOT ditch mixes with a water body of the state that has been captured and rerouted to the WSDOT system. This water is already in a mixed flow condition and is therefore flagged as a mixed flow discharge.
2. An incoming with mixed flow (INC/MF) discharge is documented at the right of way boundary where a privately constructed ditch that contains natural stream flow transitions to WSDOT responsibility.
3. An incoming (INC) discharge is documented at the exposed end (outlet) of a small-diameter pipe that conveys flow from a residential or structural underdrain/footing drain and physically connects to the WSDOT stormwater system.
4. An incoming (INC) discharge point is documented at the exposed pipe outlet of a residential septic system overflow line that drains to WSDOT property.
5. A surface water with mixed flow (SW/MF) discharge point is documented at the location that stormwater from a WSDOT ditch mixes with a rerouted stream in a mixed flow condition.
6. The mixed flow of stormwater and the rerouted stream leave the WSDOT right of way. This is also the location at which the rerouted water body transitions to a receiving water.

**Figure 18 Incoming discharge with mixed flow condition: Example 2.**

### 11-0.6 Subsurface Discharges

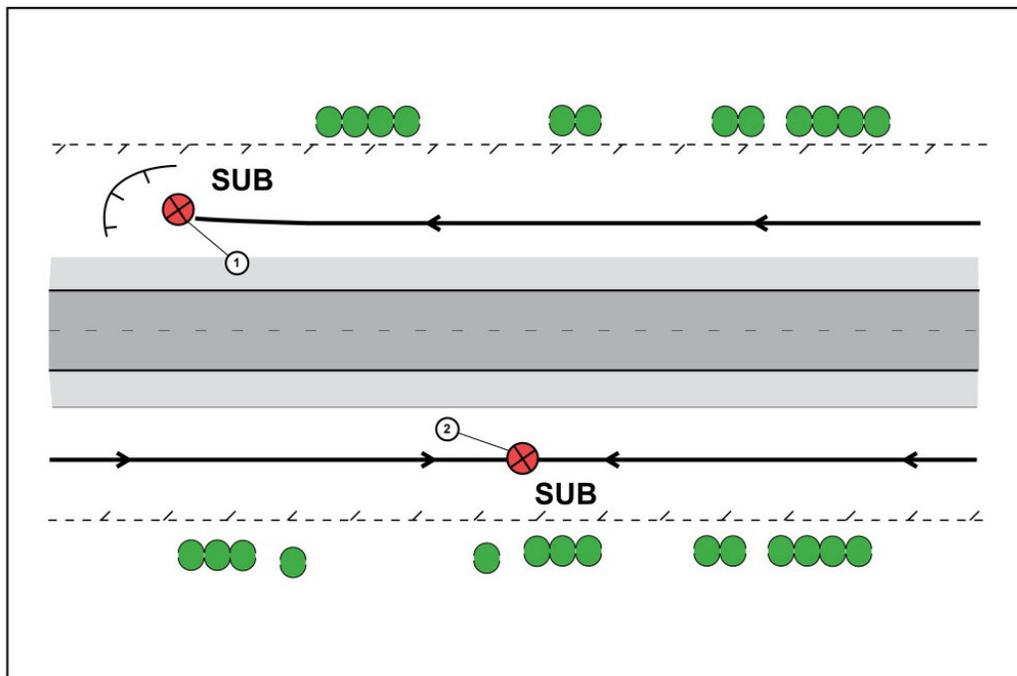
A subsurface discharge is concentrated stormwater flow that is routed through a WSDOT conveyance and terminates within WSDOT property, where the flow is infiltrated to the ground. This can include either untreated infiltration via flow dispersion from the end of the conveyance or designed best management practices (BMPs) constructed to infiltrate water (see Figure 19 and Figure 20).

Subsurface discharges document the location where, upon infiltration, stormwater potentially mixes with “waters of the state” (as defined to include groundwater). The WSDOT NPDES permit defines “groundwater” (i.e., underground water) as meaning “water in a saturated zone or stratum beneath the surface of the land or below a surface water body” (see also WAC 173-218-030).

The nature of underground waters is innately complex. Considerable technical expertise is required to assess the seasonal elevation of the local groundwater table and the ultimate destination of infiltrated stormwater. Therefore, document subsurface discharges to indicate locations of *possible* stormwater infiltration and *potential* mixing of that fluid with underground waters of the state. Obtain more detailed representations of local and regional soils and groundwater conditions from WSDOT hydraulic and geotechnical reports where available.

### Point Location Notes

- Do not use the subsurface discharge point subtype for engineered infiltration BMPs that include broad areas designed for dispersed infiltration, such as infiltration ponds or dispersion areas.
- Document subsurface discharges at the termination point of the stormwater conveyance that is conveying flow to that location.

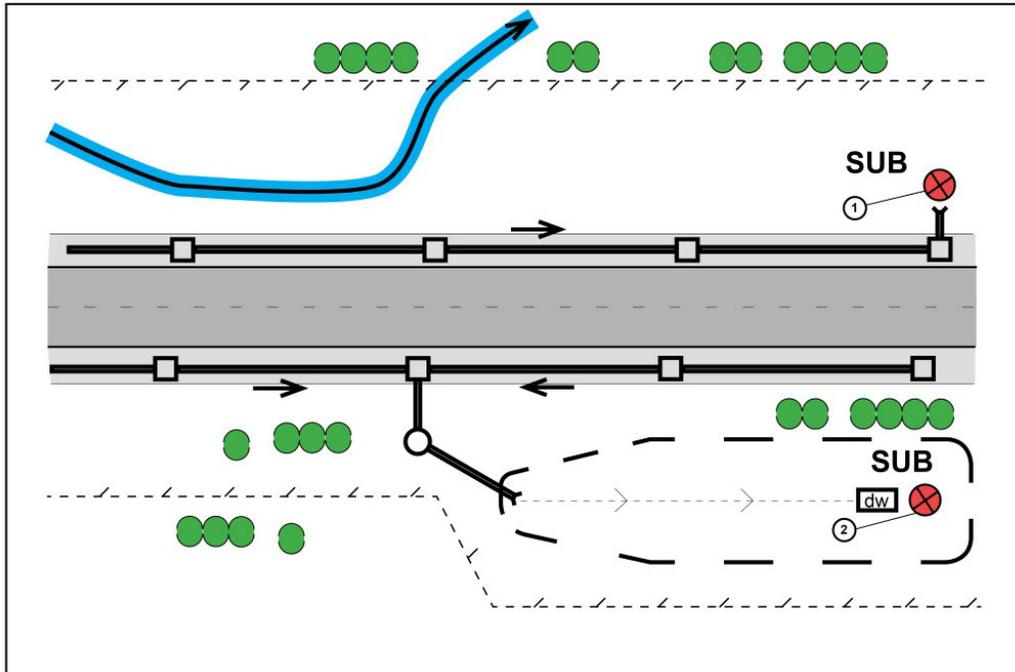


Scenario: Two WSDOT ditch lines convey stormwater to locations within the right of way where the respective conveyance terminates and the flow infiltrates to the ground in excess of 50 feet from any surface waters of the state.

#### Notes:

1. A subsurface (SUB) discharge is documented at the terminus of a WSDOT ditch that flows to a low area within the right of way and that has no apparent outlet.
2. A subsurface (SUB) discharge is documented at the point of convergence of two WSDOT ditches that flow to a low point within the right of way where there is no apparent outlet.

Figure 19 Subsurface discharge: Example 1.



**Scenario: Two WSDOT closed drainage networks convey stormwater flow to points of infiltration that are within the right of way and in excess of 50 feet from a surface water body of the state.**

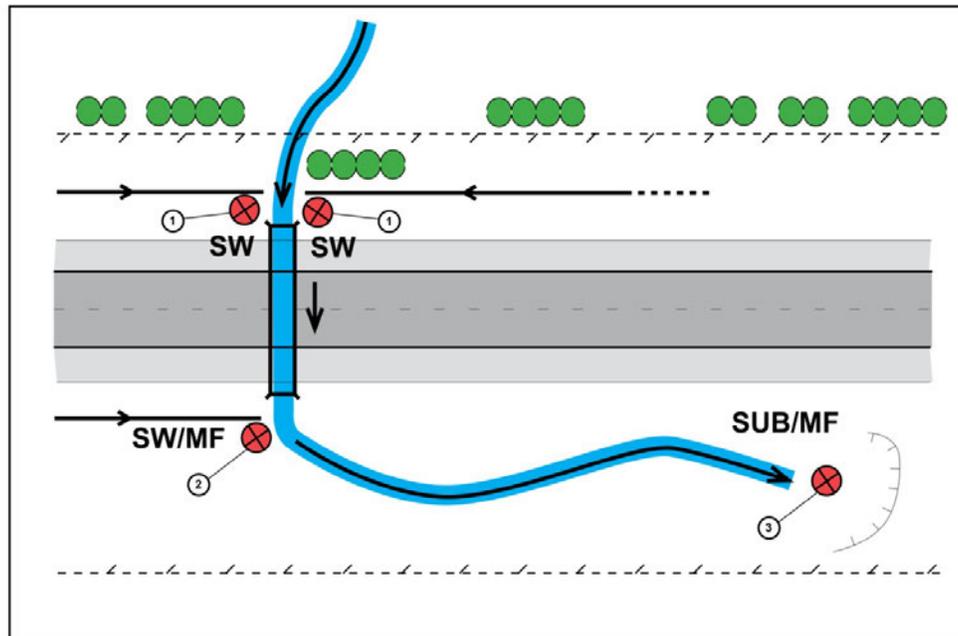
**Notes:**

1. A subsurface (SUB) discharge is documented at the terminus of a network of WSDOT-owned pipe and drainage inlet structures and flows to a slope or flat area where the flow then disperses and infiltrates to the ground within the WSDOT right of way.
2. A subsurface (SUB) discharge is documented at the dry well location at the terminus of a network of WSDOT-owned pipe and drainage inlet structures.

**Figure 20 Subsurface discharge: Example 2.**

**Mixed Flow Associated with Subsurface Discharges**

Streams and other water bodies of the state that have been captured and rerouted by the WSDOT stormwater system are treated as mixed flow (as discussed in [Section 11-0.2.3](#)). If these waters then infiltrate to the ground within the WSDOT right of way, flag the subsurface discharge type as a mixed flow discharge (see [Figure 21](#)).



**Scenario:** A natural stream is captured and rerouted by the WSDOT drainage system and flows to a point at which highly permeable soil conditions allow for complete infiltration of the stream.

**Notes:**

1. Surface water (SW) discharges are documented at the locations at which the WSDOT ditches first discharge stormwater to the natural stream.
2. A surface water with mixed flow (SW/MF) discharge point is documented at the location where a WSDOT ditch discharges stormwater to the rerouted stream that is in a mixed flow condition.
3. A subsurface with mixed flow (SUB/MF) discharge point is documented at the location where the stream completely infiltrates to the ground.

**Figure 21 Subsurface discharge with mixed flow condition: Example 1.**

### 11-0.7 Additional Stormwater Discharge considerations

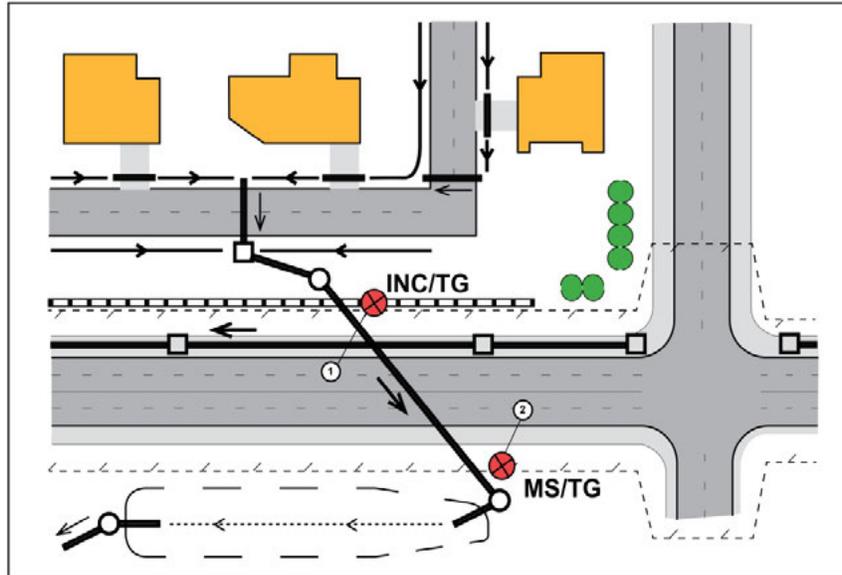
There are two primary stormwater-related considerations in addition to the five main discharge point subtypes described above. These are documentation of through-going systems and significant maintenance concerns. Document these using the incoming, managed system, and surface water discharge types, but record specific notes in the “note” field that indicate the modified use.

#### 11-0.7.1 Through-Going Systems

Whenever possible, document local jurisdictions’ drainage conveyances passing through the right of way or property without surfacing or connecting to the WSDOT system. This scenario is considered a “though-going system” and is documented using a pair of discharge points (see [Figure 22](#) and [Figure 23](#)).

**Point Location Notes**

- Document an incoming (INC) discharge point at the approximate location where the through-going line enters WSDOT right of way.
- Document a managed system (MS) discharge point at the approximate location where the conveyance leaves the right of way.

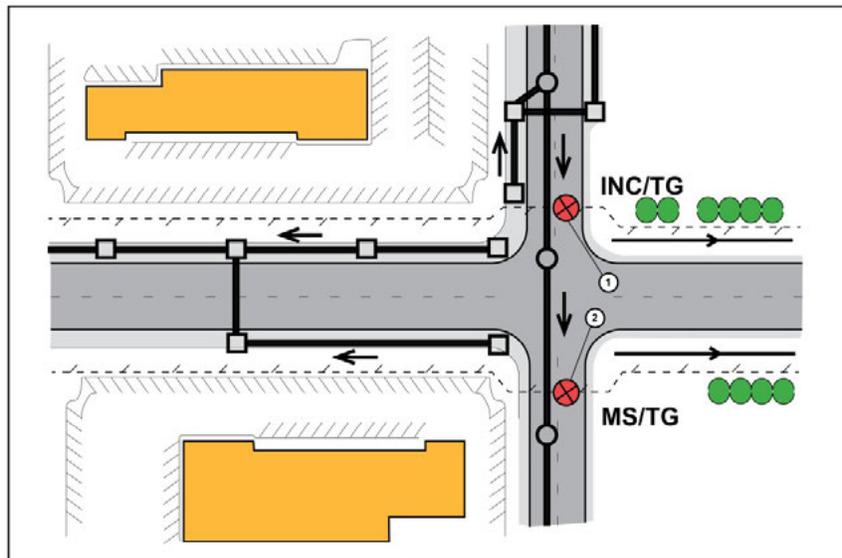


**Scenario:** The stormwater system for a local neighborhood drains to a treatment BMP on the opposite side of the WSDOT highway. The through-going line does not daylight within the WSDOT right of way and does not physically connect to the WSDOT system.

**Notes:**

1. An incoming (INC/TG) discharge point with a through-going note is documented at the approximate location where the through-going system crosses into the WSDOT right of way.
2. A managed system (MS/TG) discharge point with a through-going note is documented at the approximate location where the through-going system leaves the WSDOT right of way.

**Figure 22 Documenting a through-going stormwater system: Example 1.**



**Scenario:** A trunk line for a local stormwater system passes through the WSDOT right of way without physically connecting to the WSDOT system. The structure lids are solid and there is no WSDOT discharge to the line.

**Notes:**

1. An incoming (INC/TG) discharge with a through-going note is documented at the approximate location where the local system trunk line enters the WSDOT right of way.
2. A managed system (MS/TG) discharge with a through-going note is documented at the approximate location where the local system trunk line leaves the WSDOT right of way.

**Figure 23 Documenting a through-going stormwater system: Example 2.**

### **11-0.7.2 Maintenance Concerns**

A maintenance concern is an issues with a feature that can be remedied through maintenance activity. Maintenance-related issues can compromise the design of a conveyance system and facilitate discharge of undesirable pollutants.

Examples of major maintenance concerns include:

- A broken portion of extruded asphalt curb that allows discharge of focused flow.
- Soil berm build-up on the roadside shoulder that focuses sheet flow.
- Drainage inlet structures that are full of sediment or debris causing a bypass of stormwater flow around the system and to a discharge location.

In the case where a major maintenance concern is seen to be creating or allowing a stormwater discharge, document the discharge and flag the point as a “maintenance concern.” The SFI Field Lead or Coordinator should submit major maintenance concerns to the maintenance group for evaluation and remediation.

## **12-0 Records Management**

Data recorded as part of stormwater discharge point documentation can be roughly divided into three categories: digital data recorded using a Trimble® GeoExplorer® 6000 Series GeoXT™ handheld data collector; manually recorded field book notes; and field photographs taken during data collection.

Once you record this data, transfer it to the Stormwater Features Inventory Data Steward (Data Steward) and/or WSDOT servers located at:

(\\wSDOT\resources\Topics\GeoSpatial\StormwaterFeatures\StormwaterInventory\Images), for processing and storage. In addition to the transferred dataset, maintain a backup copy (hard copy or digital copy, where applicable) of all raw and edited dataset versions. Maintain this redundant backup until all information has been properly transferred and loaded to the final destination. It may be deleted by the appropriate personnel upon verification of transfer.

### ***Digital Data***

The WSDOT Stormwater Features Inventory Database’s (SFID’s) technical data administration is conducted by the ESO Environmental Information Program and the GIS and Roadway Data Office. These groups are responsible for maintaining the SFID, managing the geospatial data structure, and processing and storing the geospatial data.

On a weekly basis, upon coordination with the Stormwater Features Inventory field crews, the Environmental Information Program Data Administrator (Data Administrator) should check out a versioned dataset from the SFID for editing on mobile field units. This dataset will be placed on a public access WSDOT server where the field crews can transfer it to the mobile units. Upon completion of field activity, the edited dataset is transferred back onto the public access server and sequestered by the Data Administrator for post-processing and merging into the SFID.

### **Field Books**

Photocopy and scan field books to PDF file format at the end of each day. This provides a hard copy backup that can be filed by the Crew Lead and a digital copy that can be accessed by office personnel. After quality control review, transfer the digital (PDF) version of the field books onto the Stormwater Features Inventory server for permanent storage.

Pay careful attention to detail when photocopying and scanning field book pages. The contrast settings, field book orientation in the copy machine, and page size selection all have an impact on the record quality. The final product should be clear and legible. The borders should not be cropped (e.g., by an “auto formatting” function in the copy machine or by poor document placement).

Once a field book has been filled, file the original copy in a field book “library” for future reference. If a hard copy of field notes is necessary for field reviews, use the photocopy. *Never remove the original copy from the office.*

### **Field Photographs**

Transfer photographs taken of stormwater discharge points to a computer drive at the end of each day. Label the folder they’re transferred to, using the date and state route number on which they were collected. Upon quality assurance review, transfer these photos to the Stormwater Features Inventory server for permanent storage.

## **13-0 Definitions**

*The following definition is from the 2011 WSDOT Highway Runoff Manual (as abridged for use by the Stormwater Features Inventory Group).*

**Best Management Practices (BMPs):** Best management practices or structural devices, that are used singly or in combination to prevent or reduce the detrimental impacts of stormwater, such as pollution of water, degradation of channels, damage to structures, and flooding (WSDOT Highway Runoff Manual [HRM], M 31-16).

*The following definitions are from the 2009 WSDOT NPDES Permit (as abridged for use by the Stormwater Features Inventory Group).*

**Discharge:** For the purpose of this permit, unless indicated otherwise, refers to discharges from municipal separate storm sewers. (See also [40 CFR 122.2.](#))

**General permit:** A permit that covers multiple dischargers of a point source category within a designated geographical area, in lieu of individual permits being issued to each discharger.

**Groundwater:** Water in a saturated zone or stratum beneath the surface of the land or below a surface water body.

**Illicit connection:** Any constructed conveyance that is connected to a municipal separate storm sewer without a permit, excluding roof drains and other similar type connections. Examples

include sanitary sewer connections, floor drains, channels, pipelines, conduits, inlets, or outlets that are connected directly to the municipal separate storm sewer system.

**Illicit discharge:** Any discharge to a municipal separate storm sewer that is not composed entirely of stormwater, except discharges pursuant to an NPDES permit (other than the NPDES permit for discharges from the municipal separate storm sewer) and discharges resulting from fire-fighting activities.

**Large municipal separate storm sewer system (Large MS4):** All municipal separate storm sewers located in an incorporated place with a population of 250,000 or more; a county with unincorporated urbanized areas with a population of 250,000 or more according to the 1990 decennial census by the Bureau of Census. (See also [40 CFR 122.26\(b\)\(4\)](#).)

**Municipal separate storm sewer (MS3):** A conveyance, or system of conveyances (including roads with drainage systems, municipal streets, catch basins, curbs, gutters, ditches, man-made channels, or storm drains):

- (a) owned or operated by a state, city, town, borough, county, parish, district, association, or other public body (created by or pursuant to State Law) having jurisdiction over disposal of wastes, storm water, or other wastes, including special districts under State Law such as a sewer district, flood control district or drainage district, or similar entity, or an Indian tribe or an authorized Indian tribal organization, or a designated and approved management agency under section 208 of the CWA that discharges to waters of the United States;
- (b) designed or used for collecting or conveying stormwater;
- (c) which is not a combined sewer; and
- (d) which is not part of a Publicly Owned Treatment Works (POTW) as defined at [40 CFR 122.2](#).

**Municipal separate storm sewer system (MS4):** All separate storm sewers that are defined as “large” or “medium” or “small” municipal separate storm sewer systems. (See also [40 CFR 122.26\(b\)\(8\)](#), which is included below.)

**40 CFR 122.26(b)(4),(7),(8)**

(4) *Large municipal separate storm sewer system* means all municipal separate storm sewers that are...

(i) Located in an incorporated place with a population of 250,000 or more as determined by the latest Decennial Census by the Bureau of Census...

(7) *Medium municipal separate storm sewer system* means all municipal separate storm sewers that are...

(i) Located in an incorporated place with a population of 100,000 or more but less than 250,000, as determined by the latest Decennial Census by the Bureau of Census...

(8) *Municipal separate storm sewer* means conveyance or system of conveyances (including roads with drainage systems, municipal streets, catch basins, curbs, gutters, ditches, man-made channels, or storm drains):

- (i) Owned or operated by a State, city, town, borough, county, parish, district, association, or other public body (created by or pursuant to State law) having jurisdiction over disposal of sewage, industrial wastes, storm water, or other wastes, including special districts under State law such as a sewer district, flood control district or drainage district, or similar entity, or an Indian tribe or an authorized Indian tribal organization, or a designated and approved management agency under section 208 of the CWA that discharges to waters of the United States;
- (ii) Designed or used for collecting or conveying storm water;
- (iii) Which is not a combined sewer; and
- (iv) Which is not part of a Publicly Owned Treatment Works (POTW) as defined at [40 CFR 122.2](#).

**National Pollutant Discharge Elimination System (NPDES):** The national program for issuing, modifying, revoking, and reissuing, terminating, monitoring, and enforcing permits, and imposing and enforcing pretreatment requirements, under sections 307, 402, 318, and 405 of the federal Clean Water Act, for the discharge of pollutants to surface waters of the state from point sources. These permits are referred to as NPDES permits and, in Washington State, are administered by the Washington Department of Ecology.

**Outfall:** Point source as defined by [40 CFR 122.2](#) at the point where “a municipal separate storm sewer discharges to waters of the State and does not include open conveyances connecting two municipal separate storm sewers, or pipes, tunnels, or other conveyances which connect segments of the same stream or other waters of the State and are used to convey waters of the State.”

**Physically interconnected:** One municipal separate storm sewer is connected to a second municipal separate storm sewer in such a way that it allows for direct discharges to the second system. For example, the roads with drainage systems and municipal streets of one entity are physically connected directly to a municipal separate storm sewer belonging to another entity.

**Runoff:** Water that travels across the land surface, or laterally through the soil near the land surface, and discharges to water bodies either directly or through a collection and conveyance system. Runoff includes stormwater and water from other sources that travels across the land surface. (See also [stormwater](#).)

**Shared water bodies:** Water bodies, including downstream segments, lakes, and estuaries that receive discharges from more than one permittee.

**Stormwater:** Runoff during and following precipitation and snowmelt events, including surface runoff, drainage, and interflow (NPDES Permit); also, “that portion of precipitation that does not naturally percolate into the ground or evaporate, but flows via overland flow, interflow, pipes, and other features of a storm water drainage system into a defined surface water body, or a constructed infiltration facility” ([WAC 173-201A-020](#)).

**Total Maximum Daily Load (TMDL):** A water cleanup plan. A TMDL is a calculation of the maximum amount of a pollutant that a water body can receive and still meet water quality standards, and an allocation of that amount to the pollutant’s sources. A TMDL is the sum of the allowable loads of a single pollutant from all contributing point and nonpoint sources. The calculation must include a margin of safety to ensure the water body can be used for the purposes the state has designated. The calculation must also account for reasonable variation in water quality. Water quality standards are set by states, territories, and tribes. They identify the uses for each water body; for example, drinking water supply, contact recreation (swimming), and aquatic life support (fishing), and the scientific criteria to support that use. The Clean Water Act, section 303, establishes the water quality standards and TMDL programs.

**Waters of the state:** Includes those waters defined as "waters of the United States" in [40 CFR 122.2](#) within the geographic boundaries of Washington State and "waters of the state" as defined in [Chapter 90.48 RCW](#), which includes lakes, rivers, ponds, streams, inland waters, underground waters (see [RCW 90.44.035](#)), salt waters, and all other surface waters and water courses within the jurisdiction of the state of Washington.

## 14-0 References

[40 CFR 122.2](#)

[40 CFR 122.26\(b\)\(4\)](#)

[40 CFR 122.26\(b\)\(8\)](#)

[40 CFR 122.26\(e\)\(9\)](#)

[Chapter 90.48 RCW](#)

[RCW 90.44.035](#)

[WAC 173-201A-020](#)

[WAC 173-218-030](#)

[WAC 468-30-020](#)

Ecology. 2009. *Washington State Department of Transportation Municipal Stormwater Permit, National Pollution Discharge Elimination System and State Waste Discharge Permit for Large and Medium Municipal Separate Storm Sewer Systems*. Washington State Department of Ecology. Olympia, Washington. Permit No. WAR043000A. Issuance Date February 4, 2009.

FHWA. 2009. *Manual on Uniform Traffic Control Devices for Streets and Highways*. Federal Highway Administration. December 2009 edition. Last updated May, 2012.

WSDOT. 2012. *Plans Preparation Manual*. Washington State Department of Transportation, Design Office, Engineering and Regional Operations Division. Publication number M 22-31. September, 2012.

WSDOT. 2012. *Safety Procedures and Guidelines Manual*. Washington State Department of Transportation, Safety and Health Services Office, Human Resources Division. Publication number M 75-01. August, 2012.

WSDOT. 2012. *Work Zone Traffic Control Guidelines*. Washington State Department of Transportation, Traffic Operations Division. Publication number M 54-44. February, 2012.

WSDOT. 2012a. *Stormwater Features Inventory Database: Feature and Attribute Definitions*. Washington State Department of Transportation, Environmental Services Office, Stormwater and Watersheds Program. December, 2012.

WSDOT. 2012b. *Stormwater Features Inventory Database: Standard Operating Procedures for Office Data Collection*. Washington State Department of Transportation, Environmental Services Office, Stormwater and Watersheds Program. October, 2012.

WSDOT. 2013. *Standard Operating Procedure For Potential Pollutant Source Identification In Total Maximum Daily Load Areas*. Washington State Department of Transportation, Environmental Services Office, Stormwater and Watersheds Program. March, 2013.

WSDOT. 2013. *Stormwater Features Inventory: Standard Operating Procedures for Field Safety*. Washington State Department of Transportation, Environmental Services Office, Stormwater and Watersheds Program. April, 2013.