Illicit Discharge Detection and Elimination Program Manual

March 2017

Updated March 2012
Created June 2011

Prepared by:
City of Kenmore
Richard Sawyer, Surface Water Manager
Public Works Department

TABLE OF CONTENTS

OVERVIEW

The City of Kenmore Illicit Discharge Detection and Elimination Program Manual was developed to comply with requirements of the Federal Clean Water Act-National Pollutant Discharge Elimination System Program and the Western Washington Phase II Municipal Stormwater Permit issued by the Washington State Department of Ecology. The intent of this manual is to describe the City's ongoing program designed to detect and identify non-stormwater discharges and illicit connections into the City's MS4. Included in this manual are methodologies appropriate to the characteristics of the City's MS4 and water quality concerns and are consistent with those outlined in *Illicit Discharge Detection and Elimination: A Guidance Manual for Program Development and Technical Assessments* (Center for Watershed Protection, October 2004).

DOCUMENT STRUCTURE

Section 1 Municipal Storm Sewer System (MS4) Mapping Program

Section 2 IDDE and Water Quality Ordinances and Codes

Section 3 Illicit Discharge/Connection/Spill Identification

Section 4 Illicit Discharge/Connection/Spill Removal

Section 5 IDDE Enforcement

Section 6 IDDE Outreach and Education

Section 7 IDDE Training

Appendix A KMC 13.45 Water Quality

Appendix B 2010 Outfall Reconnaissance Inventory (Swamp Creek)

Appendix C 2011 Outfall Reconnaissance Inventory (Lake Washington and Sammamish River)

Appendix D 2012 Outfall Reconnaissance Inventory (Tributary 0057)

ACRONYMS AND DEFINITIONS

AKART means "All Known and Reasonable Technologies"

BMP means Best Management Practice.

Best Management Practice means a schedule of activities, prohibitions of practices, physical structures, maintenance procedures and other management practices undertaken to reduce or prevent increases in runoff quantity and pollution.

CESCL means Certified Erosion and Sediment Control Lead.

Certified Erosion and Sediment Control Lead means an individual who has satisfied the requirements set forth in Ecology's Stormwater Management Manual for Western Washington (Volume II, Chapter 4, BMP C160) for the designation of certified erosion and sediment control lead.

Ecology means the Washington State Department of Ecology.

ESC means Erosion and Sediment Control.

Facility means drainage facilities, including either flow control or water quality facilities.

Flow Control Facility means a drainage facility designed to mitigate the impacts of increased surface and storm water runoff generated by site development in accordance with the drainage requirements in KMC Chapter 13.35. Flow control facilities are designed either, to hold water for a considerable length of time and then release it by evaporation, plant transpiration, or infiltration into the ground, or to hold runoff for a short period of time and then release it to the conveyance system.

IDDE means Illicit Discharge Detection and Elimination

Illicit Connection means any infrastructure connection to the MS4 that is not intended, permitted or used for collecting and conveying stormwater or non-stormwater discharges allowed as specified in this permit (S5.C.3 and S6.D.3). Examples include sanitary sewer connections, floor drains, channels, pipelines, conduits, inlets, or outlets that are connected directly to the MS4.

Illicit Discharge means any discharge to a MS4 that is not composed entirely of stormwater or of non-stormwater discharges allowed as specified in this permit (S5.C.3 and S6.D.3).

Maintenance (also Operations and Maintenance) means those usual activities taken to prevent a decline, lapse, or cessation in the use of currently serviceable structures, facilities, equipment, or systems if there is no expansion of the structure, facilities, equipment, or system and there are no significant hydrologic impacts. Maintenance includes the repair or replacement of non-functional facilities and the replacement of existing structures with different types of structures, if the repair or replacement is required to meet current engineering standards or is required by one or more

environmental permits and the functioning characteristics of the original facility or structure are not changed.

MS4 means Municipal Separate Storm Sewer System

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

(i) Owned or operated by a state, city, town, borough, county, parish, district, association, or other public body (created by or pursuant to state law) having jurisdiction over disposal of wastes, stormwater, or other wastes, including special districts under State law such as a sewer district, flood control district or drainage district, or similar entity, or an Indian tribe or an authorized Indian tribal organization, or a designated and approved management agency under section 208 of the CWA that discharges to waters of Washington State.

(ii) Designed or used for collecting or conveying stormwater.

(iii) Which is not a combined sewer;

(iv) Which is not part of a Publicly Owned Treatment Works (POTW) as defined at 40 CFR 122.2.; and

(v) Which is defined as “large” or “medium” or “small” or otherwise designated by Ecology pursuant to 40 CFR 122.26.

NPDES means National Pollutant Discharge Elimination System.

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

OMPPM means Operations and Maintenance Policies and Procedures Manual.

O&M means Operations and Maintenance. See Maintenance.

RRMPG means Regional Road Maintenance Endangered Species Act Program Guidelines.

Regional Road Maintenance Endangered Species Act Program Guidelines means the manual developed by the Regional Road Maintenance Technical Working Group that provides a consistent, Regional Program that can be used by any agency wishing to limit, reduce or eliminate the prohibition on take of threatened species under the 4(d) Rule (NMFS), special 4(d) rule and/or Section 7 take exemption (USFWS).

SPPM means the Stormwater Pollution Prevention Manual.

Stormwater Pollution Prevention Manual means the manual referenced in KMC 13.45, Water Quality, including supporting documentation referenced or incorporated in the manual, describing best management practices and procedures for eliminating or reducing surface, storm and ground water contamination from existing facilities and existing and new activities not covered by the SWDM.

SWDM means Surface Water Design Manual (King County).

SMMWW means Stormwater Management Manual for Western Washington (Ecology).

Water Quality Facility means a drainage facility designed to reduce pollutants once they are already contained in surface and storm water runoff. Water quality (WQ) facilities are a structural component of best management practices (BMPs). When used singly or in combination, WQ facilities reduce the potential for contamination of both surface and ground waters.

WQ means water quality.

SECTION 1 – MS4 MAP

The City maintains a map of the MS4 using Geographical Information System (GIS) software provided by Environmental Systems Research Institute, Inc (ESRI) called ArcGIS. ArcGIS is industry standard software that is widely used by public and private entities. The City's Permit requires mapping of the municipal separate storm sewer system (MS4), including;

- Known MS4 outfalls and known MS4 discharge points
- Receiving waters, other than ground waters
- Stormwater treatment and flow control BMPs/facilities owned or operated by the City
- Tributary conveyances to all known outfalls and discharge points with a 24-inch nominal diameter or larger, or an equivalent cross-sectional area for non-pipe systems. The following attributes shall be mapped:
    - Tributary conveyance type, material and size where known
    - Associated drainage areas
    - Land use
- All connections authorized after February 16, 2007
- Connections between the MS4 owned or operated by the Permittee and other municipalities or public entities
- Geographical areas served by the MS4 that do not discharge stormwater to surface waters

The City has met or exceeded Ecology's requirements in regards to MS4 mapping. In addition to the requirements set forth by Ecology, the City has also mapped:

- Tributary conveyances to MS4 outfalls and discharge points with less than a 24" nominal diameter or an equivalent cross-sectional area for non-pipe systems
- Privately owned and operated treatment and flow control BMPs/facilities
- Many privately owned and operated conveyances
- Connections authorized before February 16, 2007

The City's MS4 map and associated data can be obtained at any time on the City's website at www.kenmorewa.gov in the Public Works section.

SECTION 2 – WATER QUALITY ORDINANCE

The United States defines an Illicit Discharge as any discharge to a municipal separate storm sewer that is not composed entirely of storm water except discharges pursuant to a NPDES permit (other than the NPDES permit for discharges from the municipal separate storm sewer) and discharges resulting from firefighting activities (40 CFR 122.26(b)(2)).

Revised Code of Washington State (RCW) Chapter 90.48.080 states: It shall be unlawful for any person to throw, drain, run, or otherwise discharge into any of the waters of this state, or to cause, permit or suffer to be thrown, run, drained, allowed to seep or otherwise discharged into such waters any organic or inorganic matter that shall cause or tend to cause pollution of such waters according to the determination of the department, as provided for in this chapter.

The City of Kenmore adopted much of King County's water quality code upon incorporation in 1998, which prohibited the discharge of contaminants into surface, storm, and ground water or the Puget Sound (Chapter 13.45 Kenmore Municipal Code (KMC)). In 2009 and 2016, the City of Kenmore Council updated Chapter 13.45 KMC to continue meeting standards set forth in the City's Permit. The remainder of this section summarizes Chapter 13.45 KMC. The full text of Chapter 13.45 KMC can be found in Appendix A or on the City's webpage.

2.1 Prohibited Discharges

In compliance with the City's Permit, Section S5.C.3.b, Chapter 13.45.020(A) KMC prohibits the discharge of any contaminants into surface and storm water, ground water or the Puget Sound. Contaminants include, but are not limited to, the following:

a. Trash or debris;
b. Construction materials;
c. Petroleum products (oil, gasoline, grease, fuel oil, heating oil, etc…);
d. Antifreeze and other automotive products;
e. Metals in either particulate or dissolved form;
f. Flammable or explosive materials;
g. Radioactive materials;
h. Batteries;
i. Acids, alkalis, or bases;
j. Paints, stains, resins, lacquers, or varnishes;
k. Degreasers and solvents;
l. Drain cleaners;
m. Pesticides, herbicides, or fertilizers;
n. Steam cleaning wastes;
o. Soaps, detergents, or ammonia;
p. Swimming pool backwash;
q. Chlorine, bromine, and other disinfectants;
r. Heated water;
s. Domestic animal wastes;

t. Sewage;
u. Recreational vehicle waste;
v. Animal carcasses;
w. Food wastes;
x. Bark and other fibrous materials;
y. Collected lawn clippings, leaves, or branches;
z. Silt, sediment, or gravel;
aa. Dyes (except as stated in 13.45.030(D)(1));
bb. Chemicals not normally found in uncontaminated water;
cc. Any hazardous material or waste not listed above.

2.2 Allowable Discharges

In compliance with the City's Permit, Section S5.C.3.b.i, the following discharges are not considered prohibited discharges unless the City Manager determines that the type of discharge, whether singly or in combination with other discharges, is causing significant contamination of surface and storm water, ground water or Puget Sound:

1. Spring Water;
2. Diverted stream flows;
3. Uncontaminated water from crawl space pumps, foundation drains, or footing drains;
4. Pumped ground water flows that are uncontaminated;
5. Materials placed as part of an approved habitat restoration or bank stabilization project;
6. Natural uncontaminated surface water or ground water;
7. Flows from riparian habitats and wetlands;
8. Collected rainwater that is uncontaminated;
9. Uncontaminated ground water that seeps into or otherwise enters storm water conveyance systems;
10. Air conditioning condensation;
11. Irrigation water from agricultural sources that is commingled with storm water runoff; and
12. Other types of discharges as determined by the City Manager.

2.3 Conditionally Allowable Discharges

In compliance with the City's Permit, Section S5.C.3.b.ii, Certain discharges are allowed with the application of appropriate Best Management Practices (BMPs). These discharges could apply to certain business and residential activities that have the potential to contribute contaminants to surface and storm water, ground water or Puget Sound and require the use of BMPs from the Stormwater Pollution Prevention Manual (SPPM), or supplemental BMPs as determined by the City Manager, to prevent prohibited discharges.

Common activities identified in the SPPM that require BMPs to prevent prohibited discharges include, but are not limited to, the following:

1. Potable water line flushing;
2. Dust control with water;
3. Automobile and boat washing;
4. Pavement and building washing;

5. Swimming pool and hot tub maintenance;
6. Vehicle and equipment repair and maintenance;
7. Building repair and maintenance;
8. Landscaping activities and vegetation management;
9. Hazardous waste handling;
10. Solid and food waste handling; and
11. Application of pesticides or other chemicals (other than landscaping maintenance).

2.4 Prohibited Discharges Exceptions

Exceptions are provided for prohibited discharges including:

1. Dye testing is allowable but requires verbal notification to the City Manager at least one day prior to the date of test;
2. A person is not in violation for a prohibited discharge if:
    a. That person has properly designed, constructed, implemented and is properly maintaining BMPs and is using the most current methodology that can be reasonably required for preventing, controlling or abating the pollutants associated with a discharge (known as AKART or all known and reasonable technologies), but contaminants continue to enter surface and storm water or ground water; or
    b. That person can demonstrate that there are no additional contaminants being discharged above the background conditions of the water entering the site.
3. A person who has properly designed, constructed, implemented and maintained BMPs is still liable for any prohibited discharges through illicit connections, dumping, spills or other discharges not addressed by said BMPs.
4. Emergency response activities

2.5 Stormwater Pollution Prevention Manual

The City adopted the 2016 King County Stormwater Pollution Prevention Manual (with addendum) to provide BMPs for commercial, multi-family and residential properties covering a broad spectrum of activities that have the potential to create prohibited discharges. The Stormwater Pollution Prevention Manual is available on the City's webpage at www.kenmorewa.gov.

2.6 Enforcement

The City addresses nonhazardous illicit discharge violations by first providing public education, warnings, technical assistance and requiring the implementation of BMPs, and when necessary, AKART, as the primary methods of gaining compliance with Chapter 13.45 KMC. If the illicit discharge poses a hazard to public health, safety, or welfare, endangers any property, adversely affects the safety and operation of City Right-of-Way, utilities and/or property owned by the City, or the violation is the result of a flagrant act then the City may immediately take action and impose penalties.

SECTION 3 – ILLICIT DISCHARGE IDENTIFICATION

Section S.5.C.3.c of the Permit requires the City to implement an ongoing program designed to detect and identify non-stormwater discharges and illicit connections into the City's MS4. In addition to responding to citizen complaints, calls to the City's IDDE hotline, staff reporting, or other methods of receiving notifications regarding IDDE issues, the City also conducts annual field screening of the City's MS4 using methodology described in *Illicit Discharge Detection and Elimination: A Guidance Manual for Program Development and Technical Assessments* (Center for Watershed Protection, October 2004).

3.1 Field Screening

The City has incorporated field screening into the annual catch basin inspection program, which is conducted each summer. Seasonal staff are trained to look for certain indicators during each inspection, such as odor, discoloration, unseasonal flow during dry weather, staining and suds. If an indicator is observed during an inspection then the issue is documented, photographed and a water quality service request is initiated in the City's tracking software.

Once a potential illicit discharge/connection/spill has been identified, the inspector will begin the process to trace the source and then characterize the discharge.

3.2 Source Tracing – Drainage 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 catch basins 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 the Drainage Area Investigation method described next in this section.

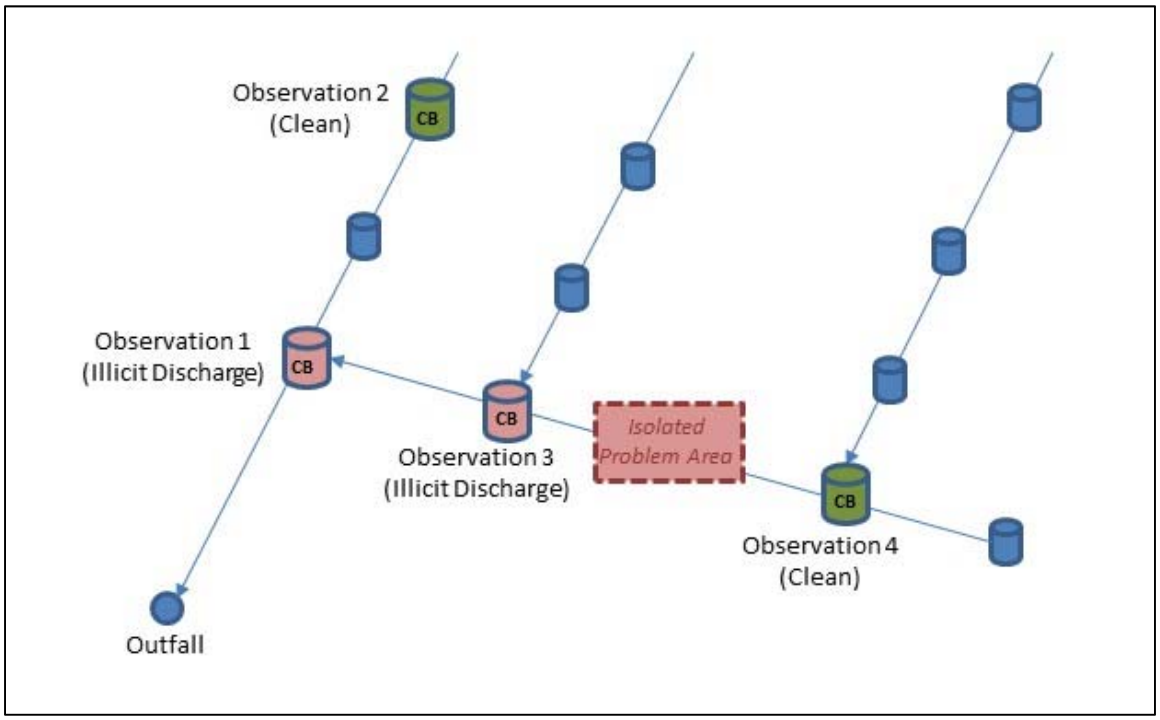
Inspectors work progressively upstream from the discharge and inspect catch basins until indicators reveal that the discharge is no longer present. Catch basin observations can be time-consuming, but they are generally a necessary step before conducting other tests. In particularly large storm drain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

Drainage network investigations include the following steps (Visualized in Figure 3-1):

1. Utilize the MS4 map and identify major branches of the drainage network
2. Starting from the discharge point, observe the next upstream catch basin or junction to see if the presence of indicators continue.
3. Repeat observations at each upstream catch basin or junction until a junction is found without an indicator; the discharge source is likely located between the junction with no presence of indicators and the next downstream junction.

4. Work downstream from the "clean" catch basin or junction to isolate the location where the polluted discharge is entering the storm drain system.
5. If the indicator source is from private property then begin efforts to contact property owner. If there is an immediate danger to the public and environment then the City may initiate a response right away.
6. Document all information in the water quality service request.

Figure 3-1 The drainage network investigation isolates the location where an illicit discharge is entering the MS4.



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 Inspections, and
- Smoke Testing.

The Center for Watershed Protection's *Illicit Discharge Detection and Elimination: A Guidance Manual for Program Development and Technical Assessments* provides more detailed instructions for employing these testing techniques. The manual can be found on the U.S. Environmental Protection Agency's webpage.

3.3 Source Tracing – Drainage Area Investigations

The source of some illicit 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 (see table 3-1). However, drainage area investigations are generally not helpful in tracing sewage discharges, since they are not related to a specific land use.

Table 3-1
Common Discharges and Potential Sources

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

Inspectors identify likely discharge sources by consulting City land use and MS4 maps to identify areas where the illicit discharge is likely entering the MS4. Inspectors will conduct a windshield survey of the drainage area to confirm and identify potential sources of the discharge. Once potential discharge sites are identified, inspectors conduct individual site inspections to locate the specific source of the illicit discharge. In some cases, dye testing may be needed to confirm that a suspected activity is actually draining into the MS4.

3.4 Source Tracing – Characterization

Source tracing and characterization of illicit discharges occur simultaneously. At times, initial characterization of a discharge will assist the inspector if the pollutant is from a particular land use or activity that narrows down the search area. Conversely, finding the discharge source may identify the pollutant. Characterization of the illicit discharge is needed to establish priority, develop the appropriate response and continue to the next step of discharge elimination.

Often, the inspector is able to identify (with reasonable confidence) what the suspected pollutant is and what/where the source is. Table 3-2 characterizes the nature of illicit discharges and outlines priority levels to assist the inspector 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. The Permit states that illicit discharge investigations should begin within seven days, on average, of identifying a problem. In most cases, the City responds faster than the required timeline. Hazardous discharges are investigated immediately.

Table 3-2
Source Investigation Priority Levels

Priority Level	Suspected Pollutants		Response Time (Work Days)
1	• 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	1-2
2	• Ammonia • Construction Runoff (Silt, Sediment, Gravel)	• Detergents • Food Waste (FOG) • Soap	3-5
3	• Car Washing • Pressure Washing Waste • Spa or Pool Water	• Steam Cleaning • Yard Waste	5-7
4	• Animal Carcasses • Bacteria • Construction Materials • Debris	• Foam • Rust • Trash • Other	10

Utilizing field screening techniques during annual MS4 inspections, inspectors are able to identify illicit discharges, such as the one above, for elimination.

On rare occasions, discharge characterization and source tracing may require analytical analysis in order to characterize the discharge and locate the source. Table 3-3 shows the equipment and parameters used by inspectors. Inspectors also have the ability to collect discharge samples for analysis at a certified lab, if needed.

Table 3-3
Equipment and Illicit Discharge Indicators

Indicator	Instrument	Method	Accuracy	Range
Temperature	YSI 63	Thermistor Sensor	±0.1°C	
pH	YSI 63	Combination Sensor with Gel Reference	±0.1 unit within 10°C of calibration ±0.2 unit within 20°C of calibration	0-14
Conductivity	YSI 63	Four Electrode Cell Sensor	±0.5% full scale and 0.1 uS/cm resolution	0 to 499.0 us/cm
Salinity	YSI 63	ASTM document *Standard Methods of Test for Electrical Conductivity of Water and Industrial Wastewater*, ASTM Designation D1125-82, and *OIML Recommendation Number 56*	±0.1 ppt	
Turbidity	LaMotte 2020e Turbidity Meter	USEPA Method 180.1	±2% NTU ±3% NTU	0-100 NTU >100 NTU
Ammonia Nitrogen	LaMotte Smart2 Colorimeter	Nesslerization		0.00-4.00 ppm
Fluoride	LaMotte Smart2 Colorimeter	SPADNS		0.00-2.00 ppm
Potassium	LaMotte Smart2 Colorimeter	Tetraphenylboron		0.0-10.0 ppm
Surfactants	LaMotte Smart2 Colorimeter	Ion Pair Estraction-Bromophenol Blue Indicator		0.5-8.0 ppm as Linear Alkyl Sulfonates (LAS)
Fecal Coliform	AMTEST Labs	SM9222D		

Collecting water for turbidity testing

Hand held meters can provide quick results

Table 3-4, on the following page, shows how analytical results may be interpreted to assist the inspector in characterizing the illicit discharge and tracing the source.

Table 3-4 Water Quality Test Parameters and Uses					
Water Quality Test	**Use of Water Quality Test**	**Sewage**	**Washwater**	**Tap Water**	**Industrial or Commercial Liquid Wastes**
Temperature	Sanitary wastewater and industrial cooling water can substantially influence outfall discharge temperatures.	⊙	N/A	N/A	⊙
pH	Extreme pH values (high or low) may indicate commercial or industrial flows. Not useful in determining the presence of sanitary wastewater (tends to have a neutral pH like uncontaminated base flows)	○	⊙	○	⊙
Water Quality Test	**Use of Water Quality Test**	**Sewage**	**Washwater**	**Tap Water**	**Industrial or Commercial Liquid Wastes**
Conductivity	Used as an indicator of dissolved solids. Used to distinguish between seawater and stormwater.	⊙	⊙	○	⊙
Salinity					
Turbidity		⊙	⊙	○	⊙
Ammonia	High levels can be an indicator of the presence of sanitary wastewater.	●	⊙	○	⊙
Fluoride	Indicates presence of potable water.	○	○	●	⊙
Potassium	High levels may indicate the presence of sanitary sewer.	⊙	○	○	●
Surfactants	Indicates the presence of detergent (e.g. laundry, car washing)	●	●	○	⊙
Fecal Coliform	Indicates presence of bacteria found in sanitary sewer or septic systems.	⊙	○	○	○

Source: *Illicit Discharge Detection and Elimination: A Guidance Manual for Program Development and Technical Assessments* (Center for Watershed Protection, October 2004)

● Can almost always (>80% of samples) distinguish this discharge from clean flow types (e.g. tap water or natural water). For tap water, can distinguish from natural water.

⊙ Can sometimes (>50% of samples) distinguish this discharge from clean flow types depending on regional characteristics, or can be helpful in combination with another parameter.

○ Poor indicator. Cannot reliably detect illicit discharges, or cannot detect tap water.

N/A Data are not available to assess the utility of this parameter for this purpose

3.5 Historical Illicit Discharge Identification Programs

Past efforts to identify illicit discharges and connections included the Outfall Reconnaissance Inventory (ORI) program, which was required by the City's 2007 Permit, but discontinued in following Permits. The ORI visually inspected known outfalls from the City's MS4 in an effort to identify areas of obvious pollution or non-stormwater discharges. Outfall inspections located potential problem areas by identifying outfalls that were flowing during dry weather (potential illicit connection) or outfalls that had illicit discharge indicators, such as high turbidity, strong odors, unusual colors, high Fluoride levels, high ammonia/potassium ratios, high surfactant levels or high fecal coliform levels.

In summer 2010 the City conducted an ORI on the main channel of Swamp Creek, Muck Creek, Little Swamp Creek and five tributaries to Swamp Creek. A copy of the 2010 Swamp Creek ORI Summary can be found in Appendix B.

In summer 2011 the City conducted an ORI on Lake Washington and Sammamish River. A copy of the 2011 Sammamish River and Lake Washington ORI Summary can be found in Appendix C.

In summer 2012 the City conducted an ORI on Tributary 0057. A copy of the 2012 Tributary 0057 ORI Summary can be found in Appendix D.

Regionally, ORIs did not prove to be effective at discovering illicit discharges and connections. Kenmore discovered no illicit discharges or connections during the Swamp Creek, Muck Creek, Little Swamp Creek, Lake Washington, Sammamish River or Tributary 0057 ORIs. However, the ORIs did provide Kenmore with valuable information in regards to unknown outfall and MS4 components, which were added to the City's MS4 maps. Kenmore has had more success in identifying and removing illicit discharges through citizen reporting and annual inspections.

SECTION 4 – ILLICIT DISCHARGE ELIMINATION

Once an illicit discharge has been identified, traced and characterized, City staff will initiate private property site entry procedures (if needed), notify the property owner or operator of the problem and provide the appropriate technical assistance needed to eliminate the illicit discharge. Ideally, property owners will voluntarily comply with eliminating illicit discharges. If illicit discharges have occurred on City property or right-of-way and the source or responsible party cannot be identified, City crews will eliminate the illicit discharge and take appropriate actions to correct the issue.

4.1 Corrective Action – Education and Technical Assistance

The City responds to illicit discharges, illicit connections or illegal dumping activities with an escalating level of enforcement response. Corrective actions will initially focus on education and technical assistance to promote voluntary compliance and then escalate to increasingly severe enforcement actions if voluntary compliance is not obtained. The Surface Water Program Manager and Code Enforcement Officer use their judgment in exercising the right mix of compliance assistance and enforcement to eliminate illicit discharges. The City may immediately levy fines if the violation is found to be willful, intentional or egregious.

In the event the violation constitutes an immediate danger to public health or safety, the City is authorized to enter upon the subject property and take any and all measures necessary to abate the violation and/or restore the property. Any expense related to such remediation shall be fully reimbursed by the property owner and/or responsible party to the City.

Voluntary Compliance

The preferred approach to address illicit discharge problems is to pursue voluntary compliance through education and technical assistance. Often, business operators and property owners are not aware of the existence of illicit connections or activities on their properties that may constitute an illicit 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 are 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. Inspectors will also provide the property owner or operator with Stormwater Pollution Prevention Manual BMP documents (if applicable).

Operational Problems

Some illicit discharges are the result of operational practices (such as washing vehicles outside or improperly storing materials). Property owners are responsible for correcting operational problems that are leading to illicit discharges to the MS4. This could include moving washing activities indoor or under cover, 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 property owners/managers in order to eliminate illicit discharges.

Structural Problems

Illicit connections (which are producing illicit discharges) 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.

Erosion and Sediment Control Problems

Illicit discharges are often attributed to erosion issues on construction sites. City inspectors will enforce permit conditions to control erosion and sediment issues on construction sites. Voluntary compliance is expected and required. If necessary, inspectors have the ability to issue stop work orders.

Discharges that pose a threat to human health and the environment may require immediate response.

Surface staining is an indicator that inspectors use to identify illicit discharges.

4.2 Corrective Action – Code Enforcement

When voluntary compliance does not eliminate the illicit discharge, the City is required to pursue enforcement action. Table 4-1 outlines the detailed enforcement steps. More serious violations or continued non-compliance may warrant a more aggressive, enforcement oriented approach.

Table 4-1 City of Kenmore IDDE Enforcement Steps

Preliminary Actions Characterization & Source Tracing		Open Service Request ↓	
		Source Tracing & Characterization Illicit Discharge ↓	
		Confirm Illicit Discharge Determine Responsible Party ↓	
Step 1 Initial Actions	↓ Flagrant Act and/or Poses Danger to Public Skip to Step 3	Alert Owner to Problem Education & Technical Assistance Correction Notice to Owner ↓	
		Voluntary Compliance ↓	
		Send Summary Letter and Provide Technical Support ↓	
		Follow-up Site Visit to Verify Compliance ↓	→ Problem Corrected ↓ Close Service Request
Step 2 Follow-up Actions		Problem Persists ↓	
		Notice of Violation Compliance Date ↓	
		Follow-up Site Visit to Verify Compliance ↓	→ Problem Corrected ↓ Close Service Request
Step 3 Final Actions		Problem Persists ↓	
		Second Notice of Violation ↓	
		City Corrects Structural Problems at Owner Expense *(optional)* ↓	
		Assess fines and/or Civil Penalties ↓	→ Problem Corrected ↓ Close Service Request
		Refer Unresolved Problems to City Manager and City Attorney	

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 will be included in all violation notices.

The 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 are responsible for reimbursing the City for any costs occurred in correcting IDDE problems.

Illicit Discharge violations are subject to fines and penalties under Chapters 1.15, 1.20 and 13.45 KMC and other enforcement provisions adopted by rule. Fines and penalties include:

- An amount reasonably determined to be equivalent to the economic gain as a result of the violation (Chapter 13.45 KMC), and
- An amount, up to $25,000, that is reasonably based upon the gravity and nature of the violation (Chapter 13.45 KMC), and
- Reimbursement of all costs incurred by the City in response to the violation (Chapters 13.45 & 1.20 KMC), and
- Responsible person(s) is guilty of a misdemeanor (Chapter 1.15 KMC), and
- Monetary fines of $250.00 per day that violation occurs up to $5,000 (Chapter 1.15 KMC), and
- Imprisonment up to one year (Chapter 1.15 KMC).

SECTION 5 – EDUCATION

The Permit requires the City to inform public employees, businesses and the general public of hazards associated with illegal discharges and improper disposal of waste.

5.1 Employee Education

Field personnel are trained on identifying potential illicit discharges and connections. Personnel responsible for conducting investigations or inspections are trained accordingly. Construction site inspectors receive erosion and sediment control training and certification, if needed.

5.2 General Public Education

The City has implemented many programs aimed at educating the general public on how stormwater drainage systems operate and the hazards associated with polluting runoff. Educational demonstrations and materials are presented at community events by City staff. Outreach is also provided to Kenmore residents via newsletters, online media and public advertisements both locally and through regional partnerships. The City also partners with other jurisdictions to provide educational material to school children, which includes outreach regarding illicit discharges.

5.3 Business Education

The City has adopted the Kenmore Stormwater Pollution Prevention Manual (SPPM). The SPPM identifies Best Management Practices (BMPs) for commercial, multi-family and residential properties for activities that have the potential to contaminate surface, storm or groundwater.

The City conducts Water Quality Audits for commercial and multi-family properties as needed or in response to inspection findings. Water Quality Audits provide assistance to property owners and assures that BMPs are correctly chosen and implemented. The City has also provided spill kits and drainage maps to many businesses in Kenmore. When receiving the spill kits, the business owners and employees received training and education on how to avoid and respond to spills.

SECTION 6 – TRAINING

Staff responsible for identification, investigation, termination, cleanup and reporting of illicit discharges, including spills and illicit connections are trained to conduct these activities. Additionally, field staff that as part of their normal job responsibilities might come into contact with or otherwise observe an illicit discharge or illicit connection to the MS4 are trained on the identification of an illicit discharge/connection and on the proper procedures for reporting and responding to the illicit discharge/connection. Follow-up training to all field staff is provided as needed.

APPENDIX A – CHAPTER 13.45 KENMORE MUNICIPAL CODE

13.45.010 Purpose.

A. The purpose of this chapter is to protect the City's surface and groundwater quality by providing minimum requirements for reducing and controlling the discharge of contaminants. The city council recognizes that water quality degradation can result either directly from one discharge or through the collective impact of many small discharges. Therefore, this chapter prohibits the discharge of contaminants into surface water and stormwater and groundwater, and outlines preventive measures to restrict contaminants from entering such waters. These measures include the implementation of best management practices (BMPs) by the residents of the City.

B. The city council finds this chapter is necessary to protect the health, safety and welfare of the residents of the City and the integrity of the City's resources for the benefit of all by: minimizing or eliminating water quality degradation; preserving and enhancing the suitability of waters for recreation, fishing, and other beneficial uses; and preserving and enhancing the aesthetic quality and biotic integrity of the water. The city council recognizes that implementation of this chapter is required under the Clean Water Act, 33 U.S.C. 1251 et seq. In meeting the intent of the Clean Water Act, the city council also recognizes the importance of maintaining economic viability while providing necessary environmental protection and believes this chapter helps achieve both goals. [Ord. 16-0428 § 10 (Att. F).]

13.45.020 Discharges into City waters.

A. It is unlawful for any person to discharge any contaminants into surface water and stormwater or groundwater. Contaminants 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 solvents;

12. Drain cleaners;

13. Pesticides, herbicides, or fertilizers;

14. Steam cleaning wastes;

15. Soaps, detergents, or ammonia;

16. Swimming pool backwash;

17. Chlorine, bromine, and 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. Collected lawn clippings, leaves, or branches;

26. Silt, sediment, or gravel;

27. Dyes (except as stated in subsection (E)(1) of this section);

28. Chemicals not normally found in uncontaminated water; and

29. Any hazardous material or waste not listed above.

B. Any connection, identified by the city manager, that could convey anything not composed entirely of surface water and stormwater directly to surface water and stormwater or groundwater is an illicit connection and is prohibited, with the following exceptions:

1. Connections conveying allowable discharges;

2. Connections conveying discharges pursuant to an NPDES permit (other than an NPDES stormwater permit) or a State waste discharge permit; and

3. Connections conveying effluent from on-site sewage disposal systems to subsurface soils.

C. This section applies to certain business and residential activities that have the potential to contribute pollutants to stormwater runoff or directly to receiving waters. To prevent a prohibited discharge, BMPs from the Stormwater Pollution Prevention Manual, or supplemental BMPs as determined necessary by the city manager, shall be applied to the activities identified in the Stormwater Pollution Prevention Manual. Examples of common activities identified in the Stormwater Pollution Prevention Manual that might result in prohibited discharges include, but are not limited to, the following:

1. Potable water line flushing;

2. Dust control with water;

3. Automobile and boat washing;

4. Pavement and building washing;

5. Swimming pool and hot tub maintenance;

6. Vehicle and equipment repair and maintenance;

7. Building repair and maintenance;

8. Landscaping activities and vegetation management;

9. Hazardous waste handling;

10. Solid and food waste handling; and

11. Application of pesticides or other chemicals (other than landscaping maintenance).

D. The following types of discharges shall not be considered prohibited discharges for the purpose of this chapter unless the city manager determines that the type of discharge, whether singly or in combination with other discharges, is causing significant contamination of surface water and stormwater or groundwater:

1. Spring water;

2. Diverted stream flows;

3. Uncontaminated water from crawl space pumps, foundation drains, or footing drains;

4. Pumped groundwater flows that are uncontaminated;

5. Materials placed as part of an approved habitat restoration or bank stabilization project;

6. Natural uncontaminated surface water or groundwater;

7. Flows from riparian habitats and wetlands;

8. Collected rainwater that is uncontaminated;

9. Uncontaminated groundwater that seeps into or otherwise enters stormwater conveyance systems;

10. Air conditioning condensation;

11. Irrigation water from agricultural sources that is commingled with stormwater runoff; and

12. Other types of discharges as determined by the city manager.

E. Exceptions.

1. Dye testing is allowable but requires verbal notification to the city manager at least one day prior to the date of test.

2. A person does not violate subsections A and B of this section if:

a. That person has properly designed, constructed, implemented and is properly maintaining BMPs, and is carrying out AKART as required by this chapter, but contaminants continue to enter surface water and stormwater or groundwater; or

b. That person can demonstrate that there are no additional contaminants being discharged from the site above the background conditions of the water entering the site.

3. A person who, under subsection (E)(2) of this section, is not in violation of subsections A and B of this section is still liable for any prohibited discharges through illicit connections, dumping, spills, or other discharges not addressed by BMPs satisfying subsection (E)(2) of this section that allow contaminants to enter surface water and stormwater or groundwater.

4. Emergency response activities or other actions that must be undertaken immediately or within a time too short to allow full compliance with this chapter in order to avoid an imminent threat to public health or safety shall be exempt from this section. The city manager may specify actions that qualify for this exception in City procedures. A person undertaking emergency response activities shall take steps to ensure that the discharges resulting from such activities

are minimized to the greatest extent possible. In addition, this person shall evaluate BMPs and the site plan, where applicable, to restrict recurrence. [Ord. 16-0428 § 10 (Att. F).]

13.45.030 Stormwater Pollution Prevention Manual.

A. Adoption. The King County Stormwater Pollution Prevention Manual (SPPM), dated April 2016, as modified by subsection B of this section, is hereby adopted for use in the City. Revisions of the SPPM by King County shall be applicable in the City only if approved by the city council.

B. Modifications to the Stormwater Pollution Prevention Manual. The city council adopts the Kenmore Addendum to the 2016 King County Stormwater Pollution Prevention Manual for the following purposes:

1. To translate specific wording or reference from King County to the City;

2. To cross-reference City ordinances and City maps in lieu of King County ordinances and maps;

3. To provide a linkage or reference to other City requirements such as more restrictive requirements outlined in basin plans and the City's critical areas ordinances; and

4. To provide exceptions and additions to the KCSWDM.

C. Compliance with this chapter shall be achieved through the use of best management practices described in the Stormwater Pollution Prevention Manual. In applying the Stormwater Pollution Prevention Manual, the city manager shall first require the implementation of source control BMPs. If these are not sufficient to prevent contaminants from entering surface water and stormwater or groundwater, the city manager may require implementation of treatment BMPs, as set forth in AKART. The city manager will provide, upon reasonable request, available technical assistance materials and information, and information on outside financial assistance options to persons required to comply with this chapter.

D. In applying the Stormwater Pollution Prevention Manual to prohibited discharges from normal single-family residential activities, the city manager shall use public education and warnings as the primary method of gaining compliance with this chapter and shall not use citations, notice and orders, assessment of civil penalties and fines, or other compliance actions as authorized in Chapter 1.20 KMC, unless the city manager determines:

1. The discharge from a normal single-family residential activity, whether singly or in combination with other discharges, is causing a significant contribution of contaminants to surface water and stormwater or groundwater; or

2. The discharge from a normal single-family residential activity poses a hazard to the public health, safety or welfare, endangers any property or adversely affects the safety and operation of City right-of-way, utilities or other City-owned or maintained property.

E. Persons implementing BMPs through another Federal, State, or local program shall not be required to implement the BMPs prescribed in the Stormwater Pollution Prevention Manual, unless the city manager determines the alternative BMPs are ineffective at reducing the discharge of contaminants. If

the other program requires the development of a stormwater pollution prevention plan or other best management practices plan, the person shall make their plan available to the City upon request. Persons who qualify for exemptions include, but are not limited to, persons who are:

1. Required to obtain a general or individual NPDES permit from the Washington State Department of Ecology;

2. Implementing and maintaining, as scheduled, a City-approved farm management plan;

3. Implementing BMPs in compliance with Chapter 18.70 KMC;

4. Implementing BMPs in compliance with the management program of the City's NPDES permit;

5. Engaged in forest practices, with the exception of forest practices occurring on lands platted after January 1, 1960, or on lands being converted to another use, or when regulatory authority is otherwise provided to local government by RCW 76.09.240; or

6. Identified by the city manager as being exempt from this section. [Ord. 16-0428 § 10 (Att. F).]

13.45.040 Administration.

The city manager is authorized to implement and enforce the provisions of this chapter. The city manager is authorized to promulgate and adopt administrative rules and regulations for the purpose of implementing and enforcing the provisions of this chapter. [Ord. 16-0428 § 10 (Att. F).]

13.45.050 Enforcement.

A. The city manager is authorized to carry out enforcement actions pursuant to the enforcement and penalty provisions of this chapter, Chapters 1.15 and 1.20 KMC, and other enforcement provisions adopted by rule.

B. The city manager shall use public education, warnings, technical assistance and the implementation of BMPs and, when necessary, AKART, as the primary methods of gaining compliance with this chapter, unless the city manager determines a violation is a result of a flagrant act that should be addressed through immediate penalties or poses a hazard as defined in KMC 13.45.060, Hazards.

C. The city manager shall develop and implement additional enforcement procedures. These procedures shall indicate how the City will investigate and respond to reports or instances of noncompliance with this chapter and shall identify by title the official(s) responsible for implementing the enforcement procedures.

D. The city manager is authorized to make such inspections and take such actions as may be required to enforce the provisions of this chapter.

1. The city manager may observe BMPs or examine or sample surface water and stormwater or groundwater as often as may be necessary to determine compliance with this chapter. Whenever an inspection of a property is made, the findings shall be recorded and a copy of the

inspection findings shall be furnished to the owner or the person in charge of the property after the conclusion of the investigation and completion of the inspection findings. The person in violation of this chapter shall be responsible for all costs and expenses related to the City's sampling, examination, analysis, application of BMPs authorized herein and/or abatement of the violation.

2. When the city manager has made a determination under subsection (D)(1) of this section that any person is violating this chapter, the city manager may require the violator to sample and analyze any discharge, surface water and stormwater, groundwater, and/or sediment, in accordance with sampling and analytical procedures or requirements determined by the city manager. If the violator is required to complete this sampling and analysis, a copy of the analysis shall be provided to the city manager. The person in violation of this chapter shall be responsible for all costs and expenses related to the sampling, examination, analysis, application of BMPs required by the city manager and/or abatement of the violation.

E. In addition to any other penalty or method of enforcement, the City may bring actions for injunctive or other relief to enforce this chapter. [Ord. 16-0428 § 10 (Att. F).]

13.45.060 Hazards.

A. Whenever the city manager determines that any violation of this chapter poses a hazard to public health, safety, or welfare, endangers any property, or adversely affects the safety and operation of City right-of-way, utilities, and/or other property owned or maintained by the City, the person holding title to the subject property, and/or other person or agent in control of said property, upon receipt of notice in writing from the city manager, shall within the period specified therein address the cause of the hazardous situation in conformance with the requirements of this chapter.

B. Notwithstanding any other provisions of this chapter, whenever it appears to the city manager that conditions covered by this chapter exist requiring immediate action to protect the public health and/or safety, the city manager is authorized to enter at all times in or upon any such property, public or private, for the purpose of inspecting and investigating such emergency conditions. The city manager, without prior notice, may order the immediate discontinuance of any activity leading to the emergency condition. Failure to comply with such order shall constitute a misdemeanor. [Ord. 16-0428 § 10 (Att. F).]

13.45.070 Criminal penalty.

Any willful violation of an order issued pursuant to KMC 13.45.050 or 13.45.060 for which a criminal penalty is not prescribed by State law is a misdemeanor. [Ord. 16-0428 § 10 (Att. F).]

13.45.080 Civil penalties for water quality.

The enforcement provisions for water quality are intended to encourage compliance with this chapter. To achieve this, violators will be required to take corrective action and comply with the requirements of this chapter, and may be required to pay a civil penalty for the redress of ecological, recreational, and economic values lost or damaged due to their unlawful action.

A. The provisions in this section are in addition to and not in lieu of any other penalty, sanction or right of action provided by law.

B. Any person in violation of this chapter may be subject to civil penalties assessed as follows:

1. An amount reasonably determined by the city manager to be equivalent to the economic benefit the violator derives from the violation as measured by the greater of the resulting increase in market value of the property or business value received by the violator, or savings of construction or retrofitting costs realized by the violator performing any act in violation of this chapter; and

2. An amount, not to exceed $25,000, that is reasonably based upon the nature and gravity of the violation and the cost to the City of enforcing this chapter against the violator.

C. Any person who, through an act of commission or omission, aids or abets in a violation shall be considered to have committed the violation for the purposes of the civil penalty.

D. Each violator is jointly and severally liable for a violation of this chapter. The city manager may take enforcement action, in whole or in part, against any violator. The decisions whether to take enforcement action, what type of action to take, and which person to take action against are all entirely within the city manager's discretion. Factors to be used in taking such enforcement actions shall be:

1. Awareness of the violation;

2. Ability to correct the violation;

3. Cooperation with government agencies; and

4. Degree of impact or potential threat to water or sediment quality, human health, or the environment.

E. In the event more than one person is determined to have violated the provisions of this chapter, all applicable civil penalties may be imposed against each person, and recoverable damages, costs, and expenses may be allocated among the persons on any equitable basis. Factors that may be considered in determining an equitable allocation include:

1. Awareness of the violation;

2. Ability to correct the violation;

3. Ability to pay damages, costs, and expenses;

4. Cooperation with government agencies; and

5. Degree of impact or potential threat to water or sediment quality, human health, or the environment.

F. The city manager may engage in mitigation discussions with the violator. The city manager may reduce the penalties based upon one or more of the following mitigating factors:

1. The person responded to City attempts to contact the person and cooperated with efforts to correct the violation;

2. The person showed due diligence and/or substantial progress in correcting the violation; or

3. An unknown person was the primary cause of the violation.

Payment of a monetary penalty pursuant to this chapter does not relieve the person of the duty to correct the violation.

G. All civil penalties recovered during the enforcement of this chapter under Chapter 1.20 KMC shall be deposited into a fund of the City and shall be used for the protection of surface water and stormwater or groundwater as set forth in this chapter, through education or enhanced implementation. [Ord. 16-0428 § 10 (Att. F).]

13.45.090 Construction – Intent.

A. This chapter is enacted as an exercise of the City's power to protect and preserve the public health, safety and welfare. Its provision shall be exempted from the rule of strict construction and shall be liberally construed to give full effect to the objectives and purposes for which it was enacted. This chapter is not enacted to create or otherwise establish or designate any particular class or group of persons who will or should be especially protected or benefited by the terms of this chapter.

B. The primary obligation of compliance with this chapter is placed upon the person holding title to the property. Nothing contained in this chapter is intended to be or shall be construed to create or form a basis for liability for the City, its officers, employees or agents, for any injury or damage resulting from the failure of the person holding title to the property to comply with the provisions of this chapter, or by reason or in consequence of any act or omission in connection with the implementation or enforcement of this chapter by the City, its officers, employees or agents. [Ord. 16-0428 § 10 (Att. F).]

13.45.100 Penalty

Except as provided in KMC 13.45.080(B)(1) and (2) for civil penalties, any person violating any of the provisions of this chapter may be subject to the general penalty and enforcement provisions in this chapter and Chapters 1.15 and 1.20 KMC. [Ord. 16-0428 § 10 (Att. F)

APPENDIX B – 2010 OUTFALL RECONNAISANCE INVENTORY (ORI)

2010 Outfall Reconnaissance Inventory Summary

Swamp Creek, Little Swamp Creek, Muck Creek, and Associated Tributaries

September 2010

Prepared by:
Richard Sawyer

Field Staff:
Richard Sawyer
Collin O'Meara
Art Simpson

City of Kenmore
Engineering Department

This page intentionally left blank.

Contents

INTRODUCTION

The City of Kenmore (City) was issued a Western Washington Phase II Municipal Stormwater Permit (Permit) on January 17, 2007. The Permit contains requirements to develop a Stormwater Management Program (SWMP). One of the requirements outlined in the SWMP was to develop an Illicit Discharge Detection and Elimination (IDDE) program. As part of the IDDE program, receiving waters were prioritized for visual inspection and screened for illicit connections. Three receiving waters were required to be completed prior to February 15, 2011. One receiving water will be required to be completed prior to February 15, 2012 and then one each year thereafter.

In 2010, the City visually inspected the Swamp Creek basin, which included 8 receiving water bodies (See Fig 1):

- Swamp Creek (Type 1[a])
- Little Swamp Creek (Type 2[a])
- Muck Creek (Type 2[a])
- Swamp Creek Tributary 01 (Unclassified[a])
- Swamp Creek Tributary 02 (Type 3[a])
- Swamp Creek Tributary 03 (Type 2[a])
- Swamp Creek Tributary 04 (Type 2[a])
- Swamp Creek Tributary 05 (Unclassified[a])

[a]*Stream classification types are described in Kenmore Municipal Code, Chapter 18.55.400.*

METHOD

Outfall Reconnaissance Inventory (ORI)

The City structured the ORI as described in the "Illicit Discharge and Elimination – A Guidance Manual for Program Development and Technical Assessments" (the Manual) by the Center for Watershed Protection and Robert Pitt released in October, 2004.

Initial mapping of the Municipal Separate Storm Sewer System (MS4) was conducted during the summer of 2010 before walking the streams in fall. Potential outfall locations were identified and mapped in the geographical information system (GIS) and provided to ORI staff. Additional outfalls discovered during the stream walks were mapped and input into the City's GIS. 'Outfall' is defined in the Permit as a point source as defined by 40 CFR 122.2 at the point where a municipal separate storm sewer discharges to waters of the State and does not include open conveyances connecting two municipal separate sewer systems, or pipes, tunnels, or other conveyances which connect segments of the same stream or other waters of the State and are used to convey waters of the State. In reality, an outfall is not always a well defined point on the ground. Efforts were made to accurately capture each outfall, as defined, but in some cases a judgment call was required to decide where an outfall would be placed. For instance, if a stream flowed through a series of catch basins while crossing a road, an outfall was identified where the last catch basin discharged back into the 'natural' stream channel.

Receiving waters were walked by at least two staff members, one walking each bank of stream when practical. Typically, streams were walked in an upstream direction to minimize disturbance to potential in-stream sample areas.

If flow was present at an outfall, an ORI worksheet was completed, a picture was taken and water was collected to test for the illicit discharge indicators identified in table 1 below. Pictures of each flowing outfall can be found in Appendix A.

Table 1 – Illicit Discharge Indicators

Indicator	Instrument	Method	Accuracy	Range
Temperature	YSI 63	Thermistor Sensor	±0.1°C	
pH	YSI 63	Combination Sensor with Gel Reference	±0.1 unit within 10°C of calibration ±0.2 unit within 20°C of calibration	0-14
Conductivity	YSI 63	Four Electrode Cell Sensor	±0.5% full scale and 0.1 uS/cm resolution	0 to 499.0 us/cm
Salinity	YSI 63	ASTM document *Standard Methods of Test for Electrical Conductivity of Water and Industrial Wastewater*, ASTM Designation D1125-82, and *OIML Recommendation Number 56*	±0.1 ppt	
Turbidity	LaMotte 2020e Turbidity Meter	USEPA Method 180.1	±2% NTU ±3% NTU	0-100 NTU >100 NTU

Table 1 continued on next page

Indicator	Instrument	Method	Accuracy	Range
Ammonia Nitrogen	LaMotte Smart2 Colorimeter	Nesslerization		0.00-4.00 ppm
Fluoride	LaMotte Smart2 Colorimeter	SPADNS		0.00-2.00 ppm
Potassium	LaMotte Smart2 Colorimeter	Tetraphenylboron		0.0-10.0 ppm
Surfactants	LaMotte Smart2 Colorimeter	Ion Pair Estraction-Bromophenol Blue Indicator		0.5-8.0 ppm as Linear Alkyl Sulfonates (LAS)
Fecal Coliform	AMTEST Labs	SM9222D		

RESULTS

A total of 61 outfalls were identified in the Swamp Creek Basin ORI (See Fig 1). Eleven outfalls had flowing water and were tested for illicit discharge indicators and are labeled in Figure 1 (SCOF001 – SCOF012).

Figure 1 – Map of Swamp Creek Basin Outfalls

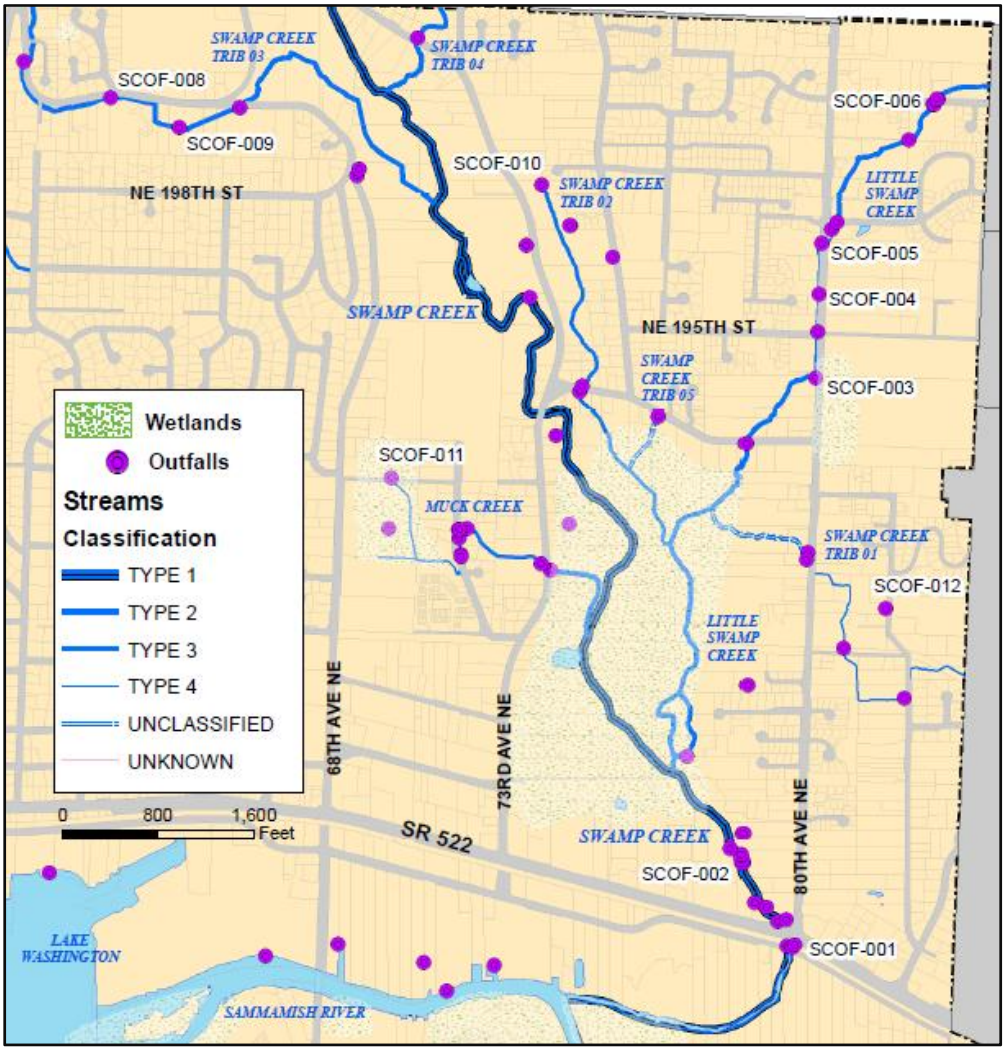


Table 2 summarizes the concentrations found for each illicit discharge indicator sampled.

Table 2 – Outfall Illicit Discharge Indicator Results

	SCOF-001	SCOF-002	SCOF-003	SCOF-004	SCOF-005	SCOF-006	SCOF-008	SCOF-009	SCOF-010	SCOF-011	SCOF012
Temp (°C)	16.7	15.2	13.6	15.0	15.7	15.2	15.8	15.3	15.5	15.0	15.0
pH	7.19	6.75	7.88	7.43	7.59	7.46	7.17	7.91	7.2	8.23	7.71
Conductivity (uS/cm)	248.4	224.5	166.1	185.3	34.1	109.6	180.6	62.3	274	178.1	221.4
Salinity (ppt)	-	-	0.1	0.1	0.0	0.1	0.1	0.0	0.2	0.1	0.1
Turbidity (NTU)	-	-	2.63	3.47	0.22	1.76	0.64	0.86	13.6	1.7	9.47
Ammonia (ppm)	0.10	.37	0.17	0.17	0.11	0.19	0.14	0.11	0.67	0.13	0.17
Fluoride (ppm)	0.04	0.01	0.79	0.19	0.56	0.66	0.05	0.14	0.23	0.05	0.04
Potassium (ppm)	5.0	2.0	1.9	2.1	2.1	1.8	2.6	1.7	5.7	2.3	6.0
Surfactant (ppm)	1.2	2.2	2.8	1.9	1.6	2.4	1.0	1.1	1.0	1.5	1.7
Fecal Coliform (FCU/100mL)	10	6	35	20	5	40	<2	8	-	-	-

Table 3 summarizes the concentrations found for each illicit discharge indicator sampled in the main channel of Swamp Creek. Fecal Coliform samples were not collected in Swamp Creek. Swamp Creek samples were not collected the same day as outfall samples.

Table 3 – Swamp Creek Illicit Discharge Indicator Results

	Swamp Creek 204TH AVE NE	Swamp Creek 73RD AVE NE	Swamp Creek NE BOTHELL WAY
Temp (°C)	12.2	12.5	12.2
pH	8.07	8.06	7.6
Conductivity (uS/cm)	148.7	155.7	152.7
Salinity (ppt)	0.1	0.1	0.1
Turbidity (NTU)	0.83	0.97	1.54
Ammonia (ppm)	0.17	0.18	0.25
Fluoride (ppm)	0.22	0.23	0.27
Potassium (ppm)	1.6	1.9	1.8
Surfactant (ppm)	2.5	1.6	1.4
Fecal Coliform (FCU/100mL)	Not Collected	Not Collected	Not Collected

CONCLUSION

Only surfactants and fluoride exceeded the benchmark concentration (BC) suggested in the Manual (Table 4). Surfactants surpassed the BC (>0.25 mg/L) in every sample. Fluoride surpassed the BC (>0.25 mg/L) in three samples. Surfactants also exceeded the BC in all three Swamp Creek samples. Fluoride exceeded the BC in one of three Swamp Creek samples, which seems unlikely. Upstream reconnaissance did not reveal any obvious source for the observed concentrations of surfactant and fluoride.

Surfactant concentration results suggest that surfactant concentrations are exceeding the BC basin wide. Surfactant concentrations in Swamp Creek entering the City were at 2.5 ppm and decreased to 1.4 ppm before reaching Lake Washington. Elevated surfactant levels observed at the outfall were not accompanied with any visual cues that could be used to track potential sources upstream.

In general, fluoride testing seemed unreliable. Multiple readings of the same sample resulted in readings that were ±75% at times.

It is interesting to note that visual inspection, without sampling, would have only triggered further investigation at one outfall due to the presence of suds and discoloration. However, that outfall had the lowest measured surfactant concentration and slightly elevated turbidity (but still well below the BC).

Additional samples should be collected during the next ORI and tested at a qualified lab to compare the measurements of the field equipment to the lab results. Surfactant and fluoride results seemed questionable.

Table 4 – Indicator Benchmark Concentrations

	Swamp Creek Basin Outfalls ORI Range	Washington State WQ Standard 173-201A WAC	Manual Benchmark Concentration
Temp (°C)	15.0 – 16.7	ND	ND
pH	6.75 – 7.91	6.5 – 8.5	≤ 5
Conductivity (uS/cm)	34.1 – 248.4	ND	≥ 2,000
Salinity (ppt)	0.0 – 0.1	ND	ND
Turbidity (NTU)	0.22 – 3.47	5 NTU over background (when ≤50 NTU)	≥ 1,000
Ammonia (ppm)	0.096 – 0.372	ND	≥50 mg/L*
Fluoride (ppm)	0.01 – 0.79	ND	> 0.25 mg/L
Potassium (ppm)	1.7 – 5.0	ND	≥ 20 mg/L*
Surfactant (ppm)	1.0 – 2.8	ND	> 0.25 mg/L*
Fecal Coliform (FCU/100mL)	<2 - 40	50	ND

* mg/L and ppm are roughly equivalent (it is equivalent with pure water)
ND – Not Determined

APPENDIX A – PHOTOS

SCOF-001
GIS # C0855
09/03/2010
07:45

24” CMP

Drains SR 522 from 80TH AVE NE to 83RD PL NE.

SCOF-002
GIS # C1584
09/03/2010
13:26

12” CMP

Drains residential area along 80TH AVE NE.

	**SCOF-003** GIS # C0869 09/09/2010 13:00 36” CMP Drains the east side of 80TH AVE NE from NE 192ND ST to NE 198TH ST.
	**SCOF-004** GIS # C0829 09/09/2010 13:25 12” CMP into 36” CMP Drains NE 196TH ST residential Cul-de-sac at 78TH AVE NE.

SCOF-005
GIS # C0866
09/09/2010
14:00

18" CMP

Drains west side of 80TH AVE NE from NE 198TH ST to the north border of Kenmore at NE 205TH ST.

SCOF-006
GIS # C1562
09/09/2010
14:30

Vegetated Ditch

Drains the south side of NE 203RD ST from approximately the 8200 block east to the Kenmore border.

	**SCOF-008** GIS # C1593 09/10/2010 11:30 12” RCP Drains the north side of NE 202ND ST between 63RD AVE NE and 62ND AVE NE.
	**SCOF-009** GIS # C0868 09/10/2010 12:05 Vegetated Ditch Drains NE 198TH ST between 62ND AVE NE and 65TH AVE NE.

	**SCOF-010** GIS # C1615 10/1/2010 11:00 24” CPEP Drains private area between 73RD AVE NE and 75TH AVE NE north of NE 200TH ST.
	**SCOF-011** GIS # C1610 10/1/2010 11:18 30” CMP Drains between 68TH AVE NE and 65TH AVE NE from NE 190TH ST to NE 196TH ST.

SCOF-012
GIS # C1605
10/1/2010
11:57

18” CMP

Drains the east side of 82ND AVE NE from NE 185TH ST to NE 187TH ST.

APPENDIX C – 2011 OUTFALL RECONNAISSANCE INVENTORY (ORI)

2011 Outfall Reconnaissance Inventory Summary

Sammamish River
Lake Washington

August 2011

Prepared by:
Richard Sawyer

Field Staff:
Richard Sawyer
Art Simpson

City of Kenmore
Engineering Department

This page intentionally left blank.

Contents

INTRODUCTION

The City of Kenmore (City) was issued a Western Washington Phase II Municipal Stormwater Permit (Permit) on January 17, 2007. The Permit contains requirements to develop a Stormwater Management Program (SWMP). One of the requirements outlined in the SWMP was to develop an Illicit Discharge Detection and Elimination (IDDE) program. As part of the IDDE program, receiving waters were prioritized for visual inspection and screened for illicit connections. Three receiving waters were required to be completed prior to February 15, 2011. One receiving water will be required to be completed prior to February 15, 2012 and then one each year thereafter.

In 2011, the City visually inspected outfalls along Sammamish River and Lake Washington.

METHOD

Outfall Reconnaissance Inventory (ORI)

The City structured the ORI as described in the "Illicit Discharge and Elimination – A Guidance Manual for Program Development and Technical Assessments" (the Manual) by the Center for Watershed Protection and Robert Pitt released in October, 2004.

Initial mapping of the Municipal Separate Storm Sewer System (MS4) was conducted during the summer of 2010. Potential outfall locations were identified and mapped in the geographical information system (GIS) and provided to ORI staff. Additional outfalls discovered during the ORI were mapped and input into the City's GIS. 'Outfall' is defined in the Permit as a point source as defined by 40 CFR 122.2 at the point where a municipal separate storm sewer discharges to waters of the State and does not include open conveyances connecting two municipal separate sewer systems, or pipes, tunnels, or other conveyances which connect segments of the same stream or other waters of the State and are used to convey waters of the State. In reality, an outfall is not always a well defined point on the ground. Efforts were made to accurately capture each outfall, as defined, but in some cases a judgment call was required to decide where an outfall would be placed. For instance, if a stream flowed through a series of catch basins while crossing a road, an outfall was identified where the last catch basin discharged back into the 'natural' stream channel.

Access to outfalls along Sammamish River and Lake Washington was achieved by using a kayak and inspecting them along the shoreline. Many of the outfalls were remote and inaccessible from land so this method proved to be very successful.

If flow was present at an outfall, an ORI worksheet was completed, a picture was taken and water was collected to test for the illicit discharge indicators identified in table 1 below. Pictures of each flowing outfall can be found in Appendix A.

Table 1 – Illicit Discharge Indicators

Indicator	Instrument	Method	Accuracy	Range
Temperature	YSI 63	Thermistor Sensor	±0.1°C	
pH	YSI 63	Combination Sensor with Gel Reference	±0.1 unit within 10°C of calibration ±0.2 unit within 20°C of calibration	0-14
Conductivity	YSI 63	Four Electrode Cell Sensor	±0.5% full scale and 0.1 uS/cm resolution	0 to 499.0 us/cm
Salinity	YSI 63	ASTM document *Standard Methods of Test for Electrical Conductivity of Water and Industrial Wastewater*, ASTM Designation D1125-82, and *OIML Recommendation Number 56*	±0.1 ppt	
Turbidity	LaMotte 2020e Turbidity Meter	USEPA Method 180.1	±2% NTU ±3% NTU	0-100 NTU >100 NTU

Table 1 continued on next page

Indicator	Instrument	Method	Accuracy	Range
Ammonia Nitrogen	LaMotte Smart2 Colorimeter	Nesslerization		0.00-4.00 ppm
Fluoride	LaMotte Smart2 Colorimeter	SPADNS		0.00-2.00 ppm
Potassium	LaMotte Smart2 Colorimeter	Tetraphenylboron		0.0-10.0 ppm
Surfactants	LaMotte Smart2 Colorimeter	Ion Pair Estraction-Bromophenol Blue Indicator		0.5-8.0 ppm as Linear Alkyl Sulfonates (LAS)
Fecal Coliform	AMTEST Labs	SM9222D		

RESULTS

A total of 31 outfalls were identified in the Sammamish River ORI (Figure 1). Six outfalls had flowing water and were tested for illicit discharge indicators and are labeled in Figure 1.

Figure 1 – Map of Sammamish River Outfalls

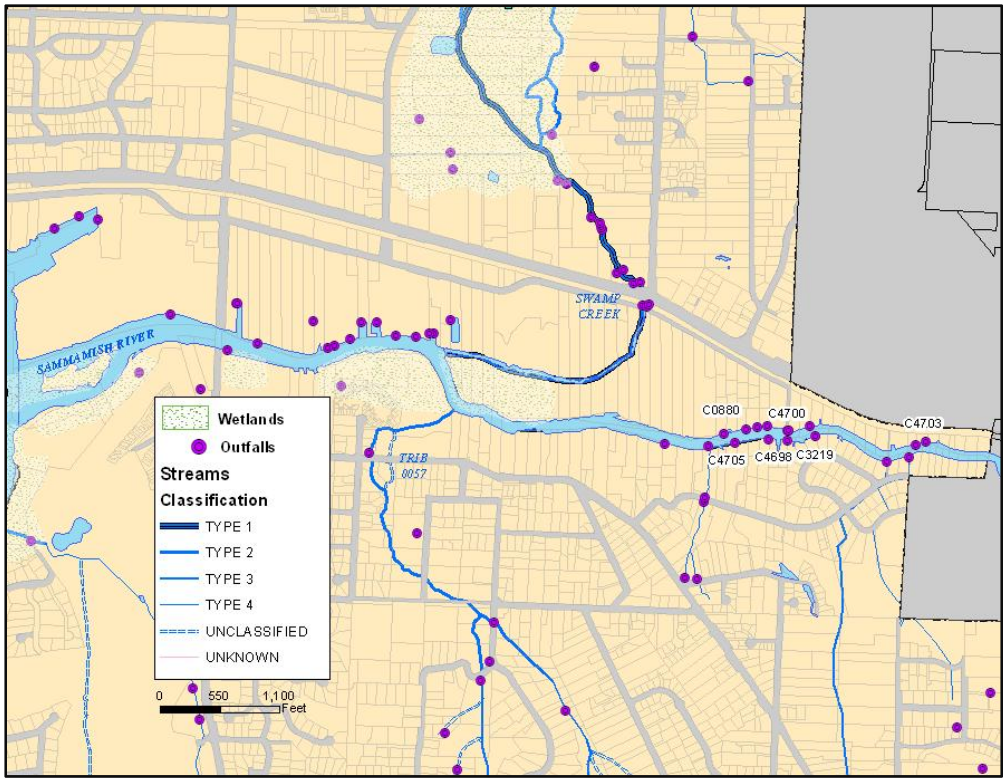


Table 2 summarizes the concentrations found for each illicit discharge indicator sampled. Duplicate samples were collected at two outfalls (C0880 and C4703) and sent to AMTEST, INC. for comparison to samples analyzed in the field. Ammonia and surfactant concentrations tested higher in the field than in the lab. Four stations had flows too low to use the YSI probe.

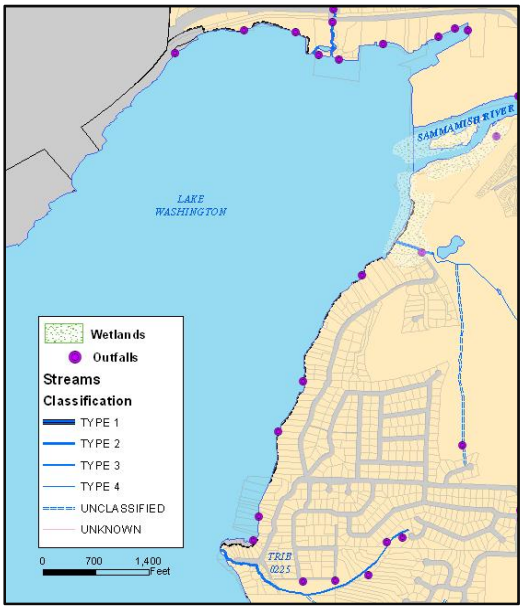
Table 2 – Outfall Illicit Discharge Indicator Results (Sammamish River)

	C0880	C0880 DUPLICATE	C4703	C4703 DUPLICATE	C4698	C4700	C3219	C4705
Temp (°C)	19.0	-	15.6	-	-	-	-	-
pH	7.70	-	7.45	-	-	-	-	-
Conductivity (uS/cm)	179.8	-	132.1	-	-	-	-	-
Salinity (ppt)	0.1	-	0.1	-	-	-	-	-
Turbidity (NTU)	1.19	-	0.0	-	1.23	0.42	1.98	6.22
Ammonia (ppm)	0.19	0.026	0.17	0.008	0.14	0.17	0.20	1.61
Fluoride (ppm)	0.06	<0.02	0	<0.02	0.0	0.03	0.0	0.0
Potassium (ppm)	2.2	2.4	1.9	2.1	2.6	2.7	2.3	3.6
Surfactant (ppm)	1.9	<0.25	1.1	<0.25	1.5	1.5	1.7	1.3

Duplicate samples were analyzed in the lab at AMTEST, INC.

A total of thirteen outfalls were identified in the Lake Washington ORI (Figure 2). Five of the outfalls were not observed during the field screening. The presumed outfall location may have been incorrect or they may have not been easily visible. No visible indicators of an illicit discharge or connection were observed in the presumed areas of these outfalls. Three outfalls had a small discharge, but flows were too small to collect a sample or conditions didn't allow it. No visible indicators of an illicit discharge or connection were observed at these locations.

Figure 2 – Map of Lake Washington Outfalls



CONCLUSION

No illicit discharges or connections were discovered during the Sammamish River or Lake Washington ORI. AMTEST, INC. analyses indicated that field instrumentation provided higher than actual concentrations for both ammonia and surfactants.

Table 3 shows indicator benchmark concentrations that would indicate a potential illicit discharge or connection.

Table 3 – Indicator Benchmark Concentrations

	Swamp Creek Basin Outfalls ORI Range	Washington State WQ Standard 173-201A WAC (Not Stormwater)	Manual Benchmark Concentration
Temp (°C)	15.6 – 19.0	ND	ND
pH	7.45 – 7.70	6.5 – 8.5	≤ 5
Conductivity (uS/cm)	132.1 – 179.8	ND	≥ 2,000
Salinity (ppt)	0.1	ND	ND
Turbidity (NTU)	0.00 – 6.22	5 NTU over background (when ≤50 NTU)	≥ 1,000
Ammonia (ppm)	0.14 – 1.61**	ND	≥50 mg/L*
Fluoride (ppm)	0.00 – 0.06	ND	> 0.25 mg/L
Potassium (ppm)	1.9 – 3.6	ND	≥ 20 mg/L*
Surfactant (ppm)	1.1 – 1.9**	ND	> 0.25 mg/L*

* mg/L and ppm are roughly equivalent (it is equivalent with pure water)
** Duplicate results suggest much lower concentrations
ND – Not Determined

APPENDIX A – SAMMAMISH RIVER OUTFALL PHOTOS

C0880
GIS # C0880
08/29/2011
11:08

12c" CMP

Drains 83RD CT NE from NE 175TH ST.

C4703
GIS # C4703
08/29/2011
11:57

18" HDPE

Drains from NE Bothell Way in Bothell.

C4698 & C4700
GIS # C0869
08/29/2011
11:35

8" CPEP

Drains private property at 84TH AVE NE & NE 175TH ST.

	**C3219** GIS # C0829 08/29/2011 12:27 42” PVC Drains 84TH AVE NE from Simonds RD NE to the river.
	**C4705** GIS # C0866 08/29/2011 12:35 8” PVC Drains private property at 8216 NE 169TH ST.

APPENDIX D – 2012 OUTFALL RECONNAISSANCE INVENTORY (ORI)

2012 Outfall Reconnaissance Inventory Summary

Tributary 0057

August 2012

Prepared by:
Richard Sawyer

Field Staff:
Richard Sawyer
Art Simpson

City of Kenmore
Engineering Department

This page intentionally left blank.

Contents

INTRODUCTION

The City of Kenmore (City) was issued a Western Washington Phase II Municipal Stormwater Permit (Permit) on January 17, 2007. The Permit contains requirements to develop a Stormwater Management Program (SWMP). One of the requirements outlined in the SWMP was to develop an Illicit Discharge Detection and Elimination (IDDE) program. As part of the IDDE program, receiving waters were prioritized for visual inspection and screened for illicit connections. Three receiving waters were required to be completed prior to February 15, 2011. One receiving water was required to be completed prior to February 15, 2012 and then one each year thereafter.

In 2010, the City visually inspected the main channel of Swamp Creek and several tributaries to Swamp Creek. In 2011, the City visually inspected Sammamish River and Lake Washington shoreline. In 2012 (this report), the City visually inspected outfalls along Tributary 0057.

METHOD

Outfall Reconnaissance Inventory (ORI)

The City structured the ORI as described in the "Illicit Discharge and Elimination – A Guidance Manual for Program Development and Technical Assessments" (the Manual) by the Center for Watershed Protection and Robert Pitt released in October, 2004.

Initial mapping of the Municipal Separate Storm Sewer System (MS4) was conducted during the summer of 2010. Potential outfall locations were identified and mapped in the geographical information system (GIS) and provided to ORI staff. Additional outfalls discovered during the ORI were mapped and input into the City's GIS. 'Outfall' is defined in the Permit as a point source as defined by 40 CFR 122.2 at the point where a municipal separate storm sewer discharges to waters of the State and does not include open conveyances connecting two municipal separate sewer systems, or pipes, tunnels, or other conveyances which connect segments of the same stream or other waters of the State and are used to convey waters of the State. In reality, an outfall is not always a well defined point on the ground. Efforts were made to accurately capture each outfall, as defined, but in some cases a judgment call was required to decide where an outfall would be placed. For instance, if a stream flowed through a series of catch basins while crossing a road, an outfall was identified where the last catch basin discharged back into the natural stream channel.

Two City staff members walked sections of Tributary 0057 in August 2012. Typically, the stream was walked in an upstream direction to minimize disturbance to potential in-stream sample areas.

If flow was present at an outfall, an ORI worksheet was completed, a picture was taken and water was collected to test for the illicit discharge indicators identified in Table 1 below. Pictures of each flowing outfall can be found in Appendix A.

Table 1 – Illicit Discharge Indicators

Indicator	Instrument	Method	Accuracy	Range
Temperature	YSI 63	Thermistor Sensor	±0.1°C	
pH	YSI 63	Combination Sensor with Gel Reference	±0.1 unit within 10°C of calibration ±0.2 unit within 20°C of calibration	0-14
Conductivity	YSI 63	Four Electrode Cell Sensor	±0.5% full scale and 0.1 uS/cm resolution	0 to 499.0 us/cm
Salinity	YSI 63	ASTM document *Standard Methods of Test for Electrical Conductivity of Water and Industrial Wastewater*, ASTM Designation D1125-82, and *OIML Recommendation Number 56*	±0.1 ppt	-
Turbidity	Eye	Visual Indicator	-	-
Ammonia Nitrogen	AMTEST Labs	EPA 350.1	Refer to published EPA Analytical Methods	Refer to published EPA Analytical Methods
Fluoride	AMTEST Labs	EPA 300.0	Refer to published EPA Analytical Methods	Refer to published EPA Analytical Methods
Potassium	AMTEST Labs	EPA 200.7	Refer to published EPA Analytical Methods	Refer to published EPA Analytical Methods
Surfactants	AMTEST Labs	SM 5540C	Refer to published EPA Analytical Methods	Refer to published EPA Analytical Methods
Fecal Coliform	AMTEST Labs	SM9222D	Refer to published EPA Analytical Methods	Refer to published EPA Analytical Methods

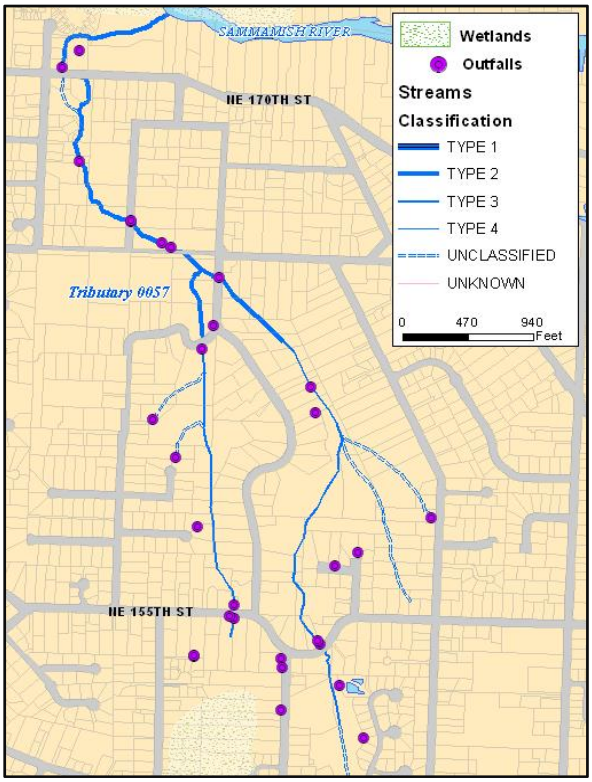
RESULTS

A total of 30 outfalls were identified in the Tributary 0057 ORI (Figure 1). One outfall had flowing water and was tested for illicit discharge indicators. Two additional samples were collected from the main stream channel and analyzed to determine background levels. Samples were analyzed at AmTest, Inc. in Kirkland, WA.

Table 2 – Outfall Illicit Discharge Indicator Results (Tributary 0057)

	Temp (°C)	pH	Conductivity (uS/cm)	Salinity (ppt)	Turbidity (NTU)	Ammonia (ppm)	Fluoride (ppm)	Potassium (ppm)	Surfactant (ppm)
CB0718 (Stream)	-	-	-	-	CLEAR	0.01	<0.2	2.2	<0.025
C2937 (Stream)	14.5	7.98	93.4	0.1	CLEAR	0.01	<0.2	2.3	<0.025
C3245 (Outfall)	19.1	7.97	0	0	CLEAR	0.01	<0.2	2	<0.025

Figure 1 – Map of Tributary 0057 Outfalls



CONCLUSION

No illicit discharges or connections were discovered during the Tributary 0057 ORI.

Table 3 shows indicator benchmark concentrations that would indicate a potential illicit discharge or connection.

Table 3 – Indicator Benchmark Concentrations

	Tributary 0057 ORI Range (Only one value)	Washington State WQ Standard 173-201A WAC (Not Stormwater)	Manual Benchmark Concentration
Temp (°C)	19.1	ND	ND
pH	7.98	6.5 – 8.5	≤ 5
Conductivity (uS/cm)	0	ND	≥ 2,000
Salinity (ppt)	0	ND	ND
Turbidity (NTU)	CLEAR	5 NTU over background (when ≤50 NTU)	≥ 1,000
Ammonia (ppm)	0.01	ND	≥50 mg/L*
Fluoride (ppm)	<0.2	ND	> 0.25 mg/L
Potassium (ppm)	2	ND	≥ 20 mg/L*
Surfactant (ppm)	<0.025	ND	> 0.25 mg/L*

* mg/L and ppm are roughly equivalent (it is equivalent with pure water)
ND – Not Determined

APPENDIX A – TRIBUTARY 0057 OUTFALL PHOTOS

	**CB0718** GIS # CB0718 08/23/2012 60” Type 2 Catch Basin (No pipe outlet with open top) Energy dissipater outlet for stream overflow on north side of NE 170TH ST.
	**C2937** GIS # C2937 08/23/2012 24” Concrete Drains portion of Tributary 0057 under 76TH AVE NE.
	**C3245** GIS # C3245 08/23/2012 12” CMP Drains from 81ST AVE NE.