

# **City of Salem's Dry Weather MS4 Field Screening Plan**

**National Pollutant Discharge Elimination System (NPDES) Municipal  
Separate Storm Sewer System (MS4)**

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## **1.0 Introduction**

This plan, which fulfills requirements identified in Schedule A.3.c.v of the City of Salem's National Pollutant Discharge Elimination System (NPDES) Municipal Separate Storm Sewer System (MS4) Permit, describes the Dry Weather MS4 Field Screening Program. This plan supports the City's Illicit Discharge Detection and Elimination (IDDE) Program. Activities discussed in this plan meet the current (Effective: October 1, 2021) NPDES MS4 permit requirements and will be implemented for the remainder of the current permit cycle.

## **2.0 Objective**

The objective of the Dry Weather MS4 Field Screening Program is to identify illicit discharges from a variety of potential sources. This is done through visual inspections and water chemistry screening of MS4 discharges. If an illicit discharge is identified, the work of tracking and eliminating the discharge is initiated.

## **3.0 Adaptive Management**

The City has been conducting dry weather MS4 screening as part of its IDDE Program since it received its first NPDES MS4 Permit in 1997. The data this program has produced has identified illicit discharges, drinking water leaks, and MS4 pipe catchments that convey groundwater to receiving streams throughout the year. These data have been imported into a geodatabase for historical record and spatial analysis purposes. Having the data in this format allows for quick and efficient responses when an illicit discharge is suspected, and helps staff adaptively manage the program on an ongoing basis.

### **3.1. Changes to this Plan During the Permit Term**

As this plan is implemented, it may be necessary to make modifications to improve the effectiveness of the program. Modifications may include but are not limited to: 1) the addition of priority outfall sites based on notifications of potential illicit discharges, variations in in-stream data, personnel safety, or other factors identified by City staff, 2) unusual weather conditions that inhibit dry weather (minimum 72-hour antecedent dry period) inspections, and 3) changes to pollutant parameter action levels. Significant modifications to this plan, made during the permit cycle, will be submitted to the DEQ as part of the annual reporting process.

## **4.0 Task Organization**

### **4.1. Stormwater Quality Monitoring Group**

Stormwater Quality monitoring staff are responsible for performing all dry weather screening at MS4 priority sites on an annual basis. This includes but is not limited to calibration of field instrumentation, visiting each MS4 priority site during the dry weather period, performing visual observations, collecting field measurements when flow is present, delivering samples to Willow Lake Laboratory for additional analysis, and updating the dry weather MS4 screening geodatabase. In addition, when an illicit discharge is found or suspected, the Stormwater Quality Monitoring Group notifies Environmental Services via Public Works Dispatch center, and often aids Environmental Services with tracking activities.

## **4.2. Annual Stream Crew Interns**

Stormwater Services employs a crew of seasonal interns to walk Salem's streams during the summer months. Primary duties include removing trash and debris for flow conveyance, documenting infrastructure damage, reporting illegal taking from waters of the state, and identifying and reporting illicit discharges. They are trained to stop at each outfall they come across and look for scaling and staining, floatable waste, recording various odors, etc. They also test the water of all flowing outfalls for the presence of chlorine using chlorine test strips. All data collected by the Stream Crew Interns is imported into the dry weather screening geodatabase. Whenever the crew suspects an illicit discharge, they notify Environmental Services via Public Works Dispatch center.

## **4.3. Environmental Services**

The City's Environmental Services workgroup leads the tracking, response, and enforcement actions associated with illicit discharges. Environmental Services staff respond to notifications from Stormwater Quality monitoring staff, annual Stream Crew Interns, all other internal staff, and residents reporting suspected illicit discharges. If the source of the suspected flow cannot be identified in the field, the Environmental Services workgroup will work with Public Works Operations supervisors to create work orders for storm line camera inspections, cleaning of the MS4 system, dye testing of the sanitary sewer system, collection of samples for laboratory analysis, and other source tracking activities.

The Environmental Services workgroup procedures for responding, reporting to OERS, notifying other authorities, and response/complaint tracking complies with the permit language found under Schedule A.3.c.iv of the current MS4 permit.

## **5.0 Information Sharing**

All information sharing of findings that come through the implementation of this plan are routed through the Public Works Dispatch Center. For example, if Stormwater Quality Monitoring staff find the presence of fluoride and no other indicators of pollutants exist (this scenario indicates water source may be treated drinking water), staff will notify the Public Works Dispatch Center and they will create a Service Request (SR) for the leak detection team. The standard practice of routing a SR through the Dispatch Center ensures that a record of activity is codified, and the appropriate response staff are issued the SR. The SR always includes the name and contact information of the caller that generated the SR, description of the issue, location, infrastructure asset number (if applicable), time/date of the call, and any other relevant information.

If it is determined that an illicit discharge has originated outside of the City's jurisdiction, that jurisdiction will be contacted as soon as possible, and all relevant data will be shared.

## **6.0 Priority MS4 Dry Weather Screening Sites**

Priority MS4 dry weather screening sites are sites that have been identified for annual visits during the dry weather season (July - September) and after an antecedent dry period of at least 72 hours. If flow is present at a priority site, all the parameters listed in Table 2 of this document will be collected at the site and the associated exceedance action levels will initiate additional efforts to determine the source of the water. All screening activities at priority MS4 dry weather

sites will be completed by the Stormwater Quality Monitoring Group. Table 1 lists all the identified priority MS4 dry weather screening sites that will be visited annually during the remainder of this permit cycle.

### **6.1. 2012 Prioritization Process**

In 2012, thirty-five MS4 locations were identified as priority sites and screened annually during the dry season during the last permit cycle. All screening activities followed the 2012 DEQ approved iteration of this plan. The prioritization process for selecting priority sites for the 2012 plan is detailed in the bulleted list below.

- **Drainage Area:** To ensure a large drainage area, storm lines discharging directly to a receiving stream of greater than or equal to 30 inches in diameter were identified, resulting in a total of 139 storm lines.
- **Land use type(s):** Greater than or equal to 30-inch diameter storm lines that drained a portion of industrial land use were given higher priority.
- **Accessibility:** Site location accessibility was reviewed from previous dry weather inspections. Areas where accessibility proved to be an issue were managed by identifying the first upstream manhole as the priority site.
- **Storm System Age:** Storm system age was determined using storm line as-builts and the relative age of buildings in the catchment area, with older storm lines being prioritized over more recent storm lines.
- **Sanitary Sewer Condition:** Storm sub-basin catchments with known sanitary sewer infiltration concerns were prioritized over catchments with relatively little infiltration concerns.
- **Historical Notifications of Suspected Illicit Discharges:** Discussion with Environmental Services Staff identified several outfalls based on historical complaints that were added to the prioritized outfall/manhole list regardless of any of the above considerations.

### **6.2. 2023 Prioritization Process**

#### **6.2.1. Data Review of 2012 Identified Priority Sites**

Staff performed a review of all screening data that was collected at 2012 priority sites. The date range for these data were from 2012 to 2023. This review helped to determine which sites should be omitted from future screening activities and which would remain. Staff analyzed the data for consistencies in flow, water chemistry, and visual observations. Of the 35 - 2012 priority sites, 12 of the sites showed inconsistencies in the data and will remain priority sites. The data for remainder of the sites were static, with several of them never having dry weather flows and others conveying ground water flows.

#### **6.2.2. Analysis of Stream Crew Data and Historical Complaints**

Staff reexamined historical complaints of suspected illicit discharges and data collected by the annual Stream Crew Interns. This analysis resulted in 5 additional sites being added as priority sites.

### 6.2.3. Analysis of MS4 Receiving Stream Water Quality Data

Staff analyzed receiving stream water quality data during the dry weather season (July-September) from the 10 continuous water quality monitoring station the City operates. The analysis looked for abnormalities in the data that may indicate the presence of illicit discharges throughout the drainage. The data showed that two of the sites, both located on Clark Creek, had a history of random abnormalities in the data. A follow up spatial analysis of the Clark Creek catchment found that there are 54 different locations where the MS4 system discharges to Clark Creek. Of the 54 locations, only 18 are outfalls that discharge to a non-piped portion of Clark Creek. Given the results of this analysis, it was decided that 18 of the larger MS4 discharge locations that enter a piped section of Clark Creek will be identified as priority MS4 dry weather screening sites. These sites, combined with the other 17 priority sites, comes to a total of 35 priority dry weather MS4 sites per year. This is the same number of priority sites that were visited annually during the last permit term.

Table 1: Priority Dry Weather Screening Sites

Historical Priority Dry Weather Screening Sites			
<u>Unit ID:</u>	<u>Unit Description</u>	<u>Basin</u>	<u>Structure Type</u>
16611	D36472203	West Bank	Outfall
26647	D39460252	Clark	Outfall
28788	D42456526	Pringle	Catchbasin
19952	D42468244	Clark	Outfall
7457	D42480215	East Bank	Outfall
5030	D42482212	East Bank	Outfall
6002	D42482223	East Bank	Outfall
5047	D42482230	East Bank	Outfall
12769	D45476217	Mill	Outfall
19081	D51468201	Mill	Manhole
2863	D51486203	Claggett	Manhole
2417	D54486217	Claggett	Outfall
New Priority Dry Weather Screening Sites			
27909	D48458201	Pringle	Outfall
73324	NA	Claggett	Manhole
24624	D33462214	Croisan	Outfall
26525	D39460209	Clark	Outfall
26463	D36460217	Clark	Manhole
New Priority Dry Weather Screening Sites that Discharge to Piped Sections of Clark Creek			
19362	D42468226	Clark	Manhole
19471	D42468560	Clark	Catchbasin
19722	D42468624	Clark	Manhole
19344	D42468204	Clark	Manhole
19521	D42468211	Clark	Manhole
19748	D42468539	Clark	Catchbasin
20472	D42466233	Clark	cleanout
20506	D42466218	Clark	cleanout
20641	D42466227	Clark	Manhole
20644	D42466263	Clark	cleanout
22327	D45464534	Clark	Catchbasin
22890	D42464208	Clark	Manhole
22893	D42464292	Clark	Manhole
24703	D39462212	Clark	Manhole (lines from N. & S.)
24760	D39462241	Clark	Manhole
24914	D39462226	Clark	Manhole
25237	D39460531	Clark	Catchbasin
25249	D39460225	Clark	Manhole

## **7.0 Dry Weather MS4 Site Field Screening**

Dry weather field screening of priority sites will occur after an antecedent dry period of at least 72 hours. The screening activities will be completed each calendar year during the dry season, more specifically July-September.

ArcGIS Online, a Survey123 outfall inspections form, ArcGIS Field Maps, and mobile devices (i.e., phones or tablets) are used to collect and record priority site inspection general observations and field screening measurements.

### **7.1. General Observations**

These observations are recorded whether flow is present or not present. The general observations that are recorded include:

- Color
- Odor
- Floatable (toilet paper, food waste, etc.)
- Oils / Sheens / Suds
- Deposits / Staining
- Overall receiving pool quality

If any of the first four bullets above are actively occurring during the visit, staff will immediately report the findings to the Public Works Dispatch Communications Center. The Dispatch Center will create a SR for the City's Environmental Services staff to respond and perform tracking activities.

If either of the last two bullets above are observed, there is the possibility that an intermittent illicit discharge exists at the site. In which case, a chalk dam will be placed in the pipe and revisited. If a pool of water exists upon return to the site, all field screening measurements listed below will be analyzed and treated accordingly.

### **7.2. Field Screening Measurements**

When flow is present at a priority dry weather MS4 screening site the following field screening measurements and/or analysis will be performed:

- Temperature
- pH
- Turbidity
- Specific Conductivity
- Total Chlorine
- Fluoride

If fluoride exceeds the action level of 0.3 mg/L then the following is performed in the field:

- Ammonia
- Detergents/Surfactants



Each of the above parameters have associated action levels that when exceeded require additional follow up activities. Table 2 below provides the action level and rationale.

If fluoride is above the 0.3 mg/L action level, field analysis for ammonia and detergents/surfactants will also be conducted.

If any exceedances of field screening pollutant parameter action levels are found and/or field observations indicate the potential of an illicit discharge, the Public Works Dispatch Communications Center will be contacted, and a SR will be created for the City’s Environmental Services staff to respond and perform tracking activities.

If fluoride is absent and there are no other indicators pointing to a potential illicit discharge, the site will be noted as conveying a natural water source. All sites noted as conveying a natural water source will continue to be screened in subsequent years.

Table 2: Field Screening Action Levels and Rationale

<b>Parameter</b>	<b>Reporting Limit</b>	<b>Action Level</b>	<b>Rationale for Action Level</b>
Flow	NA	Presence of flow	Presence of flow from unknown source may indicate illicit discharge. Source could be groundwater, leaking potable water, or illicit discharge.
Temperature	NA	> 20° C	Temperature above 20 degrees centigrade signifies wastewater or industrial process water.
pH	NA	<6.0, > 8.5	pH values falling outside the <6.0, > 8.5 range indicate something other than groundwater or potable water.
Turbidity	0.1 NTU	> 15 NTU	Turbidity values > 15 NTU indicate something other than a natural source.
Specific Conductivity	1 µS/cm	> 250 µS/cm	Historical dry weather outfall inspections data show a specific conductivity ranging 30-200 µS/cm. A Specific conductivity > 250 µS/cm indicates something other than a natural source thus necessitating the need for increased analysis and will prompt a catchment reconnaissance.
Chlorine	range 0.0 to 10 mg/L	> 0.5 mg/L	Presence of chlorine >0.5 mg/L indicates a significant presence of a city drinking water which could be wastewater. Additionally, chlorine serves as an indicator for discharges from pools or hot tubs.
Fluoride	0.3 mg/L	> 0.3 mg/L	Presence of fluoride >0.3 mg/L indicates a significant presence of city drinking water which could be sewage, or other type of wastewater.
Ammonia	0.05 mg/L	> 0.5 mg/L	Ammonia levels in city wastewater range 10-20 mg/L, closer to 20 mg/L during the dry season. An action level at 0.5 allows for detection even with significant dilution.
Detergents/ Surfactants	0.25 mg/L	0.25 mg/L	The City is limited on background data for detergents. However, tap water, groundwater, and irrigation is expected to be void of detergents. An action level of 0.25 will serve as an indicator of wastewater.

### 7.3. Laboratory Analysis

Laboratory analysis will be performed on water samples when field screening general observations and/or measurements indicate the potential of an illicit discharge, and the source was not identified.

Laboratory analysis action levels are used as additional confirmation of a suspected illicit discharge as well as to help identify the potential source, e.g., industrial/commercial wastewater sanitary cross connection, wash water, or a natural water source. Laboratory analysis will include testing for E. coli bacteria, sodium, and potassium.

Laboratory analysis parameter action levels are included in Table 3. Analytical results that exceed action levels will prompt a pipe-shed investigation and additional tracking methods. Additional analysis may be necessary when the source is difficult to find (e.g., metals, bacteria genetic markers, industry-specific pollutants).

Table 3: Laboratory Pollutant Parameter Action Levels

Parameter	Reporting Limit	Action Level	Hold Time	Rationale for Action Level
E. coli	1 MPN/100 ml	> 800 MPN/100 mls	6 hours	A value greater than 800 MPN/100 mls indicates a significant source of bacteria that is worth investigating.
Potassium	0.5 mg/L	> 5 mg/L	6 months	Stormwater and in-stream sampling data history show potassium levels ranging 0.5-2.5 mg/L. Wastewater and industrial levels range 5-150 mg/L. Action level at 5 mg/L allows for slight variance above normal but is low enough to detect a possible illicit discharge. (Potassium helps to determine potential industrial or commercial liquid wastes.)
Sodium	0.25 mg/L	> 15 mg/L	6 months	Stormwater and in-stream sampling data history show sodium levels ranging 1.5-4.0 mg/L. Wastewater and industrial levels range 20-6000 mg/L. Action level at 15 mg/L allows for slight variance above normal but is low enough to detect possible illicit discharge. ( <i>Sodium helps to further identify a potential industrial or commercial liquid waste discharge</i> )

### 8.0 Documentation and Reporting

The results of all priority MS4 dry weather screening activities are saved in a geodatabase. At the conclusion of each dry weather outfall inspection season, a report of findings will be produced. These findings will be summarized in the MS4 Annual Report, along with additional IDDE Program information and reporting.