# Illicit Discharge Detection and Elimination (IDDE) Program Manual

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Contributes to this……

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Which can lead to these types of outcomes…..


# Illicit Discharge Detection and Elimination (IDDE) Program Manual

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# Section 1 – Introduction

## 1.1 Background

The City of Camas has made a strong commitment to protect and manage Camas's natural resources. Within the Public Works Department's Water Resources Program, the Surface and Stormwater Management (SSWM) program seeks to minimize the negative effects of development and pollution, while maximizing environmental protection and conservation. Protecting and preserving the quality of the City's surface water is a key focus area of the SSWM program.

In the State of Washington, EPA has delegated the NPDES program administration to the Department of Ecology. Ecology issued a Phase II Municipal Stormwater Permit to the City of Camas in January 2007. The Phase II Permit requires the City to have a stormwater management program (SWMP) with five major conditions. One of those conditions requires that "The SWMP shall include an ongoing program to detect and remove illicit connections, discharges as defined in 40 CFR 122.26(b)(2), and improper disposal, including any spills…, into the municipal separate storm sewers owned or operated by the Permittee." (Permit Condition S5.C.3) The City must have a fully implemented illicit discharge detection and elimination (IDDE) program in place by August 2011. Therefore, the overreaching program goal is to prevent, locate, and correct illicit discharges.

The City's IDDE program is managed by the Public Works Department in conjunction with Community Development. Maintenance staff and construction site inspectors also play an important role identifying illicit discharge problems and responding to clean-up requests. However, all Public Works (Engineering and Operations and Maintenance), Community Development, Fire and Police staff will play a role in locating, identifying and reporting potential illicit discharges.

## 1.2 Summary of the IDDE Program

The Phase II Permit requires the permittees to develop an IDDE program encompassing the elements listed below. Each element is addressed in the sections of this IDDE Program Manual as noted below.

- Develop a municipal storm sewer system map (Section 2);
- Adopt an ordinance to prohibit non-stormwater, illegal discharges, and/or dumping into the storm sewer system (Section 3);
- Implement an on-going program to detect and address non-stormwater discharges, spills, illicit connections, and illegal dumping (Section 4, 5, 6);
- Educate employees, businesses, and the general public about illicit discharge concerns (Section 7);
- Adopt and implement procedures for program evaluation and assessment (Section 8);
- Maintain records of all IDDE program activities (Section 8); and
- Provide IDDE training for municipal staff. (Section 9)

- Acknowledgement of resources used to create the program manual. (Section 10)

This manual is intended to assist City staff in implementing the IDDE program. It is to be used as a guidance document for staff in their day-to-day activities related to IDDE. This document can also be used as a training tool to ensure that all staff is following the same procedures in responding to illicit discharge concerns.

# Section 2 – Storm Sewer System Map

## 2.1 Overview

The first major component of the City's illicit discharge program is the mapping of the municipal stormwater drainage system. Maintaining an accurate map of the stormwater drainage system will make it easier for the City to track and locate the source of suspected illicit discharges. The NPDES Phase II Permit outlines minimum information that should be included in the City's municipal storm sewer system map:

- Location of all known municipal storm sewer outfalls, receiving waters, and structural BMPs owned, operated, or maintained by the City,
- Tributary conveyances (type, material, size) leading to outfalls that are 24-inches or larger (or have an equivalent cross-sectional area),
- Drainage areas and land use for the drainage basins contributing to outfalls that are 24-inches or larger (or have an equivalent cross-sectional area),
- Locations of new connections to the City's stormwater drainage system, and
- Drainage areas within the City that do not discharge to surface water (aka closed depressions).

The Department of Ecology requires the map be prepared in GIS format and the map must be made available to Ecology upon request.

The City's mapping efforts are primarily focused on mapping the locations of outfalls and the drainage system infrastructure (pipes, ditches, catch basins, manholes, and stormwater facilities). The City of Camas continues to develop a comprehensive map of the City's stormwater infrastructure.

## 2.2 Mapping Procedures

The City in conjunction with Clark County GIS developed a base map utilizing as-built construction drawings of the storm system and provided a method to store field reports to specific locations. Currently the City is in the process of completing a quality assurance check along with updating the map with new developments. After the office QA is complete, staff will begin a field verification process to verify accuracy and document any missing storm infrastructure. Field crews will take sections of the map and beginning at a downstream outfall will trace the tributary drainage system upstream.

The City will work with Clark County GIS in developing workflow processes to ensure that new development is accurately mapped as systems come on line.

# Section 3 – IDDE Ordinance

## 3.1 What is an Illicit Discharge?

An illicit discharge is "Any discharge to a municipal separate storm sewer that is not composed entirely of stormwater except discharges pursuant to a NPDES permit (other than the NPDES permit for discharges from the municipal separate storm sewer) and discharges resulting from fire fighting activities", except as permitted or exempted in CMC 14.04.070. Examples of illicit discharges include:

- A measurable flow during dry weather that contains pollutants or pathogens,
- Disposal of vehicle maintenance fluids into a storm drain;
- Hosing or washing loading areas in the vicinity of storm drain inlets;
- Leaking dumpsters flowing into a storm drain inlet; and
- Old and damaged sanitary sewer line leaking fluids into a cracked or damaged storm sewer line.

## 3.2 What is an Illicit Connection?

An illicit connection is "Any manmade 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 CMC 14.04.050.

## 3.3 City of Camas IDDE Ordinance

On August 17, 2009, the City adopted Ordinance 2556 which added a new chapter (14.04) to the Camas Municipal Code to address IDDE. The prohibited discharges portion of CMC (14.04.060) is included below. A copy of the full ordinance and code chapter, including definitions and a listing of discharges specifically or conditionally allowed under the CMC, is included in Appendix A.

**14.04.060 Prohibited discharges.**

No person shall throw, drain, or otherwise discharge, cause or allow others under its control to throw, drain, or otherwise discharge into the municipal storm drain system and/or surface and ground waters, any materials other than stormwater.

A. Examples of prohibited discharges include, but are not limited to, the following:
    1. Trash or debris.
    2. Construction materials.
    3. Petroleum products, including but not limited to, oil, gasoline, grease, fuel oil, and heating oil.
    4. Antifreeze and other automotive products.
    5. Metals in either particulate or dissolved form.
    6. Flammable or explosive materials.
    7. Radioactive material.
    8. Batteries.

9. Acids, alkalis, or bases.
10. Paints, stains, resins, lacquers, or varnishes.
11. Degreasers and/or solvents.
12. Drain cleaners.
13. Pesticides, herbicides, or fertilizers.
14. Steam cleaning wastes.
15. Soaps, detergents, or ammonia.
16. Swimming pool or spa filter backwash.
17. Chlorine, bromine, or other disinfectants.
18. Heated water.
19. Domestic animal wastes.
20. Sewage.
21. Recreational vehicle waste.
22. Animal carcasses.
23. Food wastes.
24. Bark and other fibrous materials.
25. Lawn clippings, leaves, or branches.
26. Silt, sediment, concrete, cement or gravel.
27. Dyes.
28. Chemicals not normally found in uncontaminated water.
29. Any other process-associated discharge except as otherwise allowed in this section.
30. Any hazardous material or waste not listed above.

# Section 4 – Illicit Discharge Detection Procedures

## 4.1 Purpose

Illicit discharges and connections are identified through Citizen Reporting, Interdepartmental or Interagency Referral, or through Outfall Reconnaissance Inventory (ORI) activities. The City relies on local citizens, City field staff, and comprehensive water resource program inspections to detect potential problem areas quickly, so that they can be addressed before they cause significant water quality degradation

The Citizen Reporting hotline (360)-817-1565 allows local citizens to call one number when they suspect a problem. Public outreach encourages residents to participate in the reporting process and helps the City to receive timely reports of obvious problems like illegal dumping, spills, or strong odors. The City's outfall inspections provide regular opportunities to document the conditions of the outfalls and identify potential problems that may not be obvious to the general public.

## 4.2 Citizen Reporting and Interdepartmental/Interagency Referral

### 4.2.1 Contact Information

A central reporting phone line has been established to handle water quality incident reports citywide. Citizens that suspect an illicit discharge, an illicit connection, or an illegal dumping action can call the City's Illicit Hotline at (360) 817-1565 to report the incident. The call will be routed to the appropriate staff for response.

Calls may also be made directly to the Department of Ecology Southwest Regional Office at 360-407-6300.

After hours, emergency problems should be reported through 911, where operators will assess the severity of the incident and determine if emergency response (fire, hazmat, etc) is needed. Callers will then be put in contact with the City's on-call utility contact to address the problem. Residents that encounter a non-emergency incident are encouraged to report the problem the next business day through the City's Illicit Hotline or the City's Public Works department.

If after hours messages are left on the City's Public Works voicemail, staff will follow-up with the caller during the next business day  An Illicit Discharge Report form is available on the City's website at www.ci.camas.wa.us/pworks/engforms.htm.  This form can be faxed, emailed, or hand delivered to the City.

### 4.2.2 Problem Documentation

When water quality incident reports are received at Public Works, the staff person taking the call should complete the Incident Report Form and submit it to the Public Works Department for

follow up. The Illicit Discharge Report, Incident Response, and Outfall Inspection Report forms are located in Appendix B.

Once recorded, incident information is referred to the appropriate City department and/or staff person for follow-up. In most cases, IDDE problems should be referred to the Public Works Department for further investigation. Staff will either follow the investigation procedures in Section 5 to identify the source of the problem or, if the source is known, the corrective action procedures outlined in Section 6 will apply.

## 4.3 Outfall Inspection Procedures

The City will conduct an Outfall Reconnaissance Inventory (ORI) to visually inspect each known outfall from the City's stormwater drainage system to identify areas of obvious pollution or non-stormwater discharges. Outfall inspections locate potential problem areas without the need for in-depth laboratory analysis. Potential problem discharges can be identified by outfalls that are flowing during dry weather (potential illicit connection) or outfalls that have high turbidity, strong odors, or unusual colors.

*Note: If inspection staff encounters a transitory discharge, such as a liquid or oil spill, during inspection activities, the problem should be immediately referred to the appropriate agency or response contractor for clean-up. Staff should also complete a Incident Response Form located in Appendix B.*

### 4.3.1 Prioritization Schedule

The Phase II Permit requires that the City prioritize receiving waters for visual inspection to identify the area's most likely to include illicit discharges. Receiving water priorities have been set based on drainage area characteristics. Of the ten recommended screening factors listed in the *Illicit Discharge Detection and Elimination A Guidance Manual for Program Development and Technical Assistance, October 2004,* the City selected; #3 Density of Generating Sites or Industrial NPDES Storm Water, #4 Storm Water Outfall Density, #5 Age of Sub Watershed Development, #7 Historic Combined Sewer Systems, #8 Presence of Older Industrial Operations and added primary zoning and land use index as pertinent to prioritizing areas likely to have illicit discharge. The detailed receiving water priority table is included in Appendix C.

The Phase II Permit requires the City to "conduct field assessments of three high priority water bodies". Each year after the initial assessment, "field assessments shall be made on at least one high priority water body". The inspection will be undertaken at the outfalls of the three identified water bodies.
The three priority receiving waters are:

- Columbia River Basin/Downtown subarea
- Washougal River Basin/Dallas Street subarea
- Lacamas Lake Basin/Dwyer Creek subarea

After 2011 inspections, the ORI priorities will be set annually based on the priority table included in Appendix C and additional information collected through mapping efforts and citizen complaint calls.

All other outfalls will be inspected as field verification is completed. Information from these inspections will be evaluated for additions to other high priority locations.

### 4.3.2 Responsibility

Inspections are the responsibility of the Public Works Department. Inspections may be performed by City staff or by outside consultants hired by the City. In either case, all field reports will be reviewed by the Public Works Director (PWD) or appointed staff.

### 4.3.3 Timing

Timing is important when scheduling ORI field days. The preferred conditions for outfall inspections include:

- Dry season – preferably in summer or early fall
- Dry period - no run-off producing rainfall within last 48 hours
- Daytime, at low tide, to access tidally influenced outfalls
- Low vegetation (avoid late spring when access may be hindered by heavy vegetation)

The preferred conditions allow detection of flows when there should be none and prevent the dilution of pollutants.

### 4.3.4 Equipment

Prior to conducting field work, crews should assemble all required equipment (see Table 4-1) and review records from prior inspections in the same area to become familiar with the outfall locations and any potential inspection challenges. Field crews should prepare for consecutive days of field work when possible.

Table 4-1
Field Equipment for Outfall Inspections

| | |
|---|---|
| Minimum 2 person crew | Machete/Clippers |
| Safety Gear – vest, hard hat, cones | Flash light or headlamp |
| Field Notebook/Pencils | Tool Box – hammer, tape measure, duct tape, |
| Outfall Inspection Report Forms | zip ties |
| Map or Aerial Photo of Inspection Area | Spray paint or other marker |
| GPS Unit | First Aid Kit |
| Cell phone w/ charged battery | Clear sample bottles |
| Digital camera w/ charged batteries | Wide mouth container |
| Extra batteries for camera | Watch with second hand |
| Compass | Chlorine sample kit |

### 4.3.5 Activities

During ORI field days, field crews should visually inspect each outfall and the immediate surrounding area, photograph the current conditions, and complete the Outfall Inspection Report form located in Appendix B.

Potential problems are indicated by outfalls that are flowing in dry weather and/or foul odors or discolored water in or around the outfall pipe. If a flowing outfall is encountered during dry weather, field crews should attempt to first determine if the flow is from an approved discharge or natural ground water. If an approved flow or groundwater has been ruled out as the source of the flow, then a flowing outfall indicates a potential illicit discharge concern.

During field inspections, crews should also note whether the outfalls have maintenance issues, such as trash around the outfall or damaged infrastructure that should be brought to the attention of the Operations and Maintenance Division, Utility Supervisor. Observed spills or environmental hazards should be immediately reported to the PWD and the incident should be documented using the Incident Response Form located in Appendix B. The PWD will follow investigation procedures in Chapter 5 to track source, and properly dispose of the spilled material.

## 4.5 Follow-up Actions

When potential problem areas are identified, field crews should report the observations to the PWD. Based on the severity of the problem, PWD will direct staff to open a case log and begin the investigation procedures outlined in Section 5. The PWD will also determine if other City departments or outside agencies need to be involved.

# Section 5 – Investigation Procedures

## 5.1 Purpose

Potential illicit discharge problems can be revealed through outfall inspections, reports from staff, tenants, or the public, as described in Section 4. When a complaint is reported, the Phase II Permit requires that a follow-up investigation be initiated within seven (7) days, on average. The follow-up investigation could include a site visit to look at the problem area, review of mapping information, review of past complaints or investigations at the location, or other data collection and review. Once a problem has been verified (either through a routine outfall inspection or follow-up to a called-in complaint) the City will begin an official illicit discharge investigation, following the procedures outlined in this section. Figure 5-1 illustrates the steps that lead to an illicit discharge investigation.

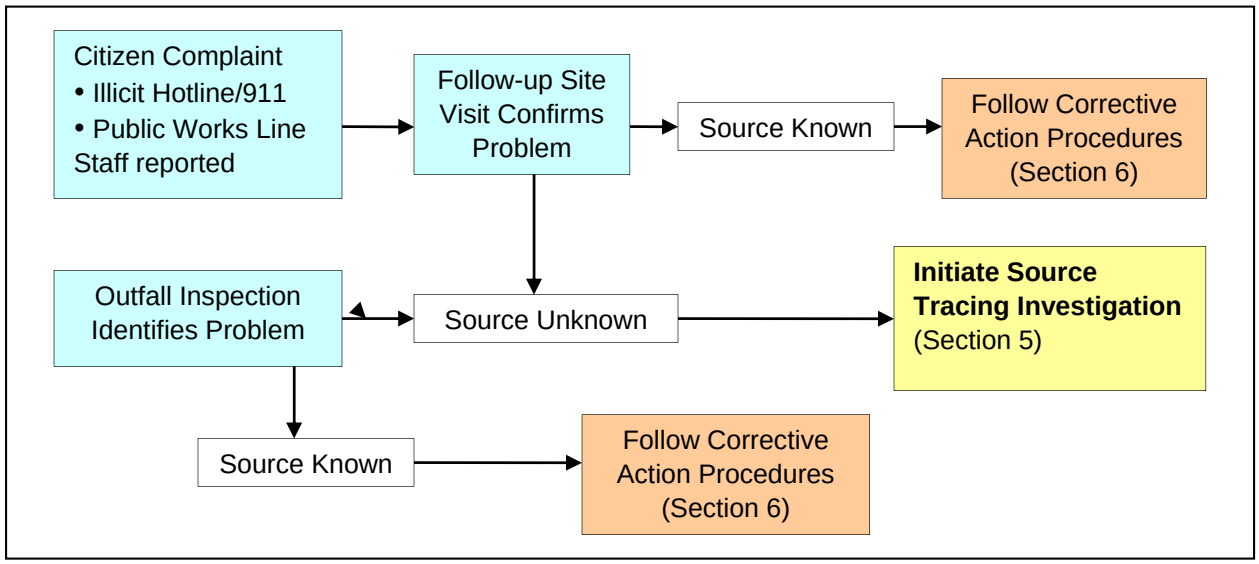



**Figure 5-1. Routes to an Illicit Discharge Investigation**

*When an illegal dumping or illicit discharge problem is directly observed by a member of the City staff, it is generally not necessary to follow these investigation procedures. In those scenarios, the source of the problem discharge is already known. Problems revealed through direct observation are referred directly to the corrective action information in Section 6. In the event that a reported problem does not have a defined source, the procedures in this section should be followed to trace the sources of the illicit discharge.*

## 5.2 Source Investigation Priority Levels

Table 5-1 outlines the priority levels to assist City staff in determining the appropriate response time for initiating a source investigation after a problem is identified in the field. Priority levels are based on the suspected pollutant source(s) of a reported problem. According to the Phase II Permit, illicit discharge investigations should begin within seven days of identifying a problem. In most cases, the City of Camas strives to respond faster than the required timeline.

Table 5-1
Source Investigation Priority Levels

| Priority Level | Suspected Pollutants | | Response Time (Work Days) |
|---|---|---|---|
| 1 | • Alkalis<br>• Automotive products<br>• Bases<br>• Cleaning products<br>• Degreaser or solvent<br>• Drain cleaner<br>• Fertilizer<br>• Flammable/explosive materials | • Herbicide<br>• Metals<br>• Painting products<br>• Pesticide<br>• Petroleum<br>• Process Wastewater<br>• Sewage<br>• Unknown chemicals | 1-2 |
| 2 | • Ammonia<br>• Construction runoff (silt, sediment, gravel) | • Detergents<br>• Food waste (fats, oils, grease)<br>• Soap | 3-5 |
| 3 | • Car washing<br>• Pressure washing waste<br>• Spa or pool water | • Steam cleaning waste<br>• Yard waste | 5-7 |
| 4 | • Animal carcasses<br>• Bacteria<br>• Construction materials<br>• Debris | • Foam<br>• Rust<br>• Trash<br>• Other | Within 10 days |

Priority levels were determined based on the potential public health and/or water quality threat posed by a given pollutant. The response time indicates a target time frame for opening a case log and initiating a source investigation as described in Section 5.3. *Contact Emergency Services (911) and Department of Ecology Spill response immediately if discharge poses severe threat to human health or the environment.*

## 5.3 Tracing the Source

This section outlines the basic tools that can be used to trace the source of a suspected illicit discharge. Source tracing begins when a suspected problem area is identified through the ORI, field assessment/testing, or a complaint call. When the source of the non-stormwater discharge is not known, one of two primary methods can be used to locate the source of an illicit discharge:

- Method A – Storm Drain Network Investigations
- Method B – Drainage Area Investigations

The method used will depend on the type of information collected or reported, level of understanding of the drainage network, and existing knowledge of operations and activities on the surrounding properties. All source tracing investigations should be documented and recorded on the Incident Response report form provided Appendix B.

### 5.3.1 Open a Case Log

When problems are identified, a case log is opened assigning a case number, creation date, case description and the primary staff contact/investigator. The investigator assigned to the case shall keep an accurate log of labor, materials and costs associated with the investigation for invoicing the responsible party. The case log should be opened prior to completing any additional field work unless the nature of the discharge necessitates immediate response. The file should include copies of the following, if applicable:

- Incident Report Form;
- Copy of Outfall Inspection Report;
- Incident Response field forms;
- Photographs;
- Additional field notes;
- Lab testing results;
- Compliance letters sent and responses received;
- Correspondence (mail, email, telephone logs);
- Proof of corrected problems (contract and invoice or clean field investigation report).

Any field investigations, photographs, corrective actions, or other activities associated with the suspected problem area should be documented in the case log. This becomes the City's official record of the IDDE investigation. Additional record keeping information is included in Section 8.

### 5.3.2 Method A – Storm Drain Network Investigations

The source of some illicit connections or discharges can be located by systematically isolating the area from which the polluted discharge originates. This method involves progressive investigation at manholes in the storm drain network to narrow down the location where the illegal discharge is entering the drainage system. This method is best used to identify constant or frequent discharge sources such as an illicit connection from a sewer system or sink drain into the storm drainage network. One-time illegal discharges (such as a surface spill or intentional dumping into the storm drain system) should be investigated using Method B described later in this section.

Field crews should work progressively upstream from the outfall and inspect manholes until indicators reveal that the discharge is no longer present. Manhole observations can be time-consuming, but they are generally a necessary step before conducting other tests. In particularly large storm drain systems, it may be helpful to first identify major branches of the system and test one manhole at the downstream end of each branch. This can help to reduce the area that must be investigated.

**Latex paint residue on catch basin**

Storm drain network investigations include the following steps:

1. Consult the drainage system map (if available) and identify the major branches.
2. Starting from the outfall, observe and take probe readings at the next upstream manhole or junction to see if there is evidence of polluted discharge. As with the outfall inspections, field crews are looking for the presence of flow during dry weather, foul odors, colors or stained deposits, oily sheen, floatable materials, and/or unusual probe readings.
3. Repeat observations and probe readings at each upstream manhole or junction until a junction is found with no evidence of discharge; the discharge source is likely located between the junction with no evidence of discharge and the next downstream junction.
4. Work downstream from the "clean" manhole or junction to isolate the location where the polluted discharge is entering the storm drain system.
5. If discharge is evident from private property initiate private property site entry procedures.
6. Document all findings on the Incident Response Report Form and record all information in the database case log.

Figure 5-2 shows the observation steps to isolate the location where an illicit discharge is entering the storm drainage network.

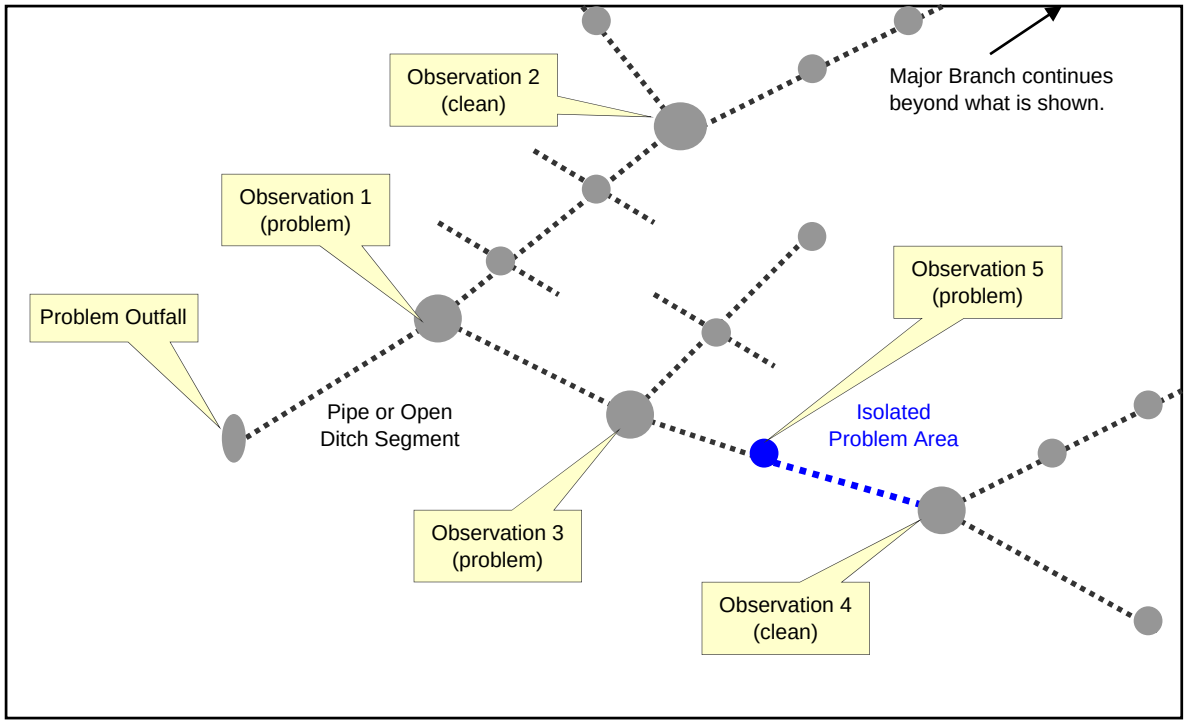



**Figure 5-2. Storm Drain Network Observation Steps**

When visual inspections are not enough to isolate the source of the illegal discharge, a number of additional field tests can be performed. These include:

- Dye testing,
- Video Testing/Camera-ing/TVing,
- Smoke testing,

The Center for Watershed Protection's *Illicit Discharge Detection and Elimination: A Guidance Manual* provides instructions for employing these testing techniques. The relevant pages from that manual are included in Appendix D.

Confirmed illicit discharge sources should be referred to the follow-up actions and corrective action procedures described at the end of this section and in Section 6.

### 5.3.3 Method B – Drainage Area Investigations

The source of some illegal discharges can be determined through a survey or analysis of the drainage area of the problem outfall. Drainage area investigations are particularly useful when the discharge observed at the outfall has a distinct or unique characteristic that can allow field crews to quickly determine the type of activity or non-point source that is generating the discharge. However, drainage area investigations are generally not helpful in tracing sewage discharges, since they are not related to a specific land use.

Drainage area investigations should begin with a discussion between the field crews, PWD and other knowledgeable City staff to identify the type of site most likely to produce the observed discharge. Table 5-2 shows some of the activities or land uses most likely associated with specific discharge problems.

Table 5-2
Common Discharges and Potential Sources

| Observed Discharge | Potential Causes |
|---|---|
| Clogging Sediment | Construction activity without proper erosion and sediment controls<br>Roadway sanding operations<br>Outdoor work areas or material storage areas |
| Thick Algae Growth | Fertilizer Leak or Spill<br>Landscaping operations<br>Hydroseeding following Construction<br>Failing or leaking septic system |
| Oil | Refueling operations<br>Vehicle or machinery maintenance activities |
| Sudsy discharge | Power washing of buildings<br>Vehicle or equipment washing operations<br>Mobile cleaning crew dumping<br>Laundry or Cleaner<br>Household greywater discharge |
| Clogged Grease | Restaurant sink drain connection to stormwater system |
| Sewage | Failing septic systems or broken sewer main |

Staff should make a list of likely discharge sources and consult City land use and drainage system maps to identify areas of likely pollution sources near the storm drain network. Field crews should then conduct a windshield survey of the drainage area to confirm and identify potential sources of the discharge. Once potential discharge sites are identified, City staff should conduct individual site inspections to locate the specific source of the illegal discharge. In some cases, dye testing (See Appendix D) may be needed to confirm that a suspected activity is actually draining into the storm drain network.

All drainage area investigations should be documented on the Incident Response Report Form and recorded with the database case log.

### 5.3.4 Equipment

Prior to conducting field work, crews should assemble all required equipment (see Table 5-3) and review the outfall inspection records or incident reports from the area to become familiar with the background information and potential pollution sources.

| Table 5-3<br>Field Equipment for Source Investigations | |
|---|---|
| Minimum 2 person crew | Machete/Clippers |
| Safety Gear –vest, hard hat, cones | Flash light or headlamp |
| Field Notebook/Pencils | Tool Box – hammer, tape measure, duct tape, zip ties |
| Incident Response Forms | |
| Map or Aerial Photo of Area | Pick or CB grate/cover remover |
| GPS Unit | Spray paint or other marker |
| Cell phone w/ charged battery | First Aid Kit |
| Digital camera w/ charged batteries | Field Test Kit (see Appendix E) |
| Extra batteries for camera | Chlorine Test Kit |
| Compass | |

### 5.3.5 Analytical Sampling (if needed)

If illicit discharge sources cannot be identified based on a storm drain network investigation and/or drainage area investigation, the PWD may request that water samples be collected from potential problem discharges and sent to the lab for analytical testing. The results of lab tests may isolate the source or type of illegal discharge. Lab tests may also be important for documentation in the event that an enforcement action must be taken against a tenant or property operator. Table 5-4 shows the recommended water quality testing parameters. Appendix E includes additional information regarding indicator parameters in water quality testing.

| Table 5-4<br>Water Quality Test Parameters and Uses | |
|---|---|
| Water Quality Test | Use of Water Quality Test |
| Conductivity | Used as an indicator of dissolved solids.<br>Used to distinguish between seawater and stormwater. |
| pH | Extreme pH values (high or low) may indicate commercial or industrial flows.<br>Not useful in determining the presence of sanitary wastewater (tends to have a neutral pH like uncontaminated base flows). |
| Temperature | Sanitary wastewater and industrial cooling water can substantially influence outfall discharge temperatures. |
| Ammonia | High levels can be an indicator of the presence of sanitary wastewater |
| Surfactants | Indicate the presence of detergent (e.g. laundry, car washing) |
| Total Chlorine | Used to indicate inflow from potable water sources.<br>Not a good indicator of sanitary wastewater because chlorine will not exist in a "free" state in water for long (it will combine with organic compounds). |
| Potassium | High levels may indicate the presence of sanitary wastewater. |
| Bacteria | Sanitary wastewater or septic systems. |

Source: *Illicit Discharge Detection and Elimination Manual* (New England Interstate Water Pollution Control Board, January 2003)

Results of any analytical testing should be recorded on the Incident Response Report Form and reported to the Public Works Director. Testing results may lead to another round of field investigations using either Method A or B. All data shall be recorded in the database case log.

## 5.4 Follow-Up Actions

Once the source of an illicit discharge has been identified, the field crews should initiate private property site entry procedures (if needed), notify the property owner or operator of the problem, and provide the appropriate educational materials and/or a copy of CMC 14.04. This is an important first step in the corrective action process. Field crews should also notify the PWD, complete the Incident Response report form, and enter all information in the case log to document the findings. The PWD and Code Enforcement Officer can then begin working through the corrective action steps outlined in Section 6.

# Section 6 – Corrective Action

## 6.1 Purpose

The City will respond to identified illicit discharges, illicit connections, or illegal dumping activities using progressive enforcement actions. Corrective actions will focus first on education to promote voluntary compliance and escalate to increasingly severe enforcement actions if voluntary compliance is not obtained. The PWD and Code Enforcement Officer should use judgment in exercising the right mix of compliance assistance and enforcement to correct identified problems. The City Attorney may levy fines if the violation is found to be willful, intentional or egregious.

## 6.2 Compliance

6.2.1 Voluntary ComplianceThe preferred method of achieving compliance when addressing an illicit discharge problem is to pursue 'voluntary' compliance through education of the property owner or responsible party. Often, business operators and property owners are not aware of the existence of illicit connections or activities on their properties that may constitute an illegal discharge. In these cases, providing the responsible party with information about the connection or operation, the environmental consequences, and suggestions on how to remedy the problem may be enough to secure voluntary compliance.

Education begins during the site investigation when the operation or connection is first confirmed. Property owners and operators should be notified that the problems must be corrected in a timely manner and that the City will be conducting a follow-up site visit to verify compliance. Field staff should also provide the property operator with an educational brochure describing illicit discharge violations and a copy of CMC 14.04. Field staff should also remind property owners of their obligation to report discharges to the proper agencies. The severity of the violation will govern the timeframe granted, by the PWD, to institute the remedy.

### 6.2.2 Compliance by Permit Holders

Permit holders of the Construction Stormwater General Permit (regulates stormwater discharges from construction sites one acre or larger) or the Industrial General Stormwater Permit (authorizes stormwater discharges associated with industrial activities) are expected to be knowledgeable of the measures required to be in compliance with their permit. An SOP is in-place, for use by staff, outlining the steps for enforcement. Failure to eliminate an illicit discharge by these permit holders shall result in a shorter timeframe to remedy the violation before fines are levied.

### 6.2.3 Operational Problems

Property owners are responsible for correcting operational problems that are leading to illegal discharges to the storm drainage system. This could include moving washing activities indoor or undercover, covering material storage areas, locating an appropriate discharge location for liquid

wastes, or other operational modifications. Through site visits and education, the City can provide technical assistance to aid property owners in identifying the required modifications.

### 6.2.4 Structural Problems

Most illicit connection problems will require a structural modification to correct the problem. Structural repairs can be used to redirect discharges such as sewage, industrial, and commercial cross-connections. Such cross-connections must be re-routed to an approved sanitary sewer system. Correcting structural problems is the responsibility of the property owner, though the city may provide technical assistance throughout the process.

## 6.3 Enforcement Actions

When voluntary compliance does not produce the desired result, the City is required to pursue follow-up enforcement action. All enforcement actions will be the responsibility of the PWD and the Code Enforcement Officer. Table 6-1 and Figure 6-1 outline the detailed enforcement steps. More serious violations or continued non-compliance may warrant a more aggressive, enforcement-oriented approach.

Table 6-1
Illicit Discharge Enforcement Steps

| Enforcement Step | Details | Responsibility |
|---|---|---|
| Step 1 – Initial Actions | • Provide educational materials (i.e. brochure and copy of CMC 14.04)<br>• Encourage voluntary compliance<br>• Provide summary letter* setting expected compliance date<br>• Additional staff support or technical assistance<br>• Request evidence of corrected problem (if applicable)<br>• Site visit to verify compliance | PWD or assigned staff |
| Step 2 – Follow-up Actions | • Send "notice of violation" letter* to property owner regarding unresolved issues<br>• Set second compliance date (determined on individual incident basis)<br>• Site visit to verify compliance | PWD;<br>Code Enforcement Officer,<br>City Attorney |
| Step 3 – Final Actions | • Send second "notice of violation" letter* indicating that unresolved issues will be referred to prosecutor<br>• City may correct problems and send bill to property owner<br>• Levy fines following CMC 14.04.190 | PWD,<br>Code Enforcement Officer, City Attorney |

* Keep copies of all letters within the case log database

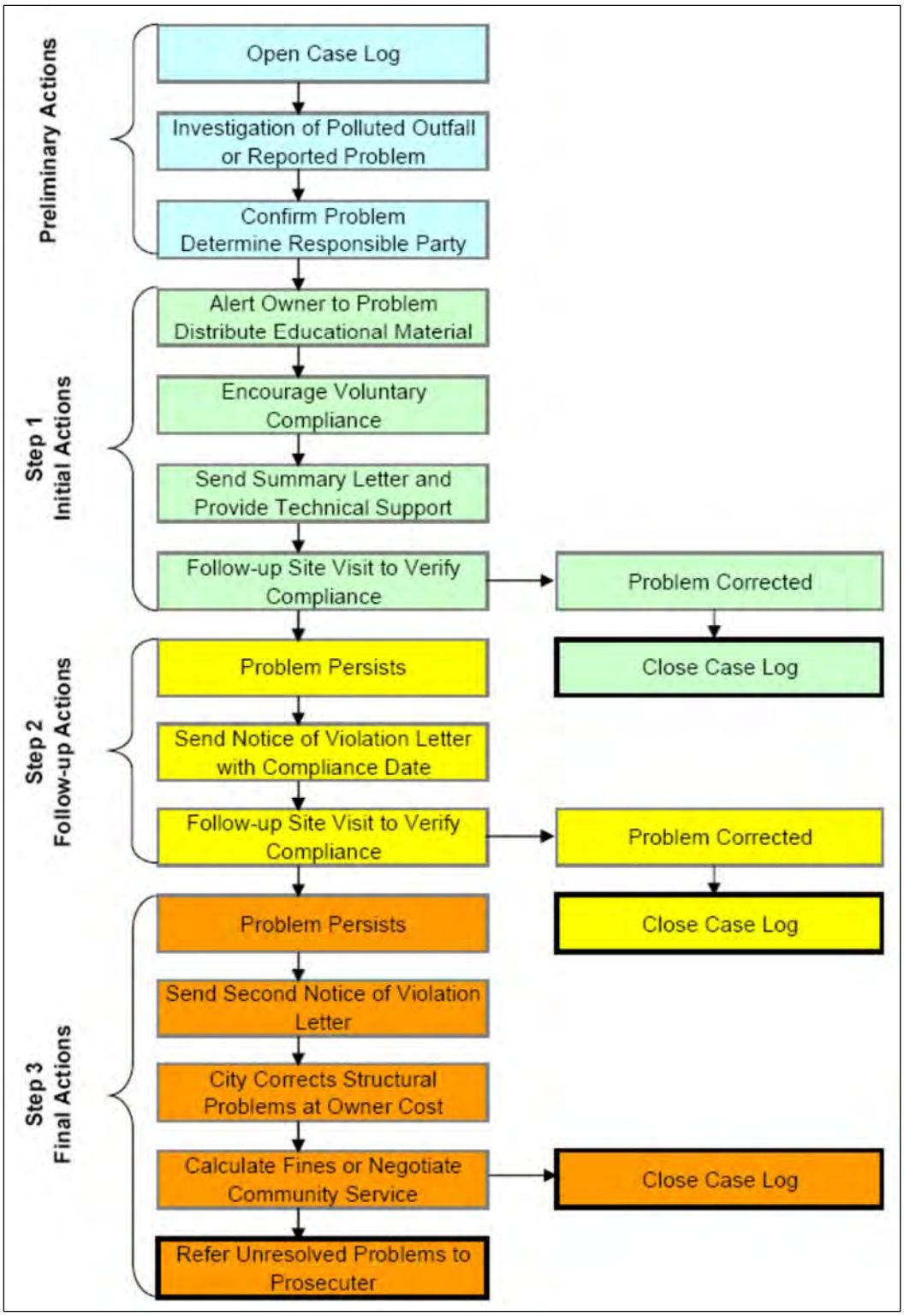



**Figure 6-1: City of Camas IDDE Enforcement Steps**

### 6.3.1 Enforcement Timeline

The timeline of corrective action procedures is highly dependent on the nature of the violation and the responsiveness and cooperation from the person(s) responsible. The urgency of addressing identified problems will be based on the nature of the pollutant in question and potential impacts to downstream waters. Compliance dates should be included in all violation notices

The Phase II Permit requires identified problems to be corrected and illicit connections removed within 180 days of identifying the source. If property owners are not addressing problems in a timely manner, the City may step in and perform the repairs necessary to remove an illicit connection, eliminate an illicit discharge, and/or clean-up a dumping incident. Property owners will also be responsible for reimbursing the City for any costs occurred in correcting IDDE problems.

### 6.3.2 Potential Fines

Illicit discharge violations are subject to fines and penalties under CMC 14.04.170. Civil penalties can be in the amount not to exceed $5000 per day with each day being a separate violation. Where a remediation or mitigation order has been issued, failure to comply constitutes a gross misdemeanor punishable by up to one year in jail or $5000 fine or both.

### 6.3.3 Record Keeping

Effective enforcement procedures require comprehensive recordkeeping and documentation to show that all program steps have been followed. Throughout the problem investigation and corrective action activities, all information related to the incident or property in question should be documented in the case log. Section 8 discusses illicit discharge record keeping in greater detail.

# Section 7 – Public Education

The NPDES Phase II Permit requires the City to conduct outreach activities to educate the public and business community about water quality protection. Outreach activities focus on reducing pollutants at the source by educating the public and businesses about their ultimate impact on the natural environment. Many members of the community are apt to modify behaviors once they understand the potential negative consequences.

To date, the City has conducted outreach activities aimed at educating local residents about natural yard care techniques, habitat protection, and personal impact on the natural environment. These programs have been well received by the general public, and the City is hoping to expand the education efforts and direct more focus to the local business community.

Illicit discharge detection and elimination will be the focus on the educational outreach to the local business community and will include an education program focused on informing business owners and their employees of their responsibilities related to water quality protection.

# Section 8 – Record Keeping

The NPDES Phase II Permit requires the City to keep records of all stormwater program activities. Thorough record keeping is particularly important for a successful IDDE program. Records of past problems can help focus an investigation in the right direction or identify repeat offenders. Thorough record keeping is also critical to the enforcement process. Examples of the different types of information to be retained are included below:

**Citizen Complaints** – retain Incident Report Forms
**Outfall Inspections** – maintain Outfall Inspection forms, catalog and organize photographs, enter open case logs for suspected problem areas.
**Investigations** – retain Incident Response forms, photographs, conversation records, and lab testing results.
**Corrective Action** – in addition to the information collected during the investigation process, retain copies of compliance letters, correspondence with property owners, and proof of corrected problems (contract and invoice for completed work or clean field investigation report)

## 8.1 Data Sources

**Outfall Inspections** – ORI data is captured using a GPS or by confirming latitude/longitude using Google earth.

**Investigations** – Illicit discharge investigation records utilize a paper file system. A case log file is created for each individual compliant call. The system tracks actions completed by the Investigator including: education opportunities, technical assistance, communications, sample collected and enforcement.

**Financial Records** – Financial records are stored in the case log file. The investigator is responsible to track costs including equipment, materials and labor until the case is closed.

## 8.2 Record Storage

A central location for filing of case logs is an important component to the record keeping process. Paper copies of case logs will be kept in a file designated for illicit discharges and located in Community Development. Yearly, the case logs shall be scanned into an electronic folder that shall be accessible by various designated staff.

### 8.2.1 Long Term Record Storage

The NPDES permit requires that all IDDE program records be retained for a minimum of five (5) years. However, longer term record storage will be helpful in building a library of data that describes pollutant problems in Camas. To facilitate this process the City will maintain the files as long as data storage availability allows past the required 5 years.

# Section 9 – Staff Training

The City has developed a comprehensive training schedule to meet the requirements of the NPDES Phase II Permit. Two primary trainings have been identified related to IDDE:

- Training for all staff members, that are routinely in the field, to educate them on what constitutes an illicit discharge problem and how to report suspected problems.
- Training for illicit discharge responders on proper identification, investigation, clean-up, disposal, and reporting techniques for illicit discharges.
- Training for Public Works administration staff on how to handle receipt of an illicit discharge report. The training will help staff to collect the appropriate information for the type of discharge being reported and provide guidance for routing the report to the appropriate staff for response.

These trainings are generally conducted by Public Works or Community Development staff using materials developed for other aspects of the IDDE program. The City has developed a PowerPoint presentation that is used for conducting the overview training for all field staff.

Training for illicit discharge responders will primarily include distribution and review of this procedures manual as well as a refresher on City spill response procedures. Follow-up trainings for illicit discharge responders may take the form of debriefings following significant IDDE incidents. Debriefings allow staff to review the actions that were taken and identify what worked well and what should be modified for future responses.

# Section 10 – References

Camas Municipal Code

*Illicit Discharge Detection and Elimination: a Guidance Manual for Program Development and Technical Assessments*, Center for Watershed Protection and Robert Pitt (University of Alabama), October 2004.

*Illicit Discharge Detection and Elimination Manual: A Handbook for Municipalities*, New England Interstate Water Pollution Control Commission, January 2003.

*Illicit Connection/Illegal Discharge (IC/ID) Detection and Elimination Model Program Guidance*, San Diego Stormwater Copermittees Jurisdictional Urban Runoff Management Program (URMP), November 13, 2001.

*Investigation of Inappropriate Pollutant Entries into Storm Drainage Systems: A User's Guide*, Robert Pitt, et al, EOA publication 600/R-92/238, January 1993

*City of Bainbridge Island Illicit Discharge Detection and Elimination Program Manual; Illicit Discharge Detection and Elimination Guidance Manual*, Otak, Inc., April 2010.

I certify, under penalty of law, that this document and all attachments were prepared under my direction, or supervision, in accordance with a system designed to assure that Qualified Personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system or those persons directly responsible for gathering information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for willful violations.

Eric Levison
City of Camas Public Works Director
Duly Authorized Representative

# APPENDIX A

# Chapter 14.04 ILLICIT DISCHARGES, DUMPING AND ILLICIT CONNECTIONS*

*__Cross references:__ Public services, Title 13; stormwater drainage utility, Ch. 13.88; stormwater utility service charges, Ch. 13.89; environment, Title 16.

Sections:



## 14.04.010 Purpose.

The Washington State Department of Ecology (DOE) issued the Western Washington Phase II Municipal Stormwater Permit (hereafter referred to as the DOE Permit) to designated municipalities throughout the state on February 16, 2007. The DOE Permit specifically defines what are considered prohibited non-stormwater illicit discharges, dumping, and illicit connections.

In order to meet the Federal Clean Water Act and DOE's requirements to protect the environment, the city has adopted regulations for identifying what is allowed and what is prohibited for discharging into waters of the state.

(Ord. No. 2556, § I, 8-17-2009)

## 14.04.020 Applicability.

The provisions of this chapter shall apply to all new and existing development, public and private. The provisions of this chapter shall also apply to the maintenance responsibility of existing stormwater facilities.

1. Meeting the requirements of this chapter is the joint and severable responsibility of the owner(s) of the site and the person(s) responsible for maintenance on both new and existing facilities.

2. The responsible city official is authorized to enforce the provisions of this chapter.

(Ord. No. 2556, § I, 8-17-2009)

### 14.04.030 Statutory authority.

The city adopts this chapter as, required, under the Department of Ecology Western Washington Phase II Municipal Stormwater Permit issued on January 17, 2007, effective February 16, 2007, with an expiration date of February 15, 2012.

(Ord. No. 2556, § I, 8-17-2009)

### 14.04.040 Severability.

If any provision of this title or its application to any person or circumstances is held invalid, the remainder of this title, or the application of the provision to other persons or circumstances, shall not be affected.

(Ord. No. 2556, § I, 8-17-2009)

### 14.04.050 Acronyms and definitions.

Acronyms

For the purpose of this chapter the following shall apply:

TABLE INSET:

| | |
|---|---|
| AKART | All Known, Available and Reasonable method of prevention, control, and Treatment |
| BMPs | Best Management Practices |
| CWA | Clean Water Act |
| the City | City of Camas |
| DOE | Washington State Department of Ecology |
| EPA | U.S. Environmental Protection Agency |
| DOE Manual | Ecology's 2005 Stormwater Management Manual for Western Washington |
| MEP | Maximum Extent Practicable |
| NPDES | National Pollutant Discharge Elimination System |
| DOE Permit | Western Washington Phase II Municipal Stormwater Permit |
| PGIS | Pollutant Generating Impervious Surfaces |
| RCW | Revised Code of Washington State |
| CMC | Camas Municipal Code |
| WAC | Washington Administrative Code |
| WSDOT | Manual Washington State Department of Transportation Highway Runoff Manual |

Definitions

For the purpose of this chapter the following shall apply:

AKART -- All known, available, and reasonable methods of prevention, control, and Treatment. See also the State Water Pollution Control Act, sections 90.48.010 RCW and 90.48.520 RCW.

Best Management Practices (BMPs) -- Those physical, structural and managerial practices, and prohibitions of practices, that, when used singly or in combination, control stormwater runoff peak flow rates and volumes and prevent or reduce pollution of surface water or groundwater.

Clean Water Act -- The Federal Water Pollution Control Act (33 USC Section 1251 et seq.), and any subsequent amendments thereto.

Director -- The Public Works Department Director and/or designees.

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

Hazardous Materials -- Any material, including any substance, waste, or combination thereof, which because of its quantity, concentration, or physical, chemical, or infectious characteristics may cause, or significantly contribute to, a substantial present or potential hazard to human health, safety, property, or the environment when improperly treated, stored, transported, disposed of, or otherwise managed.

Hyperchlorinated -- Water that contains more than 10 mg/Liter chlorine. Disinfection of water mains and appurtenances requires a chlorine residual of 10mg/L at the end of the disinfection period. This level is well above the Maximum Residual Disinfectant Level of an annual average of 4mg/Liter chlorine for potable water.

Illicit connection - Any manmade 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 a NPDES permit (other than the NPDES permit for discharges from the municipal separate storm sewer) and discharges resulting from fire fighting activities.

Municipal Separate Storm Sewer System (MS4) -- A conveyance or system of conveyances (including roads with drainage systems, municipal streets, catch basins, curbs, gutters, ditches, manmade channels, or storm drains):

1. Owned or operated by the City of Camas;

2. Designed or used for collecting or conveying stormwater;

3. Which is not part of a Publicly Owned Treatment Works (POTW). "POTW" means any device or system used in treatment of municipal sewage or industrial wastes of a liquid nature which is publicly owned; and

4. Which is not a combined sewer. "Combined sewer" means a system that collects sanitary sewage and stormwater in a single sewer system.

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, 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.

Non-Stormwater Discharge -- Any discharge to the storm drain system that is not composed entirely of stormwater.

Person -- Any individual, association, organization, partnership, firm, corporation, or other entity recognized by law and acting as either the owner of a premises or as the owner's agent.

Permit -- The most current version of the National Pollution Discharge Elimination System (NPDES) Western Washington Phase II Municipal Stormwater Permit.

Pollutant -- Anything which causes or contributes to pollution. Pollutants may include, but are not limited to: paints, varnishes, and solvents; oil and other automotive fluids; nonhazardous liquid and solid wastes and yard wastes; refuse, rubbish, garbage, litter, or other discarded or abandoned objects and accumulations, so that same may cause or contribute to pollution; floatables; pesticides, herbicides, and fertilizers; hazardous substances and wastes; sewage, fecal coliform and pathogens; dissolved and particulate metals; animal wastes; wastes and residues that result from constructing a building or structure; and noxious or offensive matter of any kind.

Premises -- Any building, lot, parcel of land, or portion of land, whether improved or unimproved, including adjacent sidewalks and parking strips.

Private system -- Any element in the surface water system which is not under city ownership or management.

Storm Drainage System -- Publicly owned facilities, including the city's municipal separate storm sewer system, by which stormwater is collected and/or conveyed, including but not limited to any roads with drainage systems, municipal streets, gutters, curbs, inlets, piped storm drains, pumping facilities, retention and detention basins, natural and human-made or altered drainage channels, reservoirs, and other drainage structures.

Stormwater -- Runoff during and following precipitation and snowmelt events, including surface runoff and drainage.

Stormwater Pollution Prevention Plan -- A document which describes the best management practices and activities to be implemented by a person to identify sources of pollution or contamination at a premises and the actions to eliminate or reduce pollutant discharges to stormwater, stormwater conveyance systems, and/or receiving waters to the maximum extent practicable.

Unsafe condition -- Any condition or activity in the surface water system on public or private premises which may cause pollution or does or may impede the operation or functioning of the surface water system or which may cause damage thereto.

(Ord. No. 2556, § I, 8-17-2009)

### 14.04.060 Prohibited discharges.

No person shall throw, drain, or otherwise discharge, cause or allow others under its control to throw, drain, or otherwise discharge into the municipal storm drain system and/or surface and ground waters, and materials other than stormwater.

A. Examples of prohibited discharges include, but are not limited to, the following:

1. Trash or debris.
2. Construction materials.
3. Petroleum products, including but not limited to, oil, gasoline, grease, fuel oil, and heating oil.
4. Antifreeze and other automotive products.
5. Metals in either particulate or dissolved form.
6. Flammable or explosive materials.
7. Radioactive material.
8. Batteries.
9. Acids, alkalis, or bases.
10. Paints, stains, resins, lacquers, or varnishes.

11. Degreasers and/or solvents.
12. Drain cleaners.
13. Pesticides, herbicides, or fertilizers.
14. Steam cleaning wastes.
15. Soaps, detergents, or ammonia.
16. Swimming pool or spa filter backwash.
17. Chlorine, bromine, or other disinfectants.
18. Heated water.
19. Domestic animal wastes.
20. Sewage.
21. Recreational vehicle waste.
22. Animal carcasses.
23. Food wastes.
24. Bark and other fibrous materials.
25. Lawn clippings, leaves, or branches.
26. Silt, sediment, concrete, cement or gravel.
27. Dyes.
28. Chemicals not normally found in uncontaminated water.
29. Any other process-associated discharge except as otherwise allowed in this section.
30. Any hazardous material or waste not listed above.

(Ord. No. 2556, § I, 8-17-2009)

### 14.04.070 Allowable discharges.

The following types of discharges shall not be considered illegal discharges for the purposes of this chapter unless the Director determines that the type of discharge, whether singly or in combination with others, is causing or is likely to cause pollution of surface water or groundwater.

A. Examples of allowable discharges include the following:
   1. Broken water mains.
   2. Diverted stream flows.
   3. Rising ground waters.
   4. Uncontaminated ground water infiltration, as defined in 40 CFR 35.2005(20).
   5. Uncontaminated pumped ground water.
   6. Foundation drains.
   7. Air conditioning condensation.
   8. Irrigation water from agricultural sources that is commingled with urban

stormwater.

9. Springs.

10. Water from crawl space pumps.

11. Footing drains.

12. Flows from riparian habitats and wetlands.

13. Discharges from emergency firefighting activities.

(Ord. No. 2556, § I, 8-17-2009)

### 14.04.080 Conditional discharges.

The following types of discharges shall not be considered illegal discharges for the purposes of this chapter if they meet the stated conditions, or unless the Director determines that the type of discharge, whether singly or in combination with others, is causing or is likely to cause pollution of surface water or groundwater:

1. Potable water, including water from water line flushing, hyperchlorinated water line flushing, fire hydrant system flushing, and pipeline hydrostatic test water. Planned discharges shall be de-chlorinated to a concentration of 0.1 ppm or less, pH-adjusted, if necessary and in volumes and velocities controlled to prevent re-suspension of sediments in the stormwater system;

2. Lawn watering and other irrigation runoff are permitted but shall be minimized;

3. De-chlorinated swimming pool discharges. These discharges shall be de-chlorinated to a concentration of 0.1 ppm or less, pH-adjusted, if necessary and in volumes and velocities controlled to prevent re-suspension of sediments in the stormwater system;

4. Street and sidewalk wash water, water used to control dust, and routine external building wash down that does not use detergents are permitted if the amount of street wash and dust control water used in minimized. At active construction sites street sweeping must be performed prior to washing the street;

5. Non-stormwater discharges covered by another NPDES permit, provided, that the discharger is in full compliance with all requirements of the permit, waiver, or order and other applicable laws and regulations; and provided, that written approval has been granted for any discharge to the storm drain system;

6. Other non-stormwater discharges. The discharges shall be in compliance with the requirements of a stormwater pollution prevention plan (SWPPP), reviewed and approved by the city, which addresses control of such discharges by applying AKART to prevent contaminants from entering surface or ground water.

(Ord. No. 2556, § I, 8-17-2009)

### 14.04.090 Prohibition of illicit connections.

The following connections, both past, current, and future, to the stormwater system are expressly prohibited:

1. The construction, use, maintenance, or continued existence of illicit connections to the storm drain system is prohibited.

2. This prohibition expressly includes, without limitation, illicit connections made in the past, regardless of whether the connection was permissible under law or practices

applicable or prevailing at the time of connection.

3. A person is considered to be in violation of this chapter if the person connects a line conveying sewage to the MS4, or allows such a connection to continue.

(Ord. No. 2556, § I, 8-17-2009)

### 14.04.100 Inspection authority.

Whenever implementing the provisions of this chapter or whenever there is cause to believe that a violation of this chapter has been or is being committed the Director is authorized to inspect during regular working hours, or at other reasonable times, all stormwater systems to determine compliance with the provisions of this chapter.

(Ord. No. 2556, § I, 8-17-2009)

### 14.04.110 Existing private facility inspections.

1. Inspection Program. The Director is authorized to develop and implement an inspection program for private drainage facilities within the city.

2. Right of Entry. An authorized representative of the utility may enter private property at all reasonable times to conduct inspections, tests or to carry out other duties imposed by the code, provided the utility shall first notify the property owner or person responsible for the premises. If entry is refused or cannot be obtained, the director shall have recourse to every remedy provided by law to secure entry.

(Ord. No. 2556, § I, 8-17-2009)

### 14.04.120 Inspection procedures.

1. Prior to making any inspections on private property, the inspector shall present identification credentials, state the reason for the inspection and request entry.

2. If the property or any building or structure on the property is unoccupied, the inspector shall first make a reasonable effort to locate the owner or other person(s) having charge or control of the property or portions of the property and request entry.

3. If after reasonable effort the inspector is unable to locate the owner or other person(s) having charge or control of the property, and has reason to believe the condition of the stormwater system creates an imminent hazard to persons or property, the inspector may enter.

4. Unless entry is consented to by the owner or person(s) in control of the property or portion of the property or unless conditions are reasonably believed to exist which create imminent hazard, the inspector shall obtain a search warrant, prior to entry, as authorized by the laws of the State of Washington.

5. The inspector may inspect the stormwater system without obtaining a search warrant provided for in subsection 4. above, provided the inspection can be conducted while remaining on public property or other property on which permission to enter is obtained.

(Ord. No. 2556, § I, 8-17-2009)

### 14.04.130 Emergency conditions requiring immediate action.

Notwithstanding any other provisions of this code, whenever it appears to the director that conditions covered by this code exist and require immediate action to protect the public health, safety, or public resources, the director is authorized to the extent permitted by law, to enter at all reasonable times in or upon any property, public or private, for the purpose of inspecting and investigating such emergency conditions.

The director may without prior notice order the immediate discontinuance of any activity leading to the emergency condition. Failure to comply with such order shall constitute a civil violation pursuant to this chapter.

(Ord. No. 2556, § I, 8-17-2009)

### 14.04.140 Enforcement authority.

The Director shall administer and enforce this chapter and shall have the authority to adopt and implement administrative procedures for such enforcement.

(Ord. No. 2556, § I, 8-17-2009)

### 14.04.150 Enforcement policy.

Enforcement action shall be taken whenever a person has violated any provision of this chapter. The choice of enforcement action taken and the severity of any penalty shall be based on the nature of the violation, the damage or risk to the public or to public resources, and/or the degree of bad faith of the persons subject to the enforcement action.

(Ord. No. 2556, § I, 8-17-2009)

### 14.04.160 Enforcement orders.

The Director shall have the authority to issue to an owner or person(s) representing an owner an order to maintain or repair a component of a stormwater facility or BMP to bring it in compliance with this chapter, the Stormwater Management Manual and/or other city regulations. The order shall include:

1. A description of the specific nature, extent and time of the violation and the damage or potential damage that reasonably might occur.

2. A notice that the violation or the potential violation cease and desist and, in appropriate cases, the specific corrective action to be taken.

3. A reasonable time to comply, depending on the circumstances.

4. Penalties that may be incurred by any owner of a stormwater system not in compliance with this chapter.

5. An order to the owner to provide to the Director a detailed plan showing drawings and steps that will be taken to achieve compliance within a specified time. This plan is subject to approval by the Director.

(Ord. No. 2556, § I, 8-17-2009)

### 14.04.170 Violation--Penalty.

A violation of this Chapter or Order of the Director pursuant to this Chapter shall be a civil

violation subject to a civil monetary penalty not to exceed $5,000.00. Each day of continued violation shall constitute a separate violation for purposes of this penalty. Any person who, through an act of commission or omission, aids or abets in the violation shall be considered to have committed a violation for the purposes of the civil penalty. A civil penalty shall be due and payable immediately upon assessment by the Court.

(Ord. No. 2556, § I, 8-17-2009)

### 14.04.180 Enforcement procedure.

All civil penalties for violations of this Chapter shall be imposed by the Camas Municipal Court. The Director or his designee or the city Attorney shall initiate the process for imposition of a civil penalty by issuing a citation setting forth the nature of the violation and directing the individual to appear before the Court at a time certain to respond to the citation. All contested proceedings before the Municipal Court shall be heard by the judge without a jury, and the burden of proof shall be by a preponderance of the evidence.

(Ord. No. 2556, § I, 8-17-2009)

### 14.04.190 Remediation and mitigation.

(A) Where appropriate, the Director shall have the authority to issue an Order of Remediation requiring a person violating this Chapter to undertake specified actions to remediate and mitigate damage caused by violation of this Chapter. The cost of remediation and mitigation shall be born by the person violating this Chapter, and shall be in addition to any monetary penalties assessed pursuant to this Chapter.

(B) In the event any person fails to comply with a remediation Order, the city may undertake such remediation and mitigation. The cost of such remediation and mitigation shall be a lien against the property and shall also be the personal obligation of the person committing the violation.

(C) Failure to comply with a remediation Order shall constitute a gross misdemeanor, and shall be punishable by one-year in jail or a fine not to exceed $5,000.00, or by both such jail term and fine.

(Ord. No. 2556, § I, 8-17-2009)

# APPENDIX B

# CITY OF CAMAS
# ILLICIT DISCHARGE REPORT

Print Form

Public Works Department, 616 NE 4th Avenue,
Camas, WA 98607
(360) 817-1565
Fax (360) 834-1535

Date: _____

Person Reporting Illicit Discharge: _____

Organization: _____

Address: _____

Phone Number: _____

Type of Illicit Discharge:

Location of Illicit Discharge:

What Caused Discharge:

Site Investigation:

Approximate Amount of Spillage:

| | |
|---|---|
| Method of Clean Up and Removal: | |
| How to Prevent Reoccurrence (if applicable): | |
| Investigator(s) (Print): | |

Signature: _____ Date: _____

Signature: _____ Date: _____

| | |
|---|---|
| Additional Note (if needed): | |

Reviewed By: _____

Public Works Director

Note: Upon completion, submit form and all pertinent documentation, e.g. maps, photos, etc. to Anita Ashton, Engineering Department.

CITY OF CAMAS

# Report of Complaint or Request for Information

Name _____

Address _____ Phone _____

Received by _____

How Received: Letter _____ Telephone _____ In Person _____

Nature of Report: _____

**Follow-up contact requested** ☐

**Department:** **Fire** ☐ **Recreation** ☐ **Police** ☐ **General** ☐
**Water-Sewer** ☐ **Street** ☐ **Building** ☐
**Finance** ☐ **Planning** ☐ **Other** ☐ **Parks** ☐

Assigned/Referred to _____ for investigation and correction by _____

Completed _____ Date _____

Remarks: _____

Citizen informed by: Phone _____ In person _____ Card _____

Reviewed _____ Date _____

# INCIDENT RESPONSE FORM

## Section 1: Background Data

| | | |
|---|---|---|
| Watershed: | Date/Time: | Last rain (circle): > 72 hours < 72 hours |
| Receiving Water: | Investigators: | Temperature: |
| Outfall ID: | Photos: | Tide: |
| Location (Lat/Long, GPS LMK#, etc): | Summary of Problem: | |
| Date of Initial Inspection or Problem Report: | | |

| Suspected Pollutants (circle): | PRIORITY LEVEL* |
|---|---|
| Alkalis Automotive products Bases Cleaning products Degreaser or solvent Drain cleaner Fertilizer Flammable/explosive materials Herbicide Metals Painting products Pesticide Petroleum Process Wastewater Sewage Unknown chemicals | 1 |
| Ammonia Construction runoff (silt, sediment, gravel) Detergents Food waste (fats, oils, grease) Soap | 2 |
| Car washing Pressure washing waste Spa or pool water Steam cleaning waste Yard waste | 3 |
| Animal carcasses Bacteria Construction materials Debris Foam Rust Trash Other _____ | 4 |

*Refer to IDDE Program Manual for target response times based on priority level

## Section 2: Investigation Methods

☐ Storm Drain Network Investigation ☐ Drainage Area Investigation ☐ Other: _____

## Section 3: Field Notes

Describe field activities (e.g. manholes inspected, odors/colors observed, suspected land uses, activities observed, any dye testing, smoke testing, or video testing conducted, etc):

***Attach map, field sketch, or additional notes as needed to describe field activities.***

**Section 4: Sampling Data (as needed)**

Attach any laboratory testing results to this form and file with case log.

| FIELD TEST PARAMETERS | | | | | | | |
|---|---|---|---|---|---|---|---|
| Date of Field Tests: | | | | | | | |
| PARAMETER | EQUIPMENT | UNIT | Describe location: | Describe location: | Describe location: | Describe location: | Describe location: |
| Temperature | Thermometer | ○C | | | | | |
| pH | Probe | pH Units | | | | | |
| DO | Probe | mg/L | | | | | |
| Conductivity | Probe | ms/cm | | | | | |
| Ammonia | Test Strip | mg/L | | | | | |

**Section 5: Additional Observations**

| Note any other concerns observed during investigations (e.g., trash, damage, excessive vegetation impeding flow, or needed repairs): |
|---|
| |

# OUTFALL INSPECTION REPORT

**Section 1: Background Data**

| | | |
|---|---|---|
| Watershed: | Date/Time: | Last rain (circle): > 72 hours < 72 hours |
| Receiving Water: | Investigators: | Temperature: |
| Outfall ID: | Photos: | Tide: |
| Location (Lat/Long, GPS LMK#, etc): | Other Background Notes: | |

**Section 2: Outfall Description**

| LOCATION | MATERIAL | SHAPE | DIMENSIONS (IN.) | SUBMERGED |
|---|---|---|---|---|
| ☐ Closed Pipe<br>☐ Single ☐ Double | ☐ RCP ☐ CMP ☐ PVC<br>☐ HDPE ☐ Steel ☐ Other:_____ | ☐ Circular ☐ Elliptical<br>☐ Box ☐ Other:_____ | Diameter _____<br>Height/Width _____ | In Water:<br>☐ No ☐ Partially ☐ Fully<br>With Sediment:<br>☐ No ☐ Partially ☐ Fully |
| ☐ Open Drainage | ☐ Concrete ☐ Earthen<br>☐ Rip-rap ☐ Other:_____ | ☐ Trapezoid ☐ Parabolic<br>☐ Other:_____ | Depth:_____<br>Top Width:_____<br>Bottom Width:_____ | |

**Section 3: Initial Assessment:**

| | | |
|---|---|---|
| Flow Present? | ☐ No<br>☐ Yes (Complete Section 5 and 6): | If both questions are answered "No," outfall is not a suspected illicit discharge. Complete Sections 4 and 7 and file report. No further action is required. |
| Illicit Discharge Concern?<br>(based on visual observation) | ☐ No<br>☐ Yes (Complete Section 6) | |

**Section 4: Additional Observations**

Note any non-illicit discharge concerns observed at the outfall that should be reported to maintenance (e.g., trash, outfall damage, excessive vegetation impeding flow, or needed infrastructure repairs):

**Section 5: Field Data for Flowing Outfalls**

| FLOW ESTIMATE | | | MEASUREMENT | UNIT | EQUIPMENT | CALCUATED FLOW |
|---|---|---|---|---|---|---|
| ☐ Trickle<br>☐ Moderate<br>☐ Substantial | ☐ Flow – Volume Method | Volume | | Liter | Bottle | |
| | | Time to fill | | Sec | Stop Watch | |
| | ☐ Flow – Area Method | Flow depth | | In | Tape measure | |
| | | Flow width | | Ft, In | Tape Measure | |
| | | Measured length | | Ft, In | Tape Measure | |
| | | Time of travel | | Sec | Stop Watch | |

**Section 6: Physical Indicators of Potential Illicit Discharge**

| INDICATOR (Check if Present) | DESCRIPTION | RELATIVE SEVERITY INDEX (1-3) | | |
|---|---|---|---|---|
| ☐ Flow Odor | ☐ Sewage ☐ Rancid/sour ☐ Petroleum/gas ☐ Sulfide ☐ Other* | ☐ 1 – Faint | ☐ 2 – Easily detected | ☐ 3 – Noticeable from a distance |
| ☐ Flow Color | ☐ Clear ☐ Brown ☐ Gray ☐ Yellow ☐ Green ☐ Orange ☐ Red ☐ Other* | ☐ 1 – Faint colors in sample bottle | ☐ 2 – Clearly visible in sample bottle | ☐ 3 – Clearly visible in outfall flow |
| ☐ Turbidity | See severity index (Collect sample in bottle) | ☐ 1 – Slight cloudiness | ☐ 2 – Cloudy | ☐ 3 – Opaque |
| ☐ Floatables (Do not include trash) | ☐ Sewage (Toilet Paper, etc.) ☐ Suds ☐ Petroleum (oil sheen) ☐ Other* | ☐ 1 – Few/slight; origin not obvious | ☐ 2 – Indications of origin (e.g., possible suds or oil sheen) | ☐ 3 – Obvious origin |
| ☐ Deposits or Stains | ☐ Oily ☐ Flow Line ☐ Paint ☐ Other* | ☐ 1 – Faint | ☐ 2 – Easily detected | ☐ 3 – Noticeable from a distance |
| ☐ Poor Pool Quality | ☐ Odors ☐ Colors ☐ Floatables ☐ Oil Sheen ☐ Suds ☐ Excessive Algae ☐ Other* | ☐ 1 – Faint | ☐ 2 – Easily detected | ☐ 3 – Noticeable from a distance |
| ☐ Pipe Benthic Growth | ☐ Brown ☐ Orange ☐ Green ☐ Other* | ☐ 1 – Faint | ☐ 2 – Easily detected | ☐ 3 – Noticeable from a distance |
| | TOTAL INDICATOR SCORE (add Severity Index scores): | | | |

*Describe Here:

**Section 7: Action Level (Circle one)**

| **No Suspected Illicit Discharge** (Total Indicator Score: 3 or lower) | **Suspected Illicit Discharge** (Total Indicator Score: 4-7) | **Obvious Illicit Discharge** (Total Indicator Score: 8 or higher) |
|---|---|---|
| No further action required | Open Case Log<br>Refer for Investigation | Open Case Log<br>Refer for Investigation and Corrective Action |

# APPENDIX C

# IDDE DISCHARGE POTENTAL EVALUATION

The City of Camas developed the following IDDE discharge potential evaluation in accordance with section S5.C.3.c.i of the NPDES phase II permit.

Drainage for the City of Camas is defined by three distinct sub-basins which include; Lacamas Lake Basin (A), Lacamas Creek/Washougal River Basin (B), and the Columbia River Basin (C) (See Map). All drainage within the City of Camas is tributary to the Columbia River.

**Lacamas Lake Sub-Basin (A)**

Lacamas Lake is the receiving waters for a much larger basin that drains significant lands in Clark County and City of Vancouver through Lacamas Creek. Lacamas Creek and Dwyer Creek are part of a TMDL study being conducted by Ecology. Lacamas Lake, also on the 303D list, has a long term management plan to reduce upstream pollution including phosphorus that promotes algae growth.
Basin A consists of approximately 6750 acres and is divided into four sub areas; Dwyer Creek, Lacamas Lake Frontage, Fallen Leaf, and Round Lake. This basin represents the newest growth in the community with most of the storm infrastructure installed under the Puget Sound Storm Water Manual. This basin is the largest of the basins within the City and has the most undeveloped area that will ultimately be installed under the new permit requirements and Western Washington Manual. Local land use is a mix of Residential, Light Industrial, and Mixed Use.

- **Dwyer Creek** – all development has storm water treatment and detention facilities. Some legacy roadway and residential drainage without treatment. Industrial Park has major industry located in the area that includes Wafertech, Linear, Sharp, Furuno, Heraeus Shin-itsu, Karcher, and IMT Bodycote. The basin also contains a 18 hole golf course and residential flows.
- **Lacamas Lake Frontage** – This area is almost exclusively residential on the south and east side of the lake and almost all undeveloped land on the north side.

- **Fallen Leaf Lake** – This area is a small basin that drains residential development. The drainage basin has significant steep slopes that are part of the open space network and is susceptible to landslide and erosion.
- **Round lake** – This area drains a mix of legacy and new residential areas

**Lacamas Creek/Washougal River Basin (B)**

Basin B consists of approximately 1600 acres and is divided into two main areas; Downtown area and Frontage residential drainage. Drainage is primarily from older residential neighborhoods and a small amount of commercial property without treatment or detention. Basin A also discharges to Lacamas Creek to the Washougal River to the Columbia River.

- **Downtown** – This area drains to a 24" outfall on Garfield Street into the Washougal River. While the area is primarily residential there are two gas stations and a few restaurants in the basin. A portion of this area was once a combined sewer/storm system.
- **Frontage** – The frontage area along the river have multiple discharge points and service mostly residential areas with a small mix of commercial space.

**Columbia River Basin (C).**

Basin C consists of 2800 acres and contains some of the oldest portions of the system and heaviest land use. The basin has eight sub areas; Brady Creek, Forest Home, SW 6th, Oak Park, Riverwalk, Blue Creek, Downtown and GP mill complex.

- **Forest Home, Oak Park, Blue Creek and SW 6th** – These areas are residential and in most cases has no treatment or detention prior to discharge. Age of system is mixed but is not part of an older combined system.
- **Riverwalk and Brady Creek** - these areas drain newer residential development that includes treatment and detention.
- **Downtown** – This area is some of the oldest infrastructure in the City and serves some residential and our downtown commercial core area. The system was historically part of a combined sewer/storm system that was separated back in the 60's. Two discharges to the Columbia River serve this area; a 27" concrete line that was part of the old combined system and a 30" line that was installed in 1989 to mitigate capacity issues. The 27" line currently runs through the GP mill site and historically had connections that were abandoned. The 30" is a direct line in an easement through the GP mill from the downtown area to the Columbia River that connects to the 27" line at 3rd and Adams to provide added capacity (prior to entering mill property).
- **GP Mill Complex** – not part of the Camas system this area is zoned Heavy Industrial and has been in existence over 100 years. Covered under Permit WA-000025-6

**Selection of screening factors**

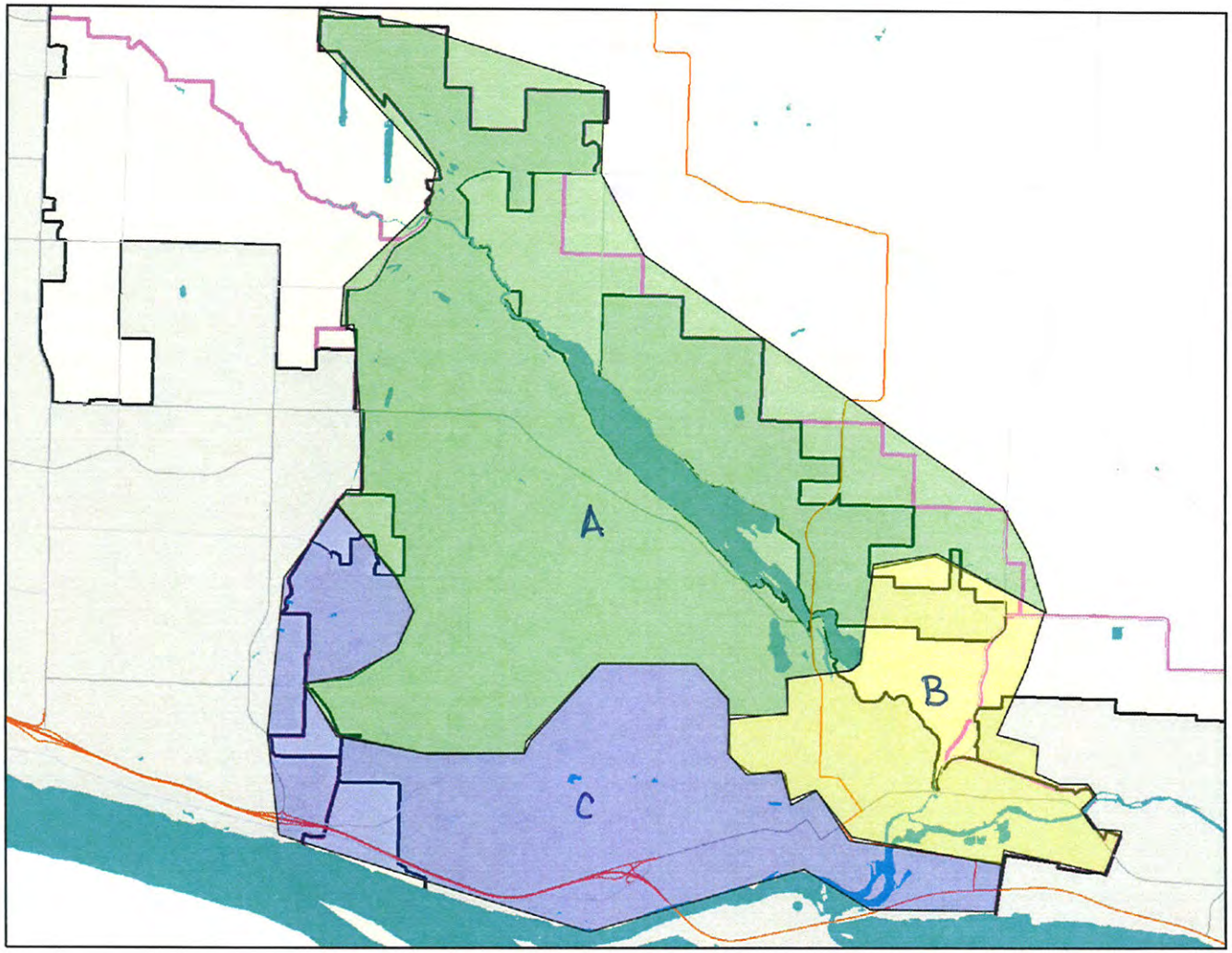
Of the ten recommended screening factors listed in the *Illicit Discharge Detection and Elimination A Guidance Manual for Program Development and Technical Assistance, October 2004,* Camas selected; #3 Density of Generating Sites or Industrial NPDES Storm Water, #4 Storm Water Outfall Density, #5 Age of Sub Watershed Development, #7 Historic Combined

Sewer Systems, #8 Presence of Older Industrial Operations and added primary zoning and landuse index as pertinent to prioritizing areas likely to have illicit discharge.

## SCREENING FACTORS

| BASINS | DENSITY OF GENERATING SITES OF INDUSTRIAL NPDES STORM WATER PERMITS | PRIMARY ZONING AND USE INDEX RES-1. COMM-2, IND-3 | STORM WATER OUTFALL DENSITY | AGE OF SUBWATERSHED DEVELOPMENT | HISTORIC COMBINED SEWER SYSTEMS | PRESENCE OF OLDER INDUSTRIAL OPERATIONS | RAW SCORE | NORMALIZED SCORE |
|---|---|---|---|---|---|---|---|---|
| **COLUMBIA RIVER** | 1 | 2 | 2 | 3 | 3 | 3 | 14 | **2.33** |
| BLUE CREEK BASIN | 0 | 1 | 1 | 2 | 0 | 0 | 4 | 0.67 |
| BRADY CREEK BASIN | 0 | 1 | 1 | 1 | 0 | 0 | 3 | 0.50 |
| SW 6TH BASIN | 0 | 1 | 2 | 2 | 0 | 0 | 5 | 0.83 |
| FOREST HOME | 0 | 1 | 1 | 2 | 1 | 2 | 7 | 1.17 |
| OAK PARK BASIN | 0 | 1 | 1 | 1 | 0 | 0 | 3 | 0.50 |
| RIVER WALK BASIN | 0 | 1 | 1 | 1 | 0 | 0 | 3 | 0.50 |
| DOWNTOWN | 1 | 2 | 1 | 3 | 3 | 3 | 13 | 2.17 |
| **WASHOUGAL RIVER/LACAMAS CREEK SUB-BASIN** | 0 | 2 | 2 | 3 | 3 | 0 | 10 | **1.67** |
| GARFIELD STREET BASIN | 0 | 2 | 1 | 3 | 3 | 0 | 9 | **1.50** |
| 3RD STREET CULVERT BASIN | 0 | 2 | 2 | 2 | 0 | 0 | 6 | 1.00 |
| LACAMAS CREEK FRONTAGE BASIN | 0 | 1 | 1 | 1 | 0 | 0 | 3 | 0.50 |
| **LACAMAS LAKE SUB-BASIN** | 2 | 3 | 1 | 1 | | 0 | 7 | **1.17** |
| FALLEN LEAF BASIN | 0 | 1 | 1 | 1 | 0 | 0 | 3 | 0.50 |
| ROUND LAKE BASIN | 0 | 1 | 1 | 1 | 0 | 0 | 3 | 0.50 |
| DWYER CREEK BASIN | 2 | 3 | 1 | 1 | 0 | 0 | 7 | **1.17** |
| LACAMAS LAKE FRONTAGE BASIN | 0 | 1 | 1 | 1 | 0 | 0 | 3 | 0.50 |

# Stormwater Basin Map




## Legend

Major Roads
- State Route
- Interstate
- Minor Collector
- Major Collector
- State Route
- Interstate

Waterbodies

Rural Centers

City Boundaries

Urban Growth Boundaries

County Boundary - outline

County Boundary

0 6500 13000 19500 ft.

Scale: 1:65,000

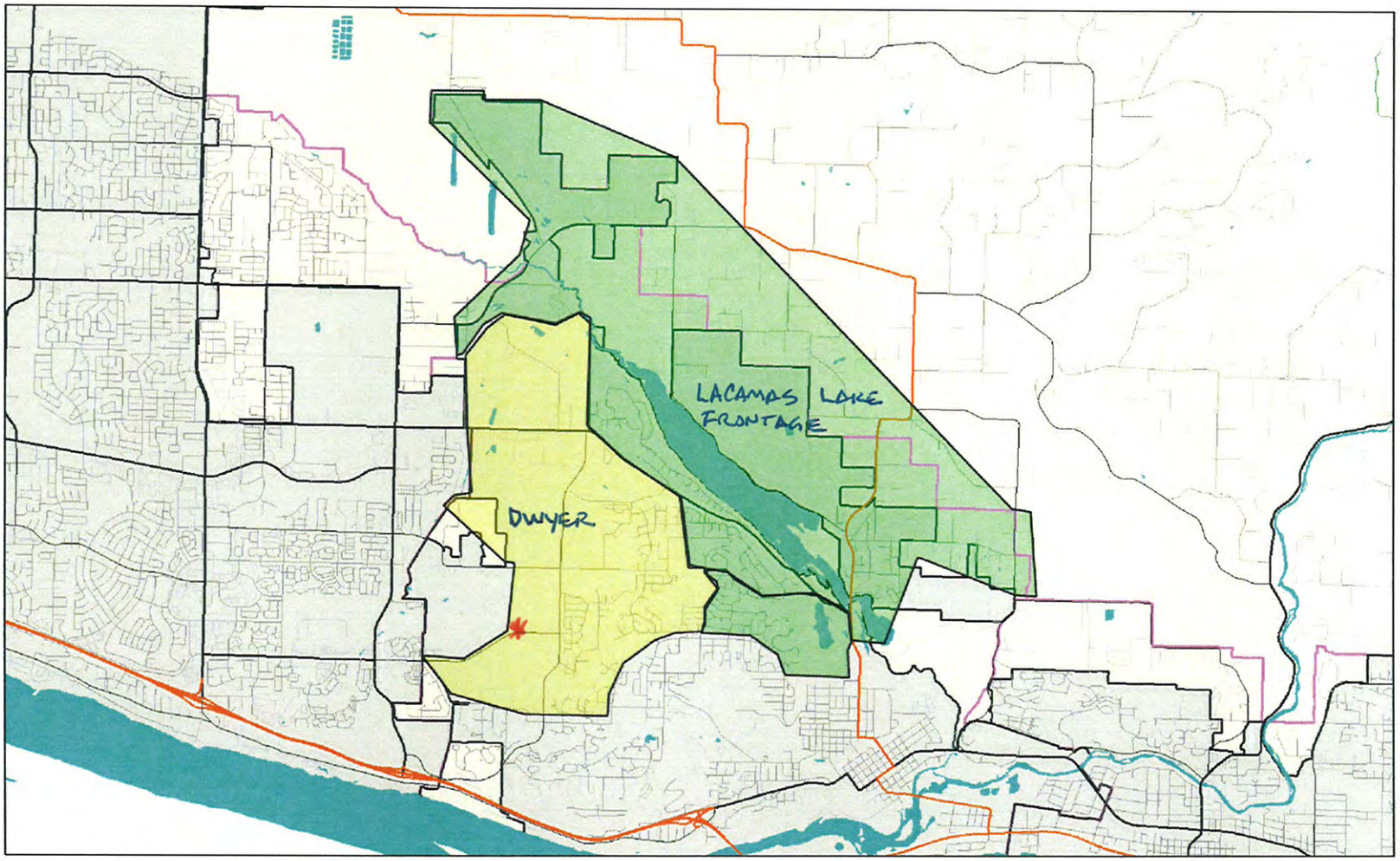
Map center: 45° 36' 58" N, 122° 25' 57" W



Notes:
Green-Lacamas Lake Basin
Blue-Columbia River Basin
Yellow-Washougal River Basin

Data published, and maintained by the Geographic Information System division of the Department of Assessment and GIS, Clark County, Washington

# Lacamas Lake Basin




**Legend**

- Roads
- Alley
- Arterial
- DNR
- DNR (Private Land)
- Driveway
- Interstate
- Interstate Ramp
- Primary Arterial
- Private Roads
- Private Roads w/o Names
- Public Roads
- SR Ramp
- State Route
- Waterbodies
- Rural Centers
- City Boundaries
- Urban Growth Boundaries
- County Boundary - outline
- County Boundary

0 4500 9000 13500 ft.

Map center: 45° 37' 18" N, 122° 25' 50" W

Scale: 1:48,000

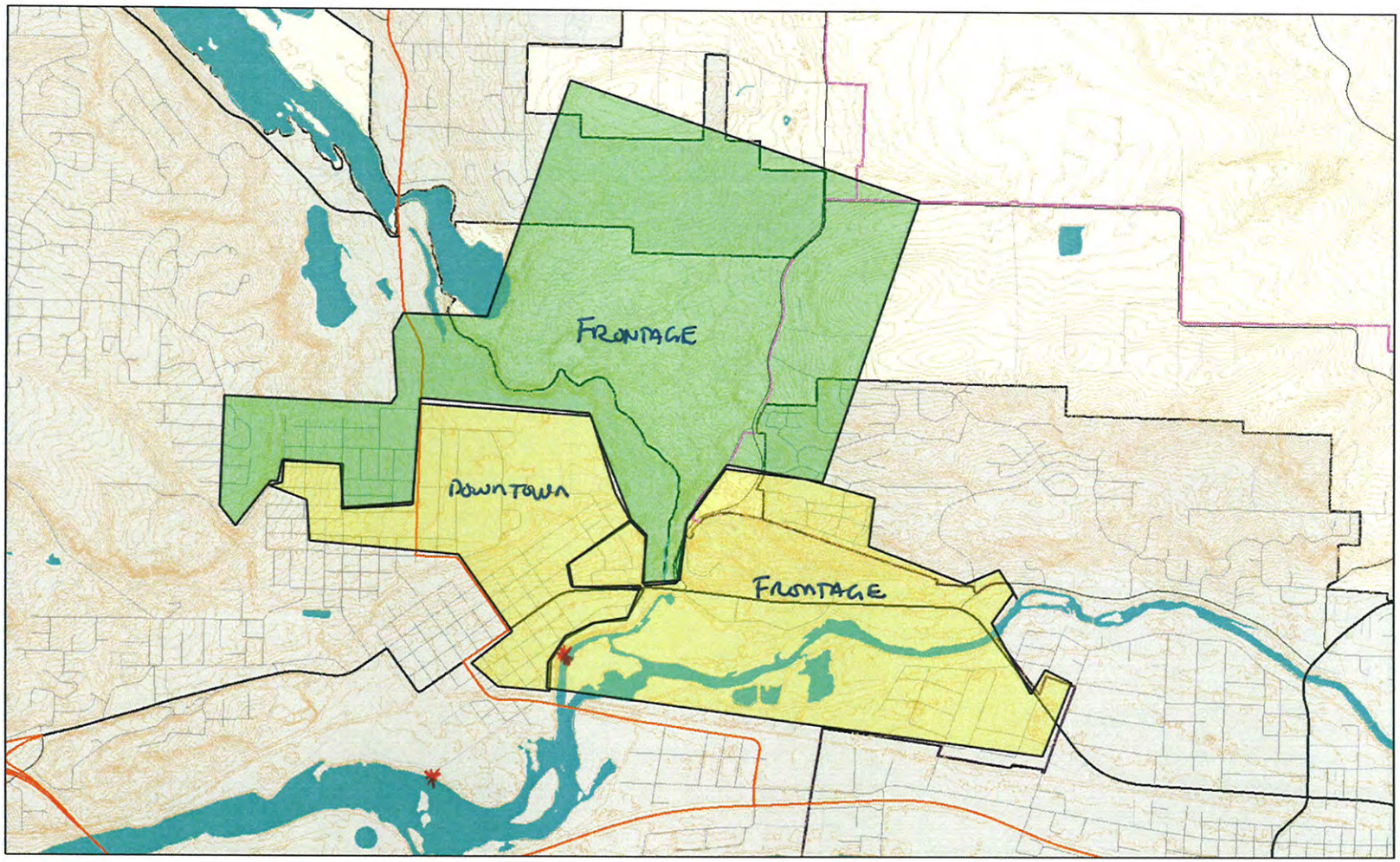


Notes: Green-Low IDP
Yellow-Medium IDP

* Priority outfalls

Data published, and maintained by the Geographic Information System division of the Department of Assessment and GIS, Clark County, Washington

# Washougal River Basin




**Legend**

- Roads
- Alley
- Arterial
- DNR
- DNR (Private Land)
- Driveway
- Interstate
- Interstate Ramp
- Primary Arterial
- Private Roads
- Private Roads w/o Names
- Public Roads
- SR Ramp
- State Route
- 10 Foot Contours
- Waterbodies
- Rural Centers
- City Boundaries
- Urban Growth Boundaries
- County Boundary - outline
- County Boundary

0 1750 3500 5250 ft.

Map center: 45° 35' 43" N, 122° 23' 22" W

Scale: 1:18,486

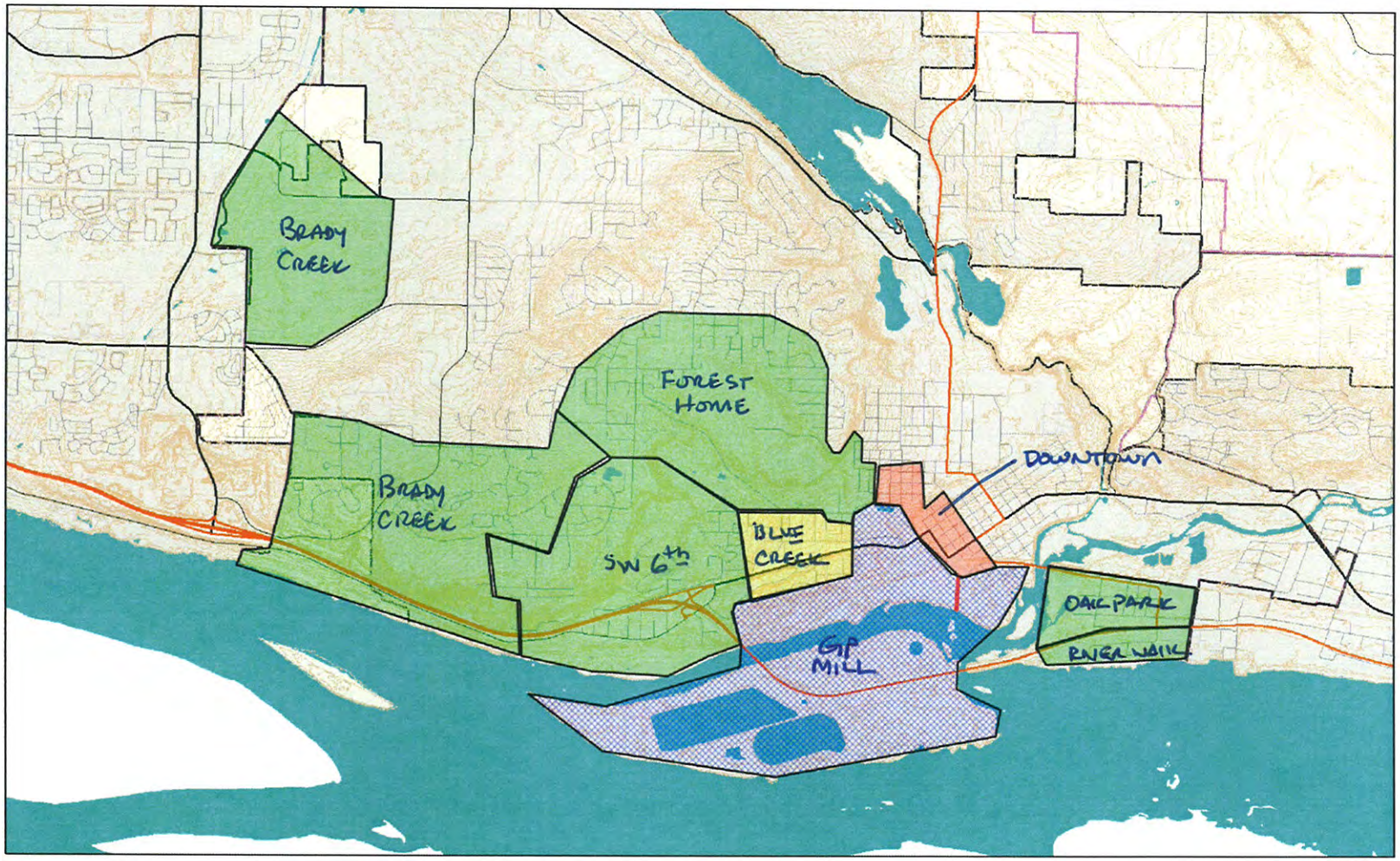


Notes:
Green-Low IDP
Yellow-Medium IDP

* Priority outfall locations

Data published, and maintained by the Geographic Information System division of the Department of Assessment and GIS, Clark County, Washington

# Columbia River Basin




## Legend

- Roads
- Alley
- Arterial
- DNR
- DNR (Private Land)
- Driveway
- Interstate
- Interstate Ramp
- Primary Arterial
- Private Roads
- Private Roads w/o Names
- Public Roads
- SR Ramp
- State Route
- 10 Foot Contours
- Waterbodies
- Rural Centers
- City Boundaries
- Urban Growth Boundaries
- County Boundary - outline
- County Boundary

0 2900 5800 8700 ft.

Map center: 45° 35' 32" N, 122° 25' 43" W

Scale: 1:29,755



Notes:
Green-Low IDP
Yellow-Medium IDP
Red-High IDP

Data published, and maintained by the Geographic Information System division of the Department of Assessment and GIS, Clark County, Washington

# APPENDIX D

# Field Equipment Checklists

## Equipment for Outfall Inspections

- ☐ Minimum 2 person crew
- ☐ Safety Gear – boots, high visibility vest, hard hat, safety cones
- ☐ Field Notebook/Pencils
- ☐ Outfall Inspection Report Forms
- ☐ Map or Aerial Photo of Inspection Area
- ☐ GPS Unit
- ☐ Cell phone w/ charged battery
- ☐ Digital camera w/ charged battery
- ☐ Compass
- ☐ Machete/Clippers
- ☐ Flash light or headlamp
- ☐ Tool Box – hammer, tape measure, duct tape, zip ties
- ☐ Spray paint or other marker
- ☐ First Aid Kit
- ☐ Clear sample bottles
- ☐ Wide mouth container and watch with second hand

## Equipment for Incident Response

- ☐ Minimum 2 person crew
- ☐ Safety Gear – boots, high visibility vest, hard hat, safety cones
- ☐ Field Notebook/Pencils
- ☐ Incident Response Forms
- ☐ Map or Aerial Photo of Area
- ☐ GPS Unit
- ☐ Cell phone w/ charged battery
- ☐ Digital camera w/ charged battery
- ☐ Compass
- ☐ Machete/Clippers
- ☐ Flash light or headlamp
- ☐ Tool Box – hammer, tape measure, duct tape, zip ties
- ☐ Pick or CB grate/cover remover
- ☐ Spray paint or other marker
- ☐ First Aid Kit
- ☐ Field Test Kit (see next)

## Equipment for Field Test Kit

- ☐ Dye Tracer
- ☐ Test Strips
- ☐ Sets of sample bottles for laboratory
- ☐ Coolers (non metallic) and ice packs
- ☐ Laboratory chain of custody forms
- ☐ Nitrile gloves – clean, non talc
- ☐ Multi-parameter probe
- ☐ Turbidimeter
- ☐ Extension sampling pole/sludge pole
- ☐ Kim-wipes
- ☐ Distilled water for equipment decontamination
- ☐ Deionized water for field blanks
- ☐ Storage bags – clean zip-type
- ☐ Garbage bags
- ☐ Sharpie Markers/Pencils/Pens

| Table 56: Techniques to Locate the Discharge | | |
|---|---|---|
| **Technique** | **Best Applications** | **Limitations** |
| Dye Testing | • Discharge limited to a very small drainage area (<10 properties is ideal)<br>• Discharge probably caused by a connection from an individual property<br>• Commercial or industrial land use | • May be difficult to gain access to some properties |
| Video Testing | • Continuous discharges<br>• Discharge limited to a single pipe segment<br>• Communities who own equipment for other investigations | • Relatively expensive equipment<br>• Cannot capture non-flowing discharges<br>• Often cannot capture discharges from pipes submerged in the storm drain |
| Smoke Testing | • Cross-connection with the sanitary sewer<br>• Identifying other underground sources (e.g., leaking storage techniques) caused by damage to the storm drain | • Poor notification to public can cause alarm<br>• Cannot detect all illicit discharges |

**TIP**

The Wayne County Department of the Environment provides excellent training materials on on-site investigations, as well as other illicit discharge techniques. More information about this training can be accessed from their website: http://www.wcdoe.org/Watershed/Programs____Srvcs_/IDEP/idep.htm.

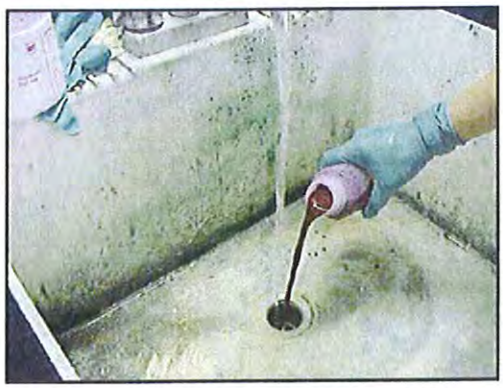


**Figure 63: Dye Testing Plumbing (NEIWPCC, 2003)**

## *Dye Testing*

Dye testing is an excellent indicator of illicit connections and is conducted by introducing non-toxic dye into toilets, sinks, shop drains and other plumbing fixtures (see Figure 63). The discovery of dye in the storm drain, rather than the sanitary sewer, conclusively determines that the illicit connection exists.

Before commencing dye tests, crews should review storm drain and sewer maps to identify lateral sewer connections and how they can be accessed. In addition, property owners must be notified to obtain entry permission. For industrial or commercial properties, crews should carry a letter to document their legal authority to gain access to the property. If time permits, the letter can be sent in advance of the dye testing. For residential properties, communication can be more challenging. Unlike commercial properties, crews are not guaranteed access to homes, and should call ahead to ensure that the owner will be home on the day of testing.

Communication with other local agencies is also important since any dye released to the storm drain could be mistaken for a spill or pollution episode. To avoid a costly and embarrassing response to a false alarm,

crews should contact key spill response agencies using a "quick fax" that describes when and where dye testing is occurring (Tuomari and Thomson, 2002). In addition, crews should carry a list of phone numbers to call spill response agencies in the event dye is released to a stream.

At least two staff are needed to conduct dye tests – one to flush dye down the plumbing fixtures and one to look for dye in the downstream manhole(s). In some cases, three staff may be preferred, with two staff entering the private residence or building for both safety and liability purposes.

The basic equipment to conduct dye tests is listed in Table 57 and is not highly specialized. Often, the key choice is the type of dye to use for testing. Several options are profiled in Table 58. In most cases, liquid dye is used, although solid dye tablets can also be placed in a mesh bag and lowered into the manhole on a rope (Figure 64). If a

**Table 57: Key Field Equipment for Dye Testing**
*(Source: Wayne County, MI, 2000)*

**Maps, Documents**
- Sewer and storm drain maps (sufficient detail to locate manholes)
- Site plan and building diagram
- Letter describing the investigation
- Identification (e.g., badge or ID card)
- Educational materials (to supplement pollution prevention efforts)
- List of agencies to contact if the dye discharges to a stream.
- Name of contact at the facility

**Equipment to Find and Lift the Manhole Safely (small manhole often in a lawn)**
- Probe
- Metal detector
- Crow bar
- Safety equipment (hard hats, eye protection, gloves, safety vests, steel-toed boots, traffic control equipment, protective clothing, gas monitor)

**Equipment for Actual Dye Testing and Communications**
- 2-way radio
- Dye (liquid or "test strips")
- High powered lamps or flashlights
- Water hoses
- Camera

**Figure 64: Dye in a mesh bag is placed into an upstream manhole (left); Dye observed at a downstream manhole traces the path of the storm drain (right)**

longer pipe network is being tested, and dye is not expected to appear for several hours, charcoal packets can be used to detect the dye (GCHD, 2002). Charcoal packets can be secured and left in place for a week or two, and then analyzed for the presence of dye. Instructions for using charcoal packets in dye testing can be accessed at the following website: http://bayinfo.tamug.tamu.edu/gbeppubs/ms4.pdf.

The basic drill for dye tests consists of three simple steps. First, flush or wash dye down the drain, fixture or manhole. Second, pop open downgradient sanitary sewer manholes and check to see if any dye appears. If none is detected in the sewer manhole after an hour or so, check downgradient storm drain manholes or outfalls for the presence of dye. Although dye testing is fairly straightforward, some tips to make testing go more smoothly are offered in Table 59.

**Table 58: Dye Testing Options**

| Product | Applications |
|---|---|
| Dye Tablets | • Compressed powder, useful for releasing dye over time<br>• Less messy than powder form<br>• Easy to handle, no mess, quick dissolve<br>• Flow mapping and tracing in storm and sewer drains<br>• Plumbing system tracing<br>• Septic system analysis<br>• Leak detection |
| Liquid Concentrate | • Very concentrated, disperses quickly<br>• Works well in all volumes of flow<br>• Recommended when metering of input is required<br>• Flow mapping and tracing in storm and sewer drains<br>• Plumbing system tracing<br>• Septic system analysis<br>• Leak detection |
| Dye Strips | • Similar to liquid but less messy |
| Powder | • Can be very messy and must dissolve in liquid to reach full potential<br>• Recommended for very small applications or for very large applications where liquid is undesirable<br>• Leak detection |
| Dye Wax Cakes | • Recommended for moderate-sized bodies of water<br>• Flow mapping and tracing in storm and sewer drains |
| Dye Wax Donuts | • Recommended for large sized bodies of water (lakes, rivers, ponds)<br>• Flow mapping and tracing in storm and sewer drains<br>• Leak detection |

**Table 59: Tips for Successful Dye Testing**
*(Adapted from Tuomari and Thompson, 2002)*

**Dye Selection**
- Green and liquid dyes are the easiest to see.
- Dye test strips can be a good alternative for residential or some commercial applications. (Liquid can leave a permanent stain).
- Check the sanitary sewer before using dyes to get a "base color." In some cases, (e.g., a print shop with a permitted discharge to the sanitary sewer), the sewage may have an existing color that would mask a dye.
- Choose two dye colors, and alternate between them when testing multiple fixtures.

**Selecting Fixtures to Test**
- Check the plumbing plan for the site to isolate fixtures that are separately connected.
- For industrial facilities, check most floor drains (these are often misdirected).
- For plumbing fixtures, test a representative fixture (e.g., a bathroom sink).
- Test some locations separately (e.g., washing machines and floor drains), which may be misdirected.
- If conducting dye investigations on multiple floors, start from the basement and work your way up.
- At all fixtures, make sure to flush with plenty of water to ensure that the dye moves through the system.

**Selecting a Sewer Manhole for Observations**
- Pick the closest manhole possible to make observations (typically a sewer lateral).
- If this is not possible, choose the nearest downstream manhole.

**Communications Between Crew Members**
- The individual conducting the dye testing calls in to the field person to report the color dye used, and when it is dropped into the system.
- The field person then calls back when dye is observed in the manhole.
- If dye is not observed (e.g., after two separate flushes have occurred), dye testing is halted until the dye appears.

**Locating Missing Dye**
- The investigation is not complete until the dye is found. Some reasons for dye not appearing include:
- The building is actually hooked up to a septic system.
- The sewer line is clogged.
- There is a leak in the sewer line or lateral pipe.

## *Video Testing*

Video testing works by guiding a mobile video camera through the storm drain pipe to locate the actual connection producing an illicit discharge. Video testing shows flows and leaks within the pipe that may indicate an illicit discharge, and can show cracks and other pipe damage that enable sewage or contaminated water to flow into the storm drain pipe.

Video testing is useful when access to properties is constrained, such as residential neighborhoods. Video testing can also be expensive, unless the community already owns and uses the equipment for sewer inspections. This technique will not detect all types of discharges, particularly when the illicit connection is not flowing at the time of the video survey.

Different types of video camera equipment are used, depending on the diameter and condition of the storm sewer being tested.

Field crews should review storm drain maps, and preferably visit the site before selecting the video equipment for the test. A field visit helps determine the camera size needed to fit into the pipe, and if the storm drain has standing water.

In addition to standard safety equipment required for all manhole inspections, video testing requires a Closed-Circuit Television (CCTV) and supporting items. Many commercially available camera systems are specifically adapted to televise storm sewers, ranging from large truck or van-mounted systems to much smaller portable cameras. Cameras can be self-propelled or towed. Some specifications to look for include:

- The camera should be capable of radial view for inspection of the top, bottom, and sides of the pipe and for looking up lateral connections.
- The camera should be color.
- Lighting should be supplied by a lamp on the camera that can light the entire periphery of the pipe.

When inspecting the storm sewer, the CCTV is oriented to keep the lens as close as possible to the center of the pipe. The camera can be self-propelled through the pipe using a tractor or crawler unit or it may be towed through on a skid unit (see Figures 65 and 66). If the storm drain has ponded water, the camera should be attached to a raft, which floats through the storm sewer from one manhole to the next. To see details of the sewer, the camera and lights should be able to swivel both horizontally and vertically. A video record of the inspection should be made for future reference and repairs (see Figure 67).


**Figure 65: Camera being towed**

## Smoke Testing

Smoke testing is another "bottom up" approach to isolate illicit discharges. It works by introducing smoke into the storm drain system and observing where the smoke surfaces. The use of smoke testing to detect illicit discharges is a relatively new application, although many communities have used it to check for infiltration and inflow into their sanitary sewer network. Smoke testing can find improper

**Figure 66: Tractor-mounted camera**

**Figure 67: Review of an Inspection video**

connections, or damage to the storm drain system (Figure 68). This technique works best when the discharge is confined to the upper reaches of the storm drain network, where pipe diameters are to small for video testing and gaining access to multiple properties renders dye testing infeasible.

Notifying the public about the date and purpose of smoke testing before starting is critical. The smoke used is non-toxic, but can cause respiratory irritation, which can be a problem for some residents. Residents should be notified at least two weeks prior to testing, and should be provided the following information (Hurco Technologies, Inc., 2003):

- Date testing will occur
- Reason for smoke testing
- Precautions they can take to prevent smoke from entering their homes or businesses
- What they need to do if smoke enters their home or business, and any health concerns associated with the smoke
- A number residents can call to relay any particular health concerns (e.g., chronic respiratory problems)

Program managers should also notify local media to get the word out if extensive smoke testing is planned (e.g., television, newspaper, and radio). On the actual day of testing, local fire, police departments and 911 call centers should be notified to handle any calls from the public (Hurco Technologies, Inc., 2003).

The basic equipment needed for smoke testing includes manhole safety equipment, a smoke source, smoke blower, and sewer plugs. Two smoke sources can be used for smoke testing. The first is a smoke "bomb," or "candle" that burns at a controlled rate and releases very white smoke visible at relatively low concentrations (Figure 69). Smoke bombs are suspended beneath a blower in a manhole. Candles are available in 30 second to three minute sizes. Once opened, smoke bombs should be kept in a dry location and should be used within one year.

The second smoke source is liquid smoke, which is a petroleum-based product that is injected into the hot exhaust of a blower where it is heated and vaporized (Figure 70). The length of smoke production can vary depending on the length of the pipe being

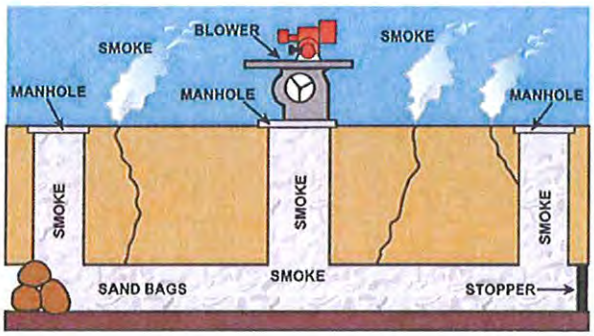



**Figure 68: Smoke Testing System Schematic**

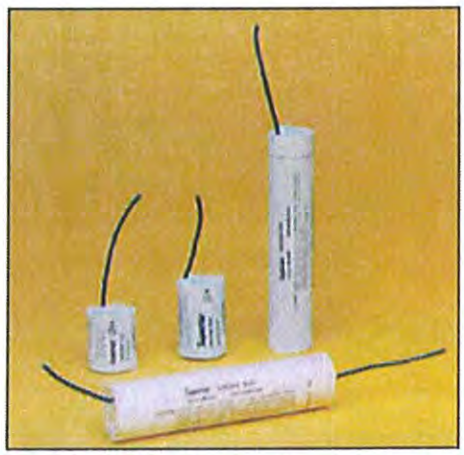


**Figure 69: Smoke Candles**

**Figure 70: Smoke blower**

tested. In general, liquid smoke is not as consistently visible and does not travel as far as smoke from bombs (USA Blue Book).

Smoke blowers provide a high volume of air that forces smoke through the storm drain pipe. Two types of blowers are commonly used: "squirrel cage" blowers and direct-drive propeller blowers. Squirrel cage blowers are large and may weigh more than 100 pounds, but allow the operator to generate more controlled smoke output. Direct-drive propeller blowers are considerably lighter and more compact, which allows for easier transport and positioning.

Three basic steps are involved in smoke testing. First, the storm drain is sealed off by plugging storm drain inlets. Next, the smoke is released and forced by the blower through the storm drain system. Lastly, the crew looks for any escape of smoke above-ground to find potential leaks.

One of three methods can be used to seal off the storm drain. Sandbags can be lowered into place with a rope from the street surface. Alternatively, beach balls that have a diameter slightly larger than the drain can be inserted into the pipe. The beach ball is then placed in a mesh bag with a rope attached to it so it can be secured and retrieved. If the beach ball gets stuck in the pipe, it can simply be punctured, deflated and removed. Finally, expandable plugs are available, and may be inserted from the ground surface.

Blowers should be set up next to the open manhole after the smoke is started. Only one manhole is tested at a time. If smoke candles are used, crews simply light the candle, place it in a bucket, and lower it in the manhole. The crew then watches to see where smoke escapes from the pipe. The two most common situations that indicate an illicit discharge are when smoke is seen rising from internal plumbing fixtures (typically reported by residents) or from sewer vents. Sewer vents extend upward from the sewer lateral to release gas buildup, and are not supposed to be connected to the storm drain system.

**TABLE 1 WATER QUALITY TEST PARAMETERS AND USES**

| Water Quality Test | Use of Water Quality Test | Comments |
|---|---|---|
| **Conductivity** | Used as an indicator of dissolved solids | - Pitt et al. 1993 suggested parameter; EPA Phase II regulations recommended parameter<br>- Typically measured in the field with a probe |
| **Ammonia** | High levels can be an indicator of the presence of sanitary wastewater | - Pitt et al. 1993 suggested parameter; EPA Phase II regulations recommended parameter<br>- Used very often and equipment is readily available; Boston, MA uses a field test kit (see case example) |
| **Surfactants** | Indicate the presence of detergent (e.g., laundry, car washing) | - Pitt et al. 1993 suggested parameter; EPA Phase II regulations recommended parameter<br>- Boston, MA uses a field test kit (see case example) |
| **pH** | Extreme pH values (low or high) may indicate commercial or industrial flows; not useful in determining the presence of sanitary wastewater (which, like uncontaminated baseflows, tends to have a neutral pH, i.e., close to 7) | - Pitt et al. 1993 suggested parameter; EPA Phase II regulations recommended parameter<br>- Typically measured in the field or lab with a probe |
| **Temperature** | Sanitary wastewater and industrial cooling water can substantially influence outfall discharge temperatures. This measurement is most useful during cold weather. | - Pitt et al. 1993 suggested parameter<br>- Measured in the field with a thermometer or probe |
| **Hardness** | Used to distinguish between natural and treated waters | - Pitt et al. 1993 suggested parameter |
| **Total Chlorine** | Used to indicate inflow from potable water sources; not a good indicator of sanitary wastewater because chlorine will not exist in a "free" state in water for long (it will combine with organic compounds) | - Pitt et al. 1993 suggested parameter |
| **Fluoride** | Used to indicate potable water sources in areas where water supplies are fluoridated | - Pitt et al. 1993 suggested parameter |
| **Potassium** | High levels may indicate the presence of sanitary wastewater | - Pitt et al. 1993 suggested parameter |
| **Optical Brighteners (Fluorescence)** | Used to indicate presence of laundry detergents (which often contain fabric whiteners, which cause substantial fluorescence) | -Pitt et al. 1993 suggested parameter<br>-Used by City of Winooski, VT (see case example) |
| **Bacteria (fecal coliform, *E. coli*, and/or *enterococci*)** | Used to indicate the presence of sanitary wastewater | - Used by NHDES (see case example in chapter 5) |