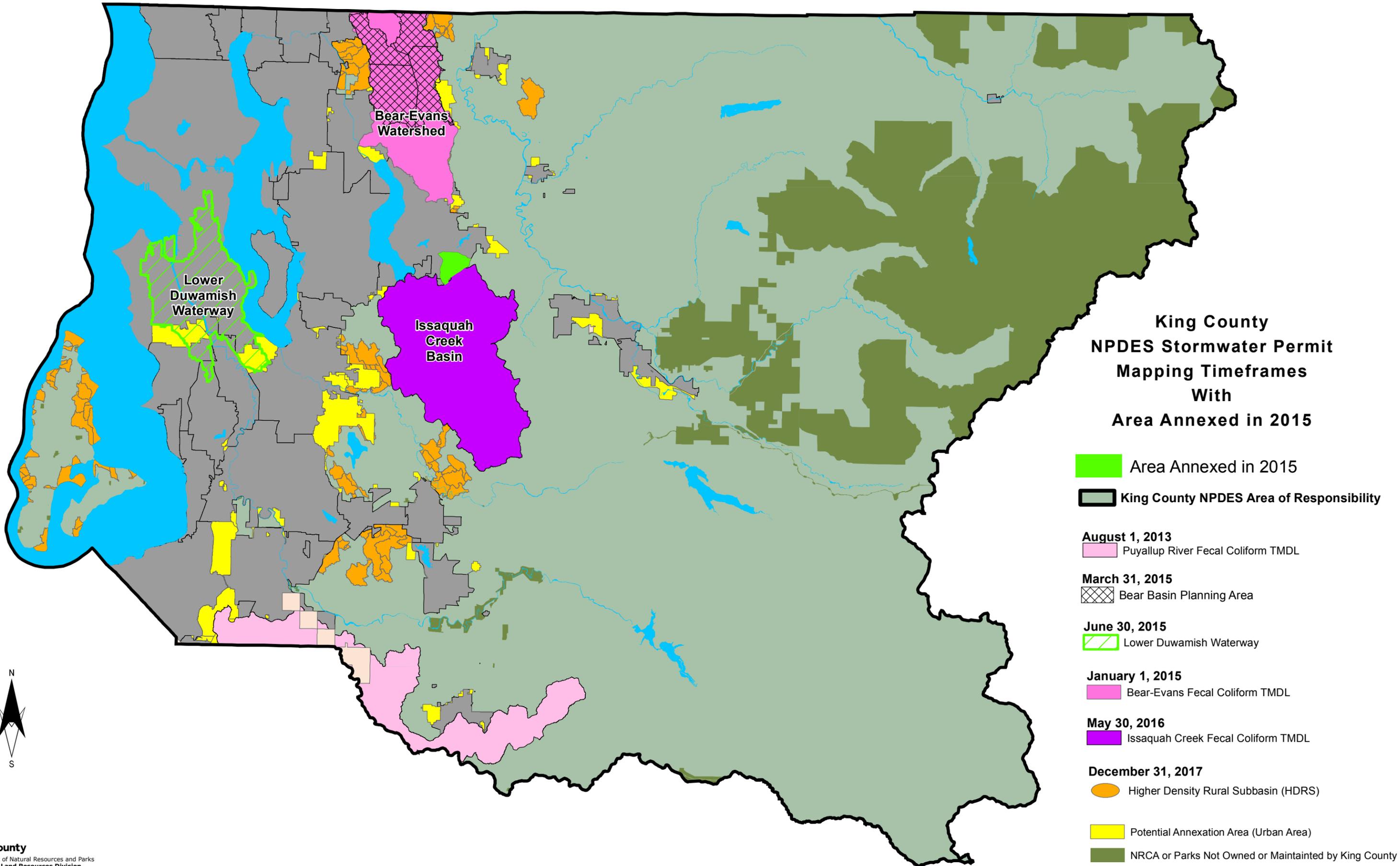


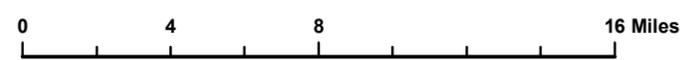
Attachment 2015 Annual Report Question #1:

Attach a notification of any annexations, incorporations or jurisdictional boundary changes resulting in an increase or decrease in the Permittee's geographic area of permit coverage during the reporting period per S9.D.6.



**King County
NPDES Stormwater Permit
Mapping Timeframes
With
Area Annexed in 2015**

- Area Annexed in 2015
- King County NPDES Area of Responsibility
- August 1, 2013**
 Puyallup River Fecal Coliform TMDL
- March 31, 2015**
 Bear Basin Planning Area
- June 30, 2015**
 Lower Duwamish Waterway
- January 1, 2015**
 Bear-Evans Fecal Coliform TMDL
- May 30, 2016**
 Issaquah Creek Fecal Coliform TMDL
- December 31, 2017**
 Higher Density Rural Subbasin (HDRS)
- Potential Annexation Area (Urban Area)
- NRCA or Parks Not Owned or Maintained by King County
- Tribal Lands



King County
Department of Natural Resources and Parks
Water and Land Resources Division

The information included on this map has been compiled by King County staff from a variety of sources and is subject to change without notice. King County makes no representations or warranties, express or implied, as to accuracy, completeness, timeliness, or rights to the use of such information. King County shall not be liable for any general, special, indirect, incidental, or consequential damages including, but not limited to, lost revenues or lost profits resulting from the use or misuse of the information contained on this map. Any sale of this map or information on this map is prohibited except by written permission of King County.

Attachment 2015 Annual Report Question #71:

For TMDL listed in Appendix 2: Attach a summary of relevant SWMP and Appendix 2 activities to address the applicable TMDL parameter(s), (S7.A).

King County Stormwater Services

Bear-Evans Creek FC TMDL Program 2015

Executive Summary

This document answers Question 71 of the questionnaire from the Washington State Department of Ecology regarding King County's Phase I NPDES Municipal Stormwater Permit implementation activities for 2015.

In 2015 King County Stormwater Services staff continued the preparatory tasks begun in 2014 for bacteria source screening for the Bear-Evans Fecal Coliform Total Maximum Daily Load (FC TMDL) as it relates to the stormwater system. Background details, including maps of sample locations and sampling methods, are included in the Sampling and Analysis Plan (SAP) submitted concurrently with this document. As a result of the work performed so far, no specific sources of high bacteria, discharging to the creeks via the MS4, have been identified. Additionally, Permit-required work regarding animal waste collection and education stations was begun. A narrative of task descriptions is provided in this document.

Regulatory Requirements:

“Designate areas discharging via the MS4 to the TMDL area as high priority areas for illicit discharge detection and elimination. Complete IDDE field screening for bacteria sources in 50 percent of MS4 subbasins, including rural MS4 subbasins, by February 2, 2017 and implement the schedules and activities identified in S5.C.8 of the Phase I permit for response to any illicit discharges found.”

“Install and maintain animal waste education and/or collection stations at municipal parks and other Permittee owned and operated lands reasonably expected to have substantial animal (dog and horse) use and the potential for pollution of stormwater.”

from Phase I NPDES Municipal Stormwater Permit 2013-2018, Appendix 2

Introduction: Work tasks were undertaken in 2015, including drafting and finalizing a Sampling and Analysis Plan (SAP) to investigate sources of fecal coliform bacteria in the County's stormwater conveyance system. These were done to comply with the first requirement listed above. This SAP has been submitted as an attachment accompanying this document, for reference purposes. In-office inventorying of County-owned properties, for the second requirement above, also began. Field, office and lab work were also undertaken and described in this document or as detailed in the SAP. No illicit discharges or illicit connections have been identified as a result of this work as yet.

Task Description Narrative: Work begun by Stormwater Services in 2014 for the Bear-Evans FC TMDL continued and expanded in 2015. The following tasks were done:

1. Completed initial wide-spread field reconnaissance in the basin to identify preliminary sampling locations in the MS4; this work was folded into the SAP, which is described below. As part of this effort, about 300 locations in the Bear-Evans basin where stormwater leaves County MS4 jurisdiction were visited during dry weather, checking for evidence of illicit discharges or illicit connections (dry weather flows, and other visual/olfactory evidence).
2. The Sampling and Analysis Plan (SAP) was drafted and completed. The SAP contains the following and may be consulted for these details:
 - Background, which describes basin (Bear, Evans and Cottage Lake Creeks)
 - Regulatory impetus
 - Map of overall basin, and map of MS4 subbasins
 - Project description, high level
 - Project management and project implementation staff
 - Project schedule
 - Sampling design
 - Sampling locations, including selection rationale and list by name and coordinates
 - Sampling location map, at time of SAP finalization in November 2015
 - Storm event targeting
 - Information to be acquired at each site
 - Proposed follow-up to synoptic sampling results
 - Sampling and measurement procedures
 - Quality control procedures, field and lab
 - Data management procedures
 - References
3. Conducted two synoptic field sampling events in the MS4 in October 2015 and November 2015, following the work plan and guidelines in the SAP.
4. Performed in-house *E. coli* screening and bacterial laboratory analyses on these samples, per the SAP.
5. Planning underway for a third synoptic event, to be done in early 2016; if one or more additional synoptic events beyond a total of three can be scheduled, these will also be done. Analytical results will be assessed from all three synoptic events, and will inform No. 7 task (below).
6. Assessed historical and current in-creek bacteria data, as this data seems relevant to this MS4 bacteria source screening work. In 2016 we will continue to analyze data collected within other programs from in-creek stations. These programs include long-term bacteria sampling, as well as additional sampling being implemented for a watershed modeling study concurrently being done in Bear basin. These results will be assessed and used, if warranted, to help bracket creek reaches which may have inputs of high bacteria from the County's MS4.

7. Preliminary, conceptual planning was begun if high levels of bacteria are found in certain locations, in the MS4 and/or within creek sampling stations. The goal is to conduct source tracing to identify and eliminate anthropogenic or anthropogenic-related bacteria sources, including but not limited to: failing septic systems; animal waste; and improperly managed garbage (food, cooking oil). These are considered to have potential to contribute elevated bacteria levels to the MS4.
8. Identified businesses in the Bear basin using existing inspection database, Google maps, and County and State records. Conducted source control inspections to ensure required stormwater best management practices were in place.
9. To comply with the second Permit requirement included above, an inventory process for County owned and operated properties was undertaken, in order to ascertain if there are any such properties reasonably expected to have substantial dog and horse use with the potential to pollute stormwater. A prioritization process was devised and imposed, whereby higher risk sites were identified to field visit (County owned or operated properties within a certain distance of creeks or tributaries). These higher priority sites will be field visited in 2016. If any County owned or operated sites are identified that need animal waste collection or education stations, preliminary work to install these will commence in 2016.

-----*End of report*-----

Sampling and Analysis Plan

Investigation of Fecal Coliform Sources in Bear/Evans Creek Stormwater Conveyance System

**As required by the
Phase I NPDES Municipal Stormwater Permit 2013-2018, Appendix 2**

November 2015

**Prepared by:
Cameron Chapman and Jeanne Dorn
King County Department of Natural Resources and Parks**



King County

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1.0 Background

The Bear Creek watershed is in the Cedar-Sammamish basin in Water Resources Inventory Area 8 (WRIA 8) in western Washington State (Figure 1). The Bear Creek main stem flows southward from southern Snohomish County, through a portion of unincorporated north King County, and joins the Sammamish River in the City of Redmond. The term “Bear Creek watershed” for purposes of this plan means the same as “Bear-Evans watershed.” The latter is the term used by the Washington State Department of Ecology (Ecology).

Bear Creek has two main tributaries: Cottage Lake and Evans Creeks. Cottage Lake Creek originates in Cottage Lake in north King County, and flows southward to its confluence with Bear Creek in unincorporated King County. Evans Creek originates at Peterson Pond in unincorporated King County, and flows first southward, then northward, to its confluence with Bear Creek in the City of Redmond. The entire Bear Creek watershed, including its tributary subbasins, measures approximately 51 square miles in extent. It drains portions of unincorporated King and Snohomish Counties, and portions of the cities of Redmond, Sammamish, and Woodinville. The area of the basin in unincorporated King County measures roughly 32 square miles.

Ecology has set water quality standards in the Bear watershed at “extraordinary primary contact” levels. Under this designation, fecal coliform bacteria levels must not exceed a geometric mean of 50 colony-forming units per 100 milliliters (cfu/100 mL), with not more than ten percent of samples exceeding 100 cfu/100 mL. This standard is defined in Washington Administrative Code (WAC) 173-201A.

Stream segments of Bear, Evans, and Cottage Lake Creeks have exceeded these water quality standards for decades. Because of this, in 2008 Ecology implemented the Total Maximum Daily Load (TMDL) program for fecal coliform (FC) bacteria in the watershed. The FC TMDL program is intended to be a collaborative interagency effort to find and eliminate sources of bacterial exceedances. To comply with the designated water quality standard, reductions in bacteria levels in Bear Creek and its tributaries of 57 percent to 96 percent would need to be achieved, per Ecology’s 2008 FC TMDL.

Under Appendix 2 of the 2013-2018 Phase I National Pollutant Discharge Elimination System (NPDES) Municipal Stormwater Permit, the jurisdiction of King County is required to perform certain tasks to attempt to reduce bacterial loadings to Bear Creek and its tributaries. One required task is to perform bacteria source screening in at least 50 percent of the Bear-Evans Creek municipal separate storm sewer system (MS4) subbasins. This document outlines King County’s plan to fulfill this requirement.

Links to the Phase I NPDES Municipal Permit and Ecology’s TMDL documents can be found below in the reference section.

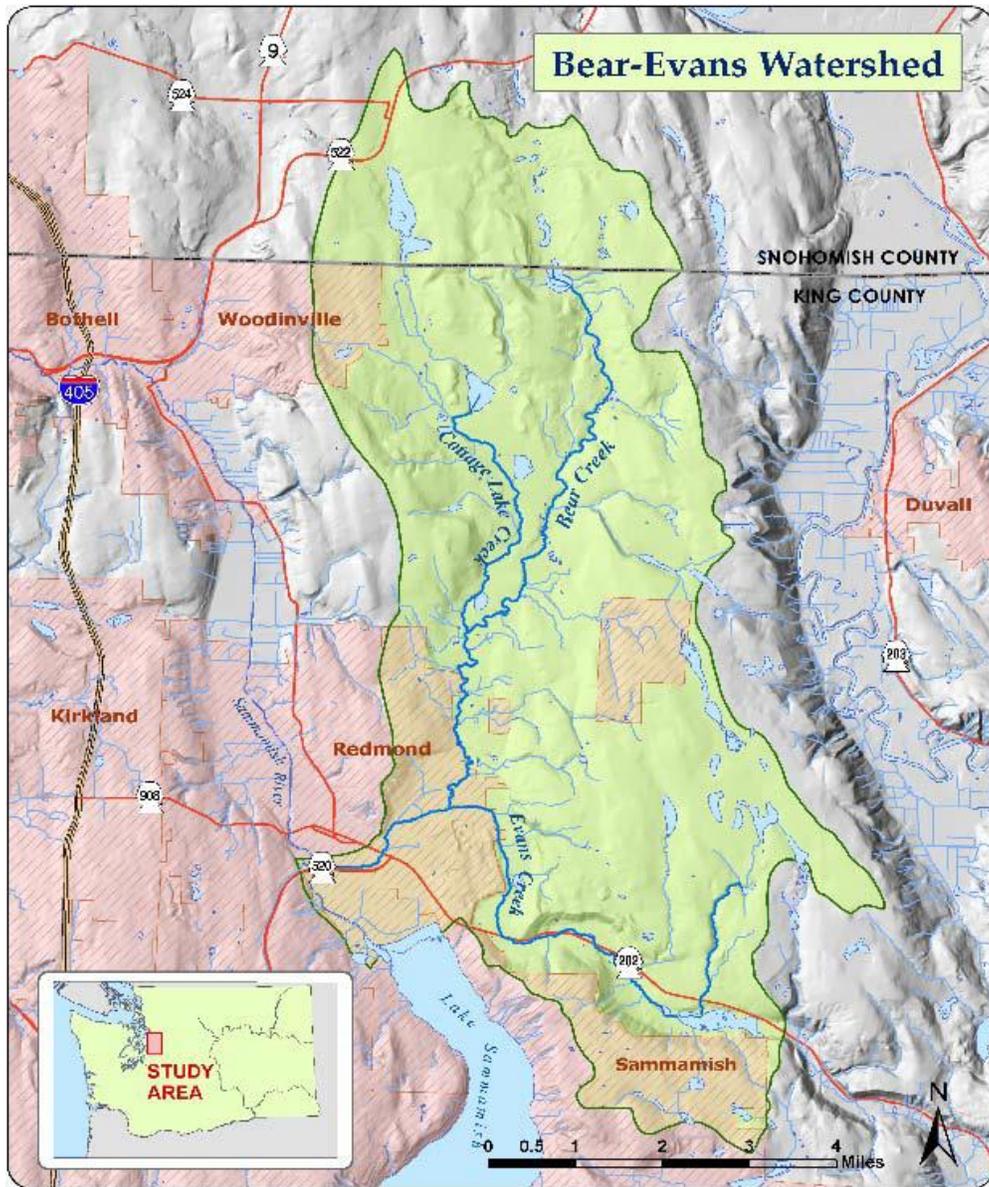


Figure 1. Bear-Evans Watershed (Washington State Department of Ecology)

2.0 Project Description

Under the 2013-2018 Phase I NPDES Municipal Stormwater Permit, King County has two specific requirements relating to the fecal coliform TMDL for the Bear Creek watershed:

- Install and maintain animal waste education and/or collection stations at municipal parks and other Permittee owned and operated lands reasonably expected to have substantial domestic animal (dog and horse) use and the potential for pollution of stormwater.
- Designate areas discharging via the MS4 to the TMDL area as high priority areas for illicit discharge detection and elimination (IDDE). Complete IDDE field screening for bacteria sources in 50 percent of MS4 subbasins, including rural MS4 subbasins, by February 2, 2017, and implement the schedules and activities identified in S5.C.8 of the Phase I permit for response to any illicit discharges found.

This document describes King County's tasks to achieve the second of the above two requirements. Staff from King County's Stormwater Services (SWS) will lead this effort, with assistance from King County's Science and Technical Support Section.

SWS will conduct both dry- and wet-season screening activities during the project period. Dry-season activities include visual and olfactory observations of the County's MS4, field analyses of dry-weather flows, and more detailed source tracing of suspect flows. Wet-season activities, which are the primary focus of this document, will include synoptic sampling of storm flows at select locations in the MS4, in-house analysis for *Escherichia coli*, laboratory analysis for human *Bacteroides* at sites testing high in *E. coli*, and more detailed source tracing of suspect flows.

For purposes of this project, Ecology's term "MS4 subbasin" is taken to mean a topographic subbasin in which stormwater is conveyed by an MS4. According to the schema of King County's existing GIS data, there are eight topographic subbasins in the Bear/Evans/Cottage Lake Creek system. Thus, to achieve the requirement to screen 50 percent of the subbasins, four subbasins were chosen for this project and are shown in green in Figure 2. The collective size of these four subbasins, and the large number of MS4 features found therein, precludes the screening of the County's entire MS4 within the watershed. Both dry-weather and wet-weather screening will take place in each subbasin, but the ultimate prioritization of (and partitioning of resources among) these four subbasins will be based on a review of available information, including historic water quality data, location of on-site septic systems, and age of home construction.

The remainder of this document provides a more detailed description of SWS's plan to perform wet-weather bacteria screening in these four subbasins.

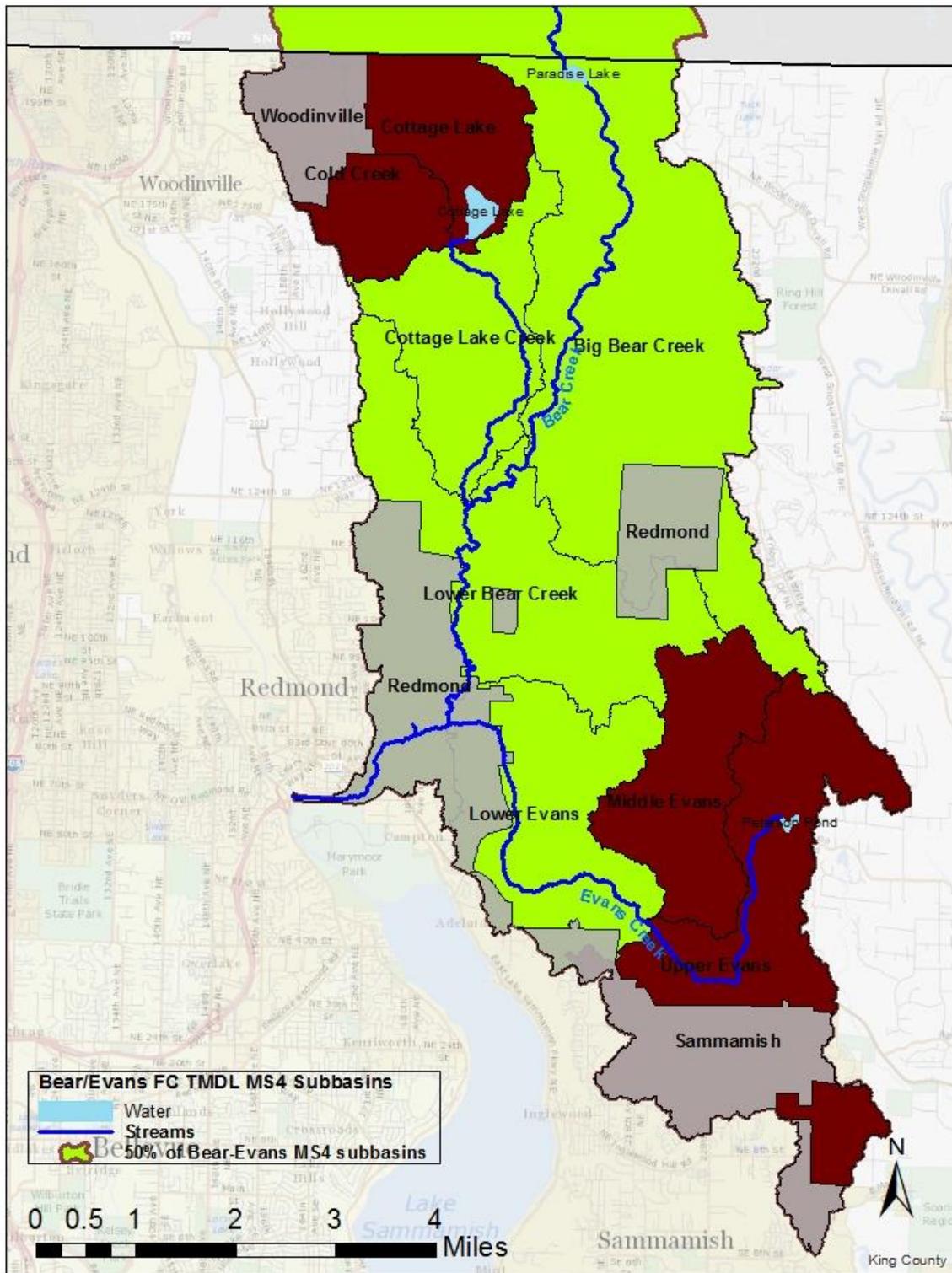


Figure 2. Bear-Evans Creek Watershed MS4 Subbasins
(High-priority MS4 subbasins selected for screening are shown in green.)

3.0 Organization and Schedule

Project Management:

Cameron Chapman, 206-477-4634, cameron.chapman@kingcounty.gov. Responsible for writing SAP and final report, sample site selection, training, scheduling and coordinating field reconnaissance and sampling efforts, data collection and analysis.

Jeanne Dorn, 206-477-4679, jeanne.dorn@kingcounty.gov. Responsible for overall project design and implementation, ensuring completion of project SAP, assistance as needed for task scheduling and implementation, project budgeting, and assistance on final report.

Fritz Grothkopp, 206-477-7114, fritz.grothkopp@kingcounty.gov. Laboratory project manager -- responsible for coordinating sample collection equipment and field sheets, login of bacteria samples, and assistance in results interpretation.

Doug Navetski, 206-477-4783, doug.navetski@kingcounty.gov. Responsible for project guidance, advice and supervisory oversight.

Project Implementation:

Eric Bosserman, 206-477-4649, eric.bosserman@kingcounty.gov. Responsible for basin and subbasin identification and mapping, and support in water sampling location selection.

Jeanie Pride, 206-477-4803, jeanie.pride@kingcounty.gov. Responsible for air photo interpretation of buffer within creek mainstems to assess possibility of bacteria sources directly to mainstem waters from private and public properties.

Cynthia Hickey, 206-477-4710, cynthia.hickey@kingcounty.gov. Responsible for contributing business audit and water quality complaint historical and current information as relevant to project goals.

Lori Cronin, 206-477-4676, lori.cronin@kingcounty.gov. Responsible for project implementation support, including providing business inspection information and assisting in field tasks.

Schedule

Target dates for:

Completion of draft Sampling and Analysis Plan:	October 9, 2015
Synoptic Sampling, (3) once per day events:	Late October through December 2015
Interim Reports:	December 30, 2015 June 30, 2016 December 30, 2016
Final Study Report:	July 31, 2018

Staff time involves:

- Identify potential sampling sites, perform basin reconnaissance to select sites
- Write Sampling and Analysis Plan (SAP)
- Plan synoptic sampling, field, and lab details
- Train and schedule staff for field work
- Conduct field sampling, 3+ synoptic events, 1X/day at all sites)
- Follow-up source tracing sampling, as needed
- Quality Assurance/Quality Control (QA/QC) data
- Analyze data
- If sources are identified, facilitate their reduction or elimination
- Write interim and final reports.

4.0 Sampling Design

4.1 Sampling approach and rationale

The goal of this sampling program is to identify portions of King County's MS4 that may contribute to exceedances of Washington State's water-quality standard for fecal coliform in Bear Creek and its tributaries. If data acquired in this program identify portions of the MS4 which consistently contribute high fecal bacteria loads relative to other locations, further reconnaissance and sampling will take place higher in the MS4 in order to determine whether there is a specific source that can be managed or regulated in order to reduce its fecal bacteria contributions to Bear Creek and its tributaries.

In order to identify portions of the MS4 contributing relatively high loads of fecal bacteria, flowing water in the MS4 (during or immediately after storms) will be sampled and analyzed for *E. coli*. The preliminary analytical screening technique will be the Coliscan Easygel® technique ("Coliscan"), a rapid and simple *E. coli* culturing method. This technique will be carried out in house by Stormwater Services.

Coliscan is a proprietary pectin-gel method consisting of a small plastic bottle of liquid medium, which is mixed with sample water and then incubated in a Petri dish pretreated with a special formulation. This analytical method has been chosen for its low unit cost and is considered a field screening approach. Coliscan has been shown to be comparable to standard laboratory methods for analysis of *E. coli* when proper QA/QC procedures are followed (Alabama Water Watch 1995). Furthermore, *E. coli* has been shown to be a more reliable indicator of human (and other warm-blooded animal) gut bacteria than fecal coliform (U.S. EPA 1992).

Two additional analytical techniques that will be utilized will be a laboratory culture technique for *E. coli* bacteria and a genetic-based qPCR laboratory technique for human *Bacteroides*. These two methods will be performed at the King County Environmental Lab (KCEL). During the first sampling event, all of the sampled sites will be analyzed for *E. coli* and *Bacteroides* at KCEL. For the subsequent synoptic events, analysis of *E. coli* and *Bacteroides* will be carried out at KCEL only on samples exhibiting high *E. coli* levels as measured by the Coliscan technique.

A synoptic ("at the same time") approach will be used in this sampling program. A single sampling event will involve the sampling of water at many sites, located throughout the basin, in a single day, minimizing sampling time between sites as much as possible. Bacteria concentrations can vary temporally over magnitudes of order even at a single site, so minimizing the time between samples will allow for better comparisons among sites. The synoptic sampling will be carried out on at least three separate sampling events during the 2015-2016 wet season. Multiple sampling events will increase the likelihood of detecting potentially transitory sources. If the sources are chronic, consistently elevated counts of *E. coli* should be observed in the data, relative to other sites.

4.2 Sampling locations

Forty sites are initially planned for synoptic bacteria screening (Table 1 and Figure 3). The number of sampling sites is constrained by the number of locations that can be safely visited and sampled within a three- to four-hour period. During each synoptic event, two teams of two people will each visit approximately 20 sites. The remainder of the work day will be used for travel to and from the study area, as well as for post-event sample processing.

All sites are located in the public road right-of-way or are on King-County-owned property. Samples will be taken from the County's MS4, which consists of pipes, ditches, catch basins, stormwater ponds, and bioswales. No natural stream channels or wetlands will be sampled, unless it is determined that the water encountered therein is largely stormwater runoff originating in the County's MS4 (see site Bear_117). Streams or wetlands may also be sampled if there is a pollution concern relating to nearby land use practices (see site Bear_302).

Sampling sites have been chosen based on their proximity to the main stem of Bear Creek and its tributaries, accessibility from the public right-of-way, safety of access, size of area draining to the location, and the likelihood that the location will convey stormwater during storms. Other factors, including domestic-animal-related land uses, and the likelihood of being impacted by groundwater or surface water flow from residences with septic systems, have also been taken into consideration.

In addition to the 40 sites identified in Table 1, 20 sites are designated as "backups" in case no flow is encountered at any of the initial 40 sites. The backup sites are listed in Table 2. In any case, the total number of sites sampled in the initial synoptic will not be greater than 40.

Table 1. Bear/Evans Fecal Coliform TMDL Sampling Sites

Site Name	KC MS4 Feature Type	KC MS4 Asset ID	Subbasin (Tributary)	X	Y
Bear_101	Pipe	4433	Bear - Mackey	1330845.409	255744.329
Bear_102	CB	27236	Bear Creek (Stensland)	1338182.753	253768.101
Bear_103	Culvert	81810	Bear Creek (Stensland)	1338369.479	253850.000
Bear_104	CB	30090	Bear Creek (Mackey)	1339879.605	254895.072
Bear_105	Ditch	31336	Bear Creek (Mackey)	1334645.221	256094.141
Bear_106	Ditch	30671	Bear Creek (Mackey)	1335960.250	257910.330
Bear_107	Ditch	30448	Bear Creek (Mackey)	1335984.023	257957.704
Bear_108	Ditch	30490	Bear Creek mainstem	1331518.877	253968.325
Bear_109	Bioswale	275	Bear Creek mainstem	1330740.153	257380.554
Bear_110	Culvert	82099	Bear Creek mainstem	1330715.781	258910.259
Bear_111	Bioswale	276	Bear Creek (Monticello)	1330461.918	259166.693
Bear_112	CB	27254	Bear Creek mainstem	1330888.607	260523.226
Bear_113	CB	3444	Bear Creek (unnamed)	1334505.349	263928.246
Bear_114	Pipe	4562	Bear Creek (Tuscany)	1334434.336	260255.564
Bear_115	Culvert	82072	Bear Creek (unnamed)	1329194.479	263190.000
Bear_116	Pipe	24504	Bear Creek (unnamed)	1329909.479	262165.000

Site Name	KC MS4 Feature Type	KC MS4 Asset ID	Subbasin (Tributary)	X	Y
Bear_117	Pipe	24547	Bear Creek (Bostic)	1328129.479	262240.000
Bear_118	Pipe	24805	Bear Creek (Bostic)	1328147.760	262198.333
Bear_119	CB	3290	Bear Creek (Bostic)	1326829.623	264236.352
Bear_120	Pipe	24598	Bear Creek (Bostic)	1326117.478	264996.408
Bear_121*	Pipe	4584	Bear Creek (Tuscany)	1334429.351	261276.411
Bear_122*	Pipe	4586	Bear Creek (Tuscany)	1334047.728	261666.025
Bear_123*	CB	26484	Bear Creek mainstem	1332652.386	262025.681
Bear_124*	Pipe	4456	Bear Creek mainstem	1331124.181	260476.110
Bear_125*	CB	3057	Bear Creek mainstem	1331092.788	254894.221
Bear_126*	CB	26029	Bear Creek (Bostic)	1326461.861	264718.799
Bear_127*	Pipe	55883	Bear Creek (Mackey)	1341317.858	254840.695
Bear_128*	Culvert	81835	Bear Creek (Stensland)	1335075.000	253645.000
Bear_129*	Pipe	23968	Bear Creek (Stensland)	1334950.000	253665.000
Bear_130*	Ditch	30535	Bear Creek (Stensland)	1332870.024	252598.393
Bear_201	Pipe	4546	Cottage Lake Creek	1331573.171	263936.321
Bear_202	CB	27815	Cottage Lake Creek	1333124.684	267200.023

Site Name	KC MS4 Feature Type	KC MS4 Asset ID	Subbasin (Tributary)	X	Y
Bear_203	CB	3604	Cottage Lake Creek	1333754.709	268084.472
Bear_204	Pipe	4694	Cottage Lake Creek	1331942.061	270273.726
Bear_205	Pipe	25781	Cottage Lake Creek	1333640.556	271573.600
Bear_206	Ditch	41399	Cottage Lake Creek	1333642.761	271586.342
Bear_207	Culvert	83067	Cottage Lake Creek	1331212.867	270804.522
Bear_208	CB	27934	Cottage Lake Creek	1331516.344	264119.467
Bear_209	Bioswale	26	Cottage Lake Creek	1331073.977	262049.344
Bear_210	CB	3334	Cottage Lake Creek	1329705.536	264671.546
Bear_211*	Culvert	82846	Cottage Lake Creek	1332031.150	264234.973
Bear_212*	Culvert	82488	Cottage Lake Creek	1332050.594	264283.932
Bear_213*	CB	3597	Cottage Lake Creek	1334053.925	268772.406
Bear_214*	Pipe	5151	Cottage Lake Creek	1334338.250	269870.798
Bear_215*	Pipe	5150	Cottage Lake Creek	1333891.648	269968.306
Bear_301	CB	34154	Evans Creek	1336094.104	240799.219
Bear_302	Pipe	32518	Evans Creek	1339509.727	240548.692
Bear_303	Link**	6860	Evans Creek	1337421.753	241857.832
Bear_304	CB	24425	Evans Creek	1336175.190	245745.841
Bear_305	CB	23265	Evans Creek	1337505.580	247926.094

Site Name	KC MS4 Feature Type	KC MS4 Asset ID	Subbasin (Tributary)	X	Y
Bear_306	Pipe	45306	Evans Creek	1337590.264	250818.417
Bear_307	Pipe	4292	Evans Creek	1337593.567	250844.809
Bear_308	Ditch	24158	Evans Creek	1333552.260	246779.116
Bear_309	Pipe	33324	Evans Creek	1335063.046	248623.997
Bear_310	Link**	12655	Evans Creek	1333334.675	249728.107
Bear_311*	Link**	12653	Evans Creek	1333576.729	250061.468
Bear_312*	Ditch	23353	Evans Creek	1334223.922	241564.157
Bear_313*	CB	23272	Evans Creek	1337471.625	245691.578
Bear_314*	Pipe	33318	Evans Creek	1337579.979	249029.328
Bear_315*	CB	23251	Evans Creek	1336925.502	248459.578
* Backup sampling site will only be sampled if other sites do not have flowing water.					
** MS4 assets unmapped at this location. The "link" referenced is a concept indicating a location where water leaves the County's MS4, such as an outfall.					

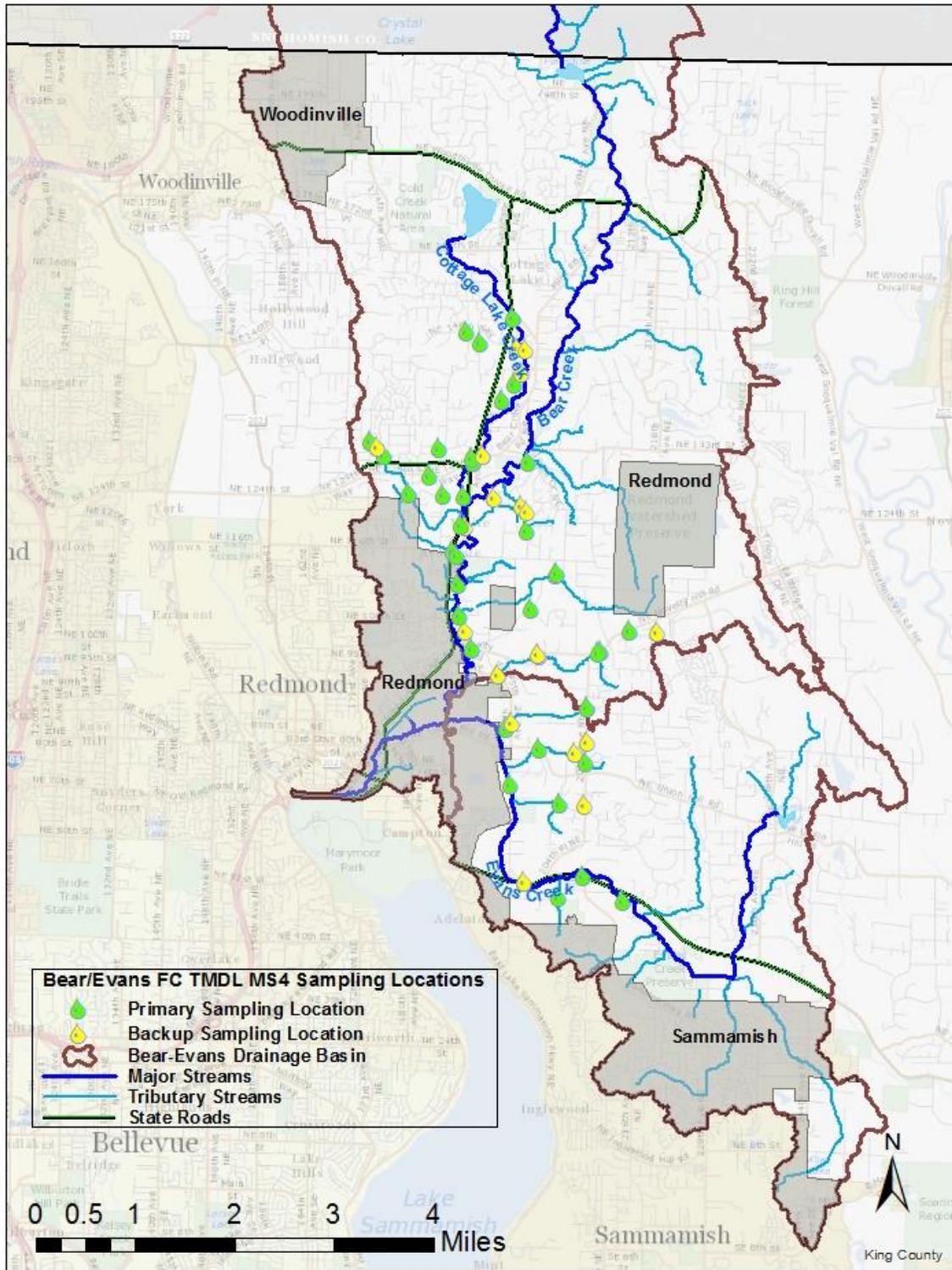


Figure 3. Bear-Evans Watershed MS4 Sampling Locations

4.3 Targeting of storm events

Targeting of storm events will begin after October 19, 2015. Currently, it is not known how much rain is needed to make the various portions of the MS4 discharge stormwater to Bear Creek and its tributaries.

A rainfall event of at least 0.25 inches of precipitation will be used as a trigger to initiate synoptic sampling. Observations made in the wet season might lead to this trigger being altered, in order to ensure that all or most sites can be sampled in a single event. Rainfall depths will be estimated from real-time, telemetered rain gauges in the study basin maintained by King County's Hydrologic Information Center. National Weather Service and University of Washington rain gauges will be used to fill in any data gaps. National Weather Service base reflectivity radar will also be used for real-time decision making. Sampling events will be separated by at least one week, in order to ensure that sampling events are independent from one another.

Bacterial samples collected at the beginning of a storm event are most desired, in order to capture the "first flush." For this program, unfortunately, the time during which samples can be acquired is limited by the workday hours of County staff. Samples submitted to KCEL for *E. coli* analysis can only be collected between Monday and Wednesday, due to the 24-hour maximum hold time for bacterial analyses. Samples collected late on a Wednesday would typically not be turned in to KCEL until early Thursday (before the 24-hour maximum hold time), at which time the samples would be cultured and then analyzed prior to the weekend. Samples not analyzed by KCEL for *E. coli* can be collected anytime between Monday and Friday. Due to the length of the work day and the estimated time needed for travel and sampling, staff will not depart King Street Center (KSC) earlier than 7 a.m. or later than 12 p.m. to begin sampling.

Bacterial data acquired during this sampling program will be analyzed, taking into account hydrologic variables (e.g., precipitation and stream flow). The time of sample acquisition will be compared to rainfall hyetographs and streamflow hydrographs to determine whether bacteria levels appear to be impacted by these factors. Adjustments to the sampling plan, if practical, will be made in response to this analysis.

4.4 Overview of information to be acquired at each site

At each site visited, sampling personnel will collect the following:

- Five-hundred milliliters of stormwater in a sterile bacteria sampling bottle, to be submitted to KCEL for Hu-2-*Bacteroides* and *E. coli* analyses in the first synoptic event, and held for possible submittal to KCEL in the next two synoptic events
- Two five-milliliter aliquots of stormwater, each to be dispensed into a separate Coliscan gel bottle
- A photo of the exact location where the sample was acquired; and

- A rough measurement of the depth of flow and/or a qualitative description of the amount of flow encountered at the sampling point.

Further details, including information on QA/QC controls, are found in the Sampling Procedures section of this document.

4.5 Follow-up to initial sampling results

The first synoptic sampling event will include culturing of all samples at KSC using the Coliscan method. Additionally, all 500-mL sample bottles will be submitted to KCEL for human *Bacteroides* and *E. coli* analyses. Sites with high *Bacteroides* will be noted for possible source tracking follow-up work. The KCEL *E. coli* sample result will be compared to the Coliscan *E. coli* sample result for each site as a reliability check on the Coliscan method. If there is not a strong positive correlation between the two results, the Coliscan method will be examined to determine the causal factor(s) that could explain the difference between methods, and alternate approaches to standard use of the Coliscans may be explored. As an example, samples from sites with previously high *E. coli* counts may be replicated using smaller volumes of sample water (e.g., 0.1 mL or 1 mL), allowing for a better estimate when counting in-house. Previous experience shows that it is difficult to accurately count Coliscan samples with large numbers of *E. coli* colonies.

For remaining synoptic events, it is anticipated that only selected sample locations will be tested at KCEL for human *Bacteroides* and *E. coli*. For these events, a preliminary count will be made of all Coliscan plates early in the morning of the day following the synoptic, before 24 hours have passed since sample acquisition. Sites where both replicates contain greater than 240 cfu/100 mL will be identified. The 500-mL samples from these sites will then be delivered immediately to KCEL (so as not to violate holding time requirements) and analyzed for *E. coli* and human *Bacteroides*. (If only one replicate contains greater than 240 cfu/100 mL, best professional judgment will be used in determining whether or not to submit to KCEL.) After the preliminary count, the Coliscan plates will be left to incubate for the remainder of the 24-hour incubation period, at which time the official count will be made.

Source tracking will not be initiated based on the data from a single synoptic event. High *Bacteroides* levels will need to be confirmed in additional synoptic sampling events before source tracking is initiated.

After three synoptic sampling events, there will be at least three independent *E. coli* observations for each site. Any sites with less than 60 cfu/100 mL in all three samples will be removed from the sampling program, and will be replaced by a backup site (Figure 3) in order to maintain or expand coverage. Any sites that consistently have high *E. coli* levels relative to other sites will be chosen for source tracking – a single additional site will be added at a strategically chosen, up-pipe or up-ditch location in the MS4. Sites that do not fit one of the two described scenarios will remain in the sampling program and continue to be sampled in future synoptic events.

At this time, it is impossible to outline all the possible scenarios that could be encountered during sampling acquisition and data analysis. The basic approach will be to use available staff resources to follow up at any sites where measurements suggest a potential problem. If many potential problems are encountered, a triage approach will be used to focus on the “hottest” spots.

4.6 Future changes to SAP

The goal of this project is to find and eliminate anthropogenic sources of fecal coliform bacteria entering the County’s MS4 within the Bear-Evans Watershed. The methods used are those deemed most likely to find said sources. As such, certain details of the project’s sampling design or procedures may be abandoned and other, more useful methods may be adopted. Addenda will be made to the SAP over the course of the first wet season (2015-2016) to document any changes made. An updated SAP will be created, incorporating the various addenda, in preparation for the second wet-season sampling period in 2016-2017.

5.0 Sampling Procedures

5.1 Overview

At each sampling site, a 500-mL polypropylene bottle will be filled with stormwater flowing in the County's MS4. From this bottle, two 5-mL aliquots will be pipetted. Each aliquot will be dispensed into a separate Coliscan gel bottle, which will be incubated later that day at KSC for *E. coli* analysis. The following provides a detailed description of the procedures to be followed at each sampling site.

5.2 Arrival at site

A field sheet has been created for each sampling location. This sheet includes a map and photo of the site and a text description of the location, including the asset ID of the feature to be sampled, tools that will be needed to acquire the sample, and driving directions to the site. Sampling personnel will use this field sheet along with SWS's Collector App for iPhone (and GPS) to positively identify the sampling location. Most or all sites will also be tagged with pink flagging and/or yellow crayon. An example the field sheet is given in Appendix A.

With the sampling site located and the necessary tools in hand, the sample may be acquired. First, however, at least one photo of the site should be taken. The photo should be taken of the exact location sampled. The quantity of water flowing at the point should be evident in the photo. For samples taken from catch basins or manholes, two photos should be taken – one at street level and one looking down into the structure (preferably with a flash).

Sampling personnel will wear appropriate safety gear at each site, including steel-toed boots, high-visibility vests or jackets, hard hats, and gloves.

5.3 Sample acquisition

In general, only flowing water will be sampled, in order to accurately characterize water leaving the MS4 and entering the streams. Standing water in ditches, ponds, and catch basins will not be sampled unless there is evidence that water has been flowing past the point in the last two hours. Lack of flow will be noted on the field sheets.

At each site, sampling personnel will fill one 500-mL, sterile, polypropylene bottle with water flowing in the MS4. One inch of headspace should be left in the bottle. The 500-mL container must not be pre-rinsed with sample prior to collection. Each 500-mL bottle will be labeled with the lab sample number, the site ID, the date and time of sample acquisition, and the requested analyses to be performed.

Samples will be collected by the manual direct fill method. If this method is not possible due to safety considerations, personnel will use a telescoping sampling pole fitted with a swivel-head polypropylene or stainless-steel bailer. The 500-mL bottle will be situated inside the bailer to allow for direct fill. If this method is not practicable, sample water will be acquired in the bailer itself and decanted into the 500-mL bottle. The bailer will be triple-rinsed with R.O. or distilled

water after each use, and will also be rinsed with sample water thrice prior to sample acquisition.

From the 500-mL sample, two 5-mL aliquots will be pipetted. Each aliquot will be dispensed into a separate Coliscan gel bottle, each of which will be thawed and pre-marked with the sample site ID prior to dispensing. The same pipette tip may be used for each aliquot, but must be discarded after sampling at each site.

5.4 Sample handling and processing

All samples will be immediately placed in coolers with chilled blue ice. Coliscan samples will be transported as soon as possible to the King Street Center, 201 South Jackson Street, Seattle, WA 98104, Lab Room PA09, near the garage entrance/exit. For the first synoptic sampling event, all 500-mL samples will be transported to King County Environmental Lab for Hu-2-*Bacteroides* and *E. coli* analyses.

At King Street Center, Coliscan samples will be transferred to Petri dishes and incubated overnight. Incubation will take place at 95° F (± 2 °F) for at least 24 hours. At the end of 24 hours, final *E. coli* colony plate counts will be obtained and recorded. A photograph of each Petri dish will be taken with notation indicating the sample number, collection time, incubation time, and colony count normalized to 100 mL.

Samples in the 500-mL containers will be refrigerated or kept chilled with fresh blue ice at King Street Center overnight and transported to KCEL for lab analyses the next morning. All 500-mL samples collected during the first synoptic event will be submitted to KCEL for *E. coli* and Hu-2-*Bacteroides* analyses. Samples from subsequent sampling events will be submitted to KCEL for analyses pursuant to the guidelines established in section 4.5.

Table 2. Containers, sample size, and field preservation methods for collected samples

Parameter	Container Type	Field Preservation
<i>E. coli</i>	Coliscan nutrient bottle; pipette	Store on ice
<i>E. coli</i> and Hu-2- <i>Bacteroides</i>	500 ml sterile polypropylene	Store on ice

5.5 Field replicates and field blanks

Field replicates will be collected at 15 percent of the sampling sites (i.e., at six of the 40 sites). These sites will be chosen prior to the first synoptic event based on ease of access and likelihood of encountering flow.

Field replicates will consist of a second 500-mL polypropylene bottle filled immediately after the first, in the same manner as the first. From the second 500-mL polypropylene bottle, a single 5-mL aliquot will be pipetted and dispensed into its own labeled Coliscan gel bottle. The Coliscan sample will be cultured and analyzed in the same manner as described above.

Field blanks will be acquired at 5 percent of all sites (i.e., at two of the 40 sites). A field blank will consist of a separate 500-mL polypropylene bottle filled with R.O. water or distilled water. From this additional 500-mL polypropylene bottle, a single 5-mL aliquot will be pipetted and dispensed into its own labeled Coliscan medium bottle. This Easygel sample will be cultured and analyzed in the same manner as described above.

5.6 Other measurements

In-situ parameters (temperature, pH, specific conductivity, ammonium ion, and nitrate ion) will not be measured in the initial synoptic event due to limited available time at each location. These parameters may be measured in future events at selected sites of interest.

5.7 Documentation and custody procedures

Unique site IDs will be assigned to each sampling location. All Coliscan gel bottles will be labelled with the site ID and the time of sample acquisition. All 500-mL bottles will be labeled with the site ID, date and time of sample acquisition, sampling personnel, and parameters requested. Replicate samples will be identified as such on their respective bottles.

Relevant information, including the sampling personnel, date and time of collection, number of samples collected, and a description of water flowing at the site, will be noted on the field sheet or in field notebooks. Photographs will be taken at each site as described in section 5.2.

During sample collection, all sample bottles will be in the custody of sampling personnel. Field sheets or notebooks will be used to document all steps of the transfer of custody from the sampler to King Street Center or KCEL if needed. Field forms and a completed chain-of-custody will be marked with the same information as marked on the sample bottle, for submittal to KCEL.

Sampling personnel who do not directly transport samples to King Street Center will transfer custody to the courier by signing and dating the “relinquished by” section of each field sheet. Couriers will then transfer custody to the lab via a separate custody stamp on each field sheet.

6.0 Measurement Procedures

Samples collected in 500-mL bottles will be analyzed for *E. coli* and human *Bacteroides* in the first synoptic event, and in subsequent two events if Coliscan results exceed the above-mentioned threshold. These analyses will be done at the KCEL, which is accredited by the Department of Ecology to perform these analyses. The table below summarizes the methods to be used by KCEL.

Table 3. *E. coli* and Hu-2-*Bacteroides* methods

Parameter	Method	Units	Lower Reporting Limit	Holding Time	Preservation
<i>Escherichia coli</i>	Standard methods 9213D	cfu/100 mL	1 cfu/100 mL	24 hours	Cool to 10°C
Human-2- <i>Bacteroides</i>	King County SOP 570VD	copies/mL	0.01 copy/mL	24 hours	Cool to 10°C

7.0 Quality Assurance/Quality Control Objectives

7.1 Data quality objectives

Data quality objectives (DQOs) reflect the overall degree of data quality or uncertainty considered acceptable during decision making. DQOs typically describe the quality of the data in terms of precision, accuracy (bias), representativeness, comparability, and completeness.

Precision is a measure of data scatter due to random error, and reflects the reproducibility of measurements under a given set of conditions. Precision is evaluated through duplicate field and laboratory samples.

Accuracy is a measure of differences between a parameter value and the true value due to systematic errors. Sources of error include the sampling process, field contamination, sample preservation, sample handling, sample matrix, laboratory preparation, and analysis techniques. The most common methods to assess for accuracy are spiked samples and various types of blanks.

Representativeness expresses the degree to which sample data accurately and precisely represent population characteristics— in this case, *E. coli* levels in the water leaving the County's MS4. At a given site, representativeness is achieved by collecting a sufficient number of samples to be able to characterize *E. coli* levels at that site with some degree of confidence. In the basin as a whole, representativeness is achieved by sampling at locations that drain relatively large areas, so the sample data can be said to represent the MS4's bacterial contribution to Bear Creek.

Comparability is a qualitative parameter expressing the confidence with which one data set can be compared to another. This goal will be achieved through use of standardized techniques to collect and analyze representative samples, along with standardized data validation and reporting procedures. All samples will be collected according to the sampling, handling, and analytic protocols established in this document.

Completeness is defined as the total number of samples for which acceptable analytical data are generated, compared to the total number of samples submitted for analysis. The goal for this project is 100 percent completeness. If 100 percent completeness is not achieved, the Project Manager and Assistant Project Manager will evaluate whether Study Objectives can still be met or if additional samples may need to be collected and analyzed.

Details regarding the procedures used to evaluate the precision and bias of lab sample collection, field measurements, and lab analyses are documented in the KCEL Standard Operating Procedures (SOPs) and Quality Assurance Manuals. Measurement quality objectives specific to the parameters to be reported for this project are summarized in the Quality Control sections of the applicable SOPs in section 7.2. It is expected that the quality objectives for this project will be achieved if the procedures in this document are followed and the frequency and

acceptance limits in the Quality Control sections of the applicable quality assurance documents are met.

7.2 Laboratory QA/QC: King County Environmental Laboratory

QA/QC for *Escherichia coli*

Routine QC analyses for *Escherichia coli* include both those procedures used to ensure the quality of each batch of media and containers and those procedures used to monitor method performance of each sample analysis batch or analysis session. A sample analysis batch should not exceed 20 samples of the same matrix that are all prepared and analyzed together, using the same reagents, media, and equipment. An analysis session consists of one or more batches done within a working day.

Each batch of media must be tested to confirm pH, sterility, and positive and negative performance characteristics. After washing and sterilization, each batch of containers used for the collection of samples must be evaluated for appropriate pH and sterility. Details on these procedures are available from KCEL.

- *Lab duplicates.* Lab duplicates are prepared at a frequency of 5 percent per project. For MF, the acceptance limits are based on the precision criterion calculated from the duplicates of the previous 15 duplicate pairs (see Standard Methods, 22nd Edition, p. 9-18). These acceptance limits are updated automatically by the County's Laboratory Information Management System (LIMS) whenever duplicate sample results are entered. If the 15 previous duplicate pairs are unavailable, a senior analyst and/or supervisor must evaluate the duplicate value.
- *Positive control.* A positive control is prepared at a frequency of one per session. The positive control is a suspension of *E. coli* and analyzed through the complete procedure. The positive control should show an appropriate qualitative response for the test organism and should be identified as containing fecal coliforms or *E. coli*, as appropriate.
- *Negative control.* A negative control is prepared at a frequency of one per session or 5 percent, whichever is more frequent. The negative control is a media streaked with a suspension of *Proteus sp.* or *Enterobacter sp.* and analyzed through the complete procedure. The negative control should show an appropriate qualitative response for the test organism and should not be identified as containing *E. coli*.
- *System controls.* For the MF procedure, both a "pre" and a "post" filtration blank are prepared on the least specific media being used that day at a frequency of one set per session. The filtration blanks challenge the same batch of American Public Health Association (APHA) water (100 mL) used to dilute and analyze the samples. These system controls are considered acceptable if the target organism for the media is not detected. If the "pre" and "post" filtration blanks show positive results by the least-specific method, the controls must be evaluated by each of the more-specific methods.

- *Verification – Escherichia coli.* Colonies identified as *Escherichia coli* are periodically confirmed by biochemical reactions in accordance with standard taxonomy. To ensure analysts' accuracy, monthly verification tests are performed on 20 colonies picked from various samples being processed that month. Colonies should be picked within one hour of being placed on the urea soaked pad. The colonies are streaked for purity and then confirmed as *E. coli* with a standard biochemical screen; lactose positive on MacConkey agar, indole positive, and citrate negative. Results are archived in the QC data book.
- *Corrective actions.* Corrective actions must be taken whenever a QC failure occurs. Unacceptable QC results within a batch or session of analyses require that all samples associated with those batches and/or session must be reviewed. A decision should be made as to if and how the samples should be qualified. A Data Anomaly form should be prepared to document the failure and describe how it was resolved, if possible, and how it could be avoided in the future.

QA/QC for *Bacteroides*

Routine QC analyses for MST qPCR testing include procedures used to monitor each sample filtration batch and each amplification run. A sample filtration batch should not exceed 20 samples of the same matrix that are all filtered together, using the same analysts, supplies, and equipment. Current acceptance limits are listed in the Data Review form shown in Appendix B of KCEL's SOP for *Bacteroides*. These limits may change when each near-annual calibration curve is completed.

- *Duplicates.* Lab duplicates are run on a minimum of 5 percent of samples per project.
- *Positive control.* Three calibrator samples will be run with each amplification run. The positive control used is *Bacteroides thetaiotaomicron* ATTC # 29471.
- *Negative control.* Two Non-Template Control (NTC) samples (nuclease-free water) are run with every amplification. Both the primer and probe sets for the target organism and the salmon DNA will be tested.
- *Endogenous control.* Salmon Testes DNA (Skeeta) that codes for ribosomal RNA from chum salmon *Oncorhynchus keta* is run with every sample.
- *Method blanks.* Method blanks will be run at a frequency of one per sample filtration batch. Results of the method blanks should be less than the LIMS MDL. If method blank fails, data will be re-evaluated.
- *Other QC procedures.* DNA standards and standard curves will be run on a nearly annual basis.
- *Corrective Actions.* An experienced analyst must review all QC failures. Corrective actions must be taken whenever a QC failure occurs. Unacceptable QC results within a filtration batch or amplification require that all samples associated with those batches and/or run must be reviewed. A failure of a positive control, NTC, or endogenous

control (skeeta) result for an individual sample should be reanalyzed on a separate run, following appropriate corrective action such as sample dilution. If a true QC failure occurs, a Data Anomaly form (DAF) should be prepared to document the failure, corrective actions taken, and the potential impact on data quality. The DAF should also describe how the anomaly could be avoided in the future.

7.3 Laboratory QA/QC: Stormwater Services

Stormwater Services will use the Coliscan Easygel© method as an in-house field screening tool to assess levels of *E. coli* in stormwater conveyance system samples. There is no regulatory limit for *E. coli* in Washington State receiving waters or stormwater. Stormwater Services' in-house Coliscan work is not implied to be certified or warranted. As such, there is no formal QA/QC for Coliscan included in this SAP.

Alabama Water Watch (AWW) has created a quality assurance plan for the Coliscan Easygel© method that has been adopted by U.S. EPA Region 4 (AWW 1995). AWW's QA methods will be incorporated into SWS's practices to provide confidence that this screening tool is being well-utilized and results are representative of the true population of *E. coli* in aliquots obtained.

Key elements of SWS's quality assurance protocols will be the following:

- *Use of positive and negative controls.* SWS will be provided by KCEL with suspensions of *Escherichia coli* (as a positive control) and of *Pseudomonas sp.* (as a negative control) and will use these in consultation with KCEL to ensure that SWS's incubators are working as intended.
- *Verification of Escherichia coli colonies.* At the outset of the study, at a frequency of once every one or two synoptic sampling events, SWS will coordinate with KCEL for verification of *Escherichia coli* colonies. SWS will submit Coliscan petri dishes to KCEL and indicate between 10 and 20 colonies that SWS counted as *E. coli*, and KCEL will use the methods listed in section 7.2 of this SAP to verify that these colonies are indeed *E. coli*.
- *Side-by-side analyses with KCEL.* Aliquots for Coliscan analysis will be pipetted directly from the same bottle to be submitted to KCEL. This is equivalent to splitting the sample. SWS's Coliscan results will be compared to KCEL's *E. coli* results to assess the Coliscan's performance relative to standard methods.
- *Replicates.* The pipetting of two separate aliquots for Coliscan analysis will provide some measure of the variability associated with subsampling or splitting samples.
- *Counting of colonies.* At least 20 percent of *E. coli* plates will be counted by a second analyst. The second analyst will not know the name of the sampling site or the previous analyst's count. Any plates for which there is a greater than 10 percent RPD between counts will be revisited and the discrepancies evaluated.

- *Consistent incubation temperature.* All plates will be incubated at 95° Fahrenheit (± 2 °F) using temperature-controlled Little Giant Styrofoam chicken egg incubators manufactured by Hobovator and available from Incubators.com.
- *Proper sample handling.* All laboratory procedures related to the Coliscan method will be undertaken with utmost care to avoid sample cross-contamination.

7.4 Field QA/QC: Stormwater Services

Field QA/QC on the part of Stormwater Services consists of the following:

- *Positive identification of sampling sites.* Sampling locations are described in detail in the sampling site guides prepared for each site (see Appendix A). Sampling at the proper site will be ensured by the project manager by review of photos taken of the sampling site. Samples taken at the wrong location will be flagged or thrown out.
- *Field replicates and field blanks.* These will be taken at 15 percent and 5 percent of all sites, respectively. Details are provided in section 5.5.
- *Proper sample collection and handling.* All field procedures will be undertaken with utmost care to avoid sample cross-contamination. All samples will be kept on blue ice while they are in SWS's custody, until their ultimate submittal to KCEL or incubation for in-house *E. coli* analysis at KSC.

8.0 Data Management Procedures

8.1 Data review, reporting, verification, and validation requirements

King County Environmental Laboratory

Data reported by KCEL, including field measurements, must pass a review process before final results are available to the client. A peer review process is used in which a second analyst or individual proficient at the method reviews the data set. The reviewer will complete a data review checklist that will document the completeness of the data package and assess whether any QC failures exist.

Once data review is complete and all data quality issues have been resolved or corrected, the status of the data in LIMS will be changed to “approved.” Once a data set has been approved, it is transferred to the Environmental Data System (EDS) where all historical LIMS data are maintained. Signatures or initials of the lab lead and reviewer(s) indicate formal approval of hardcopy data or reports (non-LIMS), typically on the review checklist. A copy of this approved checklist should be stored with the final hardcopy data package.

Table 4. KCEL detection limits for *E. coli* and Hu-2-*Bacteroides* analyses

Parameter	Units	Method Detection Limit (MDL)	Reporting Detection Limit (RDL)
<i>Escherichia coli</i>	cfu/100 mL	1	not applicable
Hu-2- <i>Bacteroides</i>	copies/mL	0.01	not applicable

E. coli results for samples with no detectable colonies are reported in LIMS as <MDL. Non-detects for Hu-2-*Bacteroides* also will be reported as <MDL.

If it is determined in the review process that the quality objectives were not met or an analysis anomaly has occurred, the affected data will be flagged and the project manager notified. Common data qualification flags found in LIMS are presented in the following table:

Table 5. KCEL qualifier codes

Qualifier	Description
H	Indicates that a sample handling criterion was not met in some manner prior to analysis. The sample may have been compromised during the sampling procedure or may not comply with holding times, storage conditions, or preservation requirements. The qualifier will be applied to applicable analyses for a sample.
JU	Indicates there are unknown variables in the qPCR test for that sample.
R	Indicates that the data are judged unusable by the data reviewer. The qualifier is applied based on the professional judgment of the data reviewer rather than any specific set of QC parameters and is applied when the reviewer feels that the data may not or will not provide any useful information to the data user (other than as an approximate maximum or minimum value). This qualifier may or may not be analyte-specific.
TA	Applied to a sample result when additional narrative information is available in the text field. The additional information may help to qualify the sample result but is not necessarily covered by any of the standard qualifiers.
C	Applied to bacteria data when the sample analysis exhibits confluent growth of organisms. The value reported can be reliably used as an indicator of relative abundance, however, it cannot be used as an accurate count of the associated organism.
>#####	Applied to bacteria data when the population count exceeds the procedural capacity to measure quantitatively. The number in the qualifier is the highest procedural count or concentration possible for the sample dilutions analyzed. A value is not entered into the numvalue field. The actual population count is at least as great as or greater than the value reported in the qualifier.
<MDL	Applied when a target analyte is not detected or detected at a concentration less than the associated method detection limit (MDL). MDL is defined as the lowest concentration at which an analyte can be detected. The MDL is the lowest concentration at which a sample result will be reported.
J	Applied to a parameter result when the reported value is an estimated value.

Stormwater Services

Written field observations and photos taken during sampling events will be checked by project management staff for accuracy and completeness.

Coliscan plate counts and photos will be peer-reviewed for accuracy, consistency, and completeness. Colors seen in photos of Coliscan plates will be normalized by using the same camera for taking photos and the same computer monitor for reviewing photos, as well as by taking a photo of a hue known to accurately represent an actual *E. coli* colony and viewing this on the designated computer monitor.

Field observations and in-house Coliscan plate count information will be included within or attached to program reports provided to relevant parties within and outside King County.

8.2 Data Storage

King County Environmental Laboratory

Once raw data has been generated by an analytical procedure or from field measurements, the data must be transformed into a format appropriate for the client. For microbiological parameters, numerical results are entered into LIMS where additional calculations may take place, such as conversion of instrumental concentrations to final sample results.

Data will not be distributed outside each lab unit or to clients until it has met the full definition of final data. "Final Data" is defined as approved data posted to the historical database (EDS) or is otherwise in its final reportable and stored format (if not a LIMS parameter). This implies the data has been appropriately peer reviewed, properly qualified, and is in its final format in terms of units and significant figures. Not only is final data assured of a higher level of quality through peer reviewing and qualification, but it will also match any future reports since it has come from the final storage location.

The standard method for clients to access final data is either through direct electronic access to LIMS (EDS database) or through hardcopy reports and/or electronic files provided by the Laboratory Project Manager or their equivalent. Direct client access to the EDS database is controlled by access privileges provided by the Information Systems and Data Analysis unit for individual clients. Data reporting via hardcopy through Laboratory Project Managers must follow the guidelines in King County Environmental Lab's SOP# 11-03-001-001 (Project Report Review Guidelines) before being delivered to the client. Electronic files delivered to clients must also follow the King County Environmental Lab's SOP # 08-01-001-000 (Guidelines for Delivering Electronic Lab Data to Customers).

All field and sampling records, custody documents, raw lab data, and summaries and narratives will be archived according to KCEL policy.

Stormwater Services

Written field observations and Coliscan plate counts will be transcribed into an Excel document or other software format. Relevant data for this project from KCEL will be imported from LIMS and included in SWS's data tables. This information, along with field and Coliscan plate photos, will be stored on the SWS hard drive. Once compiled, all bacteria data (including both Coliscan data and data from KCEL) will be imported into SWS's stormwater geodatabase, specifically the "StormEdit.STORMWATERMOBILEDBO.WQ_Sample" database table.

9.0 References

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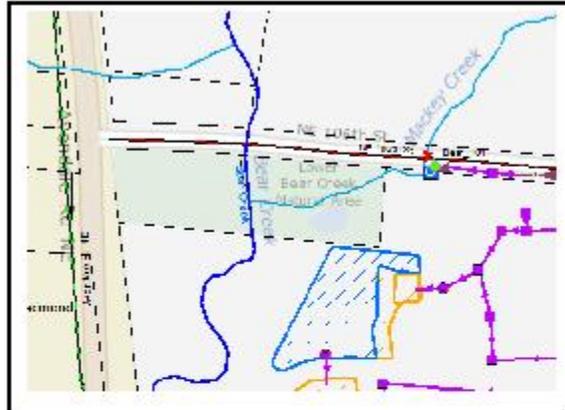
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U.S. Environmental Protection Agency, 1992. Fecal Bacteria factsheet available on EPA website at <http://water.epa.gov/type/rs1/monitoring/vms511.cfm>

Appendix A: Sampling Site Guide

Sampling Site ID	Bear_101
Feature Asset ID	4433
Feature Type	Pipe
Facility Number	NA
Facility Name	NA
Bioswale?	NA
Link Asset ID	9274
Link Type	Outfall
To/From	Stream
Owner Entity	Roads
Street	NE 106th St
Block	18600
Side of road	South



Driving	From Avondale, go E on 106th, to just beyond second stream crossing (Mackey Creek)
Parking	Road widens just east of Mackey Ck. Public ROW. Park on north side of road, across from Little Bit Stables entrance; walk ~75 ft back to west
Specific location	CMP with trash rack ~30 ft east of Mackey crossing; about 10 ft from south edge of road
Tools	Direct grab, no tools needed
Sampling details	Attempt to sample only water flowing out of pipe. Note if water from pipe is flowing or if it is stagnant and possibly due to backwater from creek.
Contributing area	Private -- horse pastures at 18804 NE 106th St
Notes	Little Bit Riding Center has private D9 which discharges directly to creek



SAMPLED?	YES	NO	DATE:	
PHOTO TAKEN?	YES	NO	TIME:	
CIRCLE ONE:	FLOWING WATER		PERSONNEL:	
	STANDING WATER		FIELD NOTES:	
Flow depth: (inches, est)	MOIST			
	DRY			

King County Stormwater Services

Puyallup-White River FC TMDL Program 2015

Executive Summary

This document responds to Question 71 of the questionnaire from the Washington State Department of Ecology regarding King County's Phase I NPDES Municipal Stormwater Permit Appendix 2 Puyallup-White Fecal Coliform Total Maximum Daily Load (FC TMDL) implementation activities for 2015.

In 2015, King County Stormwater Services (SWSS) staff conducted bacterial source screening in both the Boise and Jovita Creek municipal separate storm sewer (MS4) basins as required by Appendix 2 of the NPDES permit for the Puyallup-White River FC TMDL. Work plans and findings specific to each basin in 2015 are described in this document. For work performed prior to 2015 and for background descriptions, previous documentation submitted to Ecology for Annual Report 2014 can be reviewed. For efficiency and as a courtesy, this previous documentation (of work performed in 2014) has been submitted to Ecology for 2015's report.

At the time of this writing, no new illicit connections or illicit discharges of high bacteria have definitely been identified in the Boise Creek or Jovita Creek MS4 basin areas. However, Stormwater Services suspects that some high bacteria levels in the Boise Creek stormwater system may be explained by the presence of cattle in this agricultural/pastoral basin, as well as the agronomic application of manure to fields. Stormwater Services has no detailed information regarding manure application. No specific parcels of concern regarding cattle fecal waste runoff have been identified at time of this report.

Continued bacteria source screening work will be implemented in 2016 in Boise and Jovita Creek MS4.

Regulatory Requirements

Under the Washington State Department of Ecology Phase I NPDES Municipal Stormwater Permit effective August 1, 2013, in Appendix 2, Puyallup Watershed Fecal Coliform TMDL, King County is required to perform the following:

- Designate areas discharging via the MS4 to Boise Creek as high priority areas for illicit discharge detection and elimination. Complete IDDE field screening for bacteria sources in 100 percent of the MS4 subbasins, including rural subbasins, by February 2, 2016 and implement the schedules and activities identified in S5.C.8 of the Phase I permit for response to any illicit discharges found. Field screening must include activities for both the dry season (May through September) and the wet season (October through April).
- Inventory commercial animal handling areas (associated with Standard Industrial Code 074 and 075) in areas discharging via the MS4 to Boise Creek and conduct inspections of these areas as

part of the Source Control program required in S5.C.7 of the Phase I permit. All qualifying facilities must be inspected by August 1, 2016. The Permitted shall implement an ongoing inspection program to re-inspect facilities or areas with bacteria source control problems every three years. (*County note: no such areas were found in the Boise Creek basin.*)

- Designate areas discharging via the MS4 to Jovita Creek as high priority areas for illicit discharge detection and elimination field screening, and implement the schedules and activities identified in S5.C.8 of the Phase I permit.

Introduction

This document updates work findings in bacteria source screening programs in Boise Creek and Jovita Creek. King County Stormwater Services (SWSS) has undertaken these tasks as part of the Fecal Coliform Total Maximum Daily Load (FC TMDL) program specific to the County's MS4. Relevant regulatory requirements are included in the following section.

For the following, the documents submitted for Annual Report 2014 may be consulted. These documents were submitted concurrently with this write-up.

- Field and Laboratory Methods
- Project Trigger Levels for Bacteria and Nutrient Ions
- Field Staff
- Field Screening Techniques

BOISE CREEK BASIN

For the following, the documents submitted for Annual Report 2014 may be consulted. These documents were submitted concurrently with this write-up.

- Desktop Analyses, 2014
- Investigation Site Selection, 2014
- Field Investigation Tasks and Findings, 2014

Field Investigation Tasks and Findings, 2015

In 2015, the following work was performed:

- Illicit discharge detection-type field reconnaissance and in-situ screening of the County MS4.
- Additional MS4 sampling sites were added; the Boise sampling map (Figure 1) shows sampling locations in the MS4.
- Samples for bacterial analyses were obtained from MS4 locations in September, November and December.

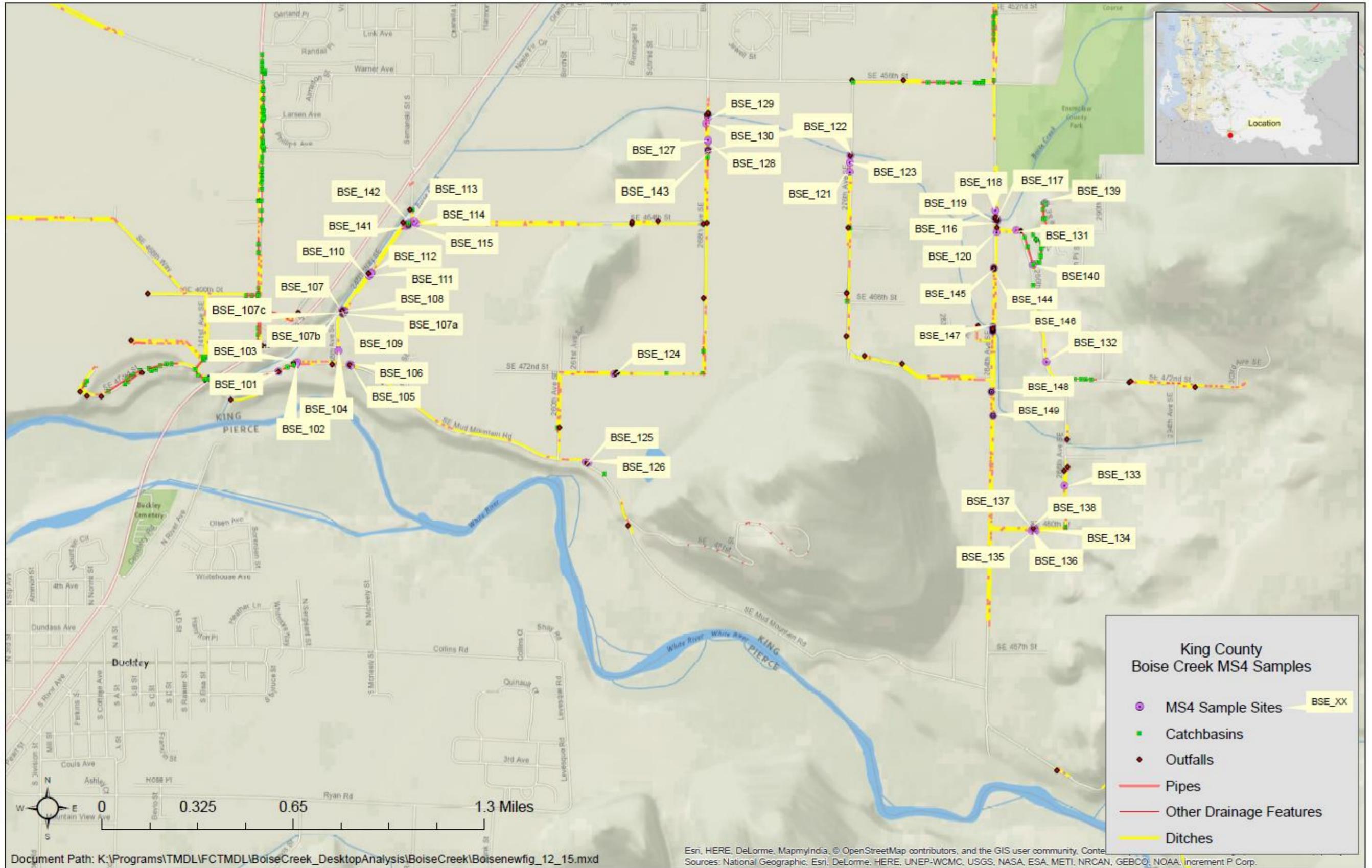
Samples were submitted to the following laboratories:

King County Environmental Lab, in Seattle, WA; and

Source Molecular, in Miami, FL.

The illicit connections found in late 2014 (septic wastewater and laundry wash water discharging through pipes called sample location BSE_107b into a County MS4 ditch) were removed in mid-2015. However, elevated levels of bacteria were detected in a tile discharge pipe at this location in November 2015, so there may be residual bacteria in the soil discharging from this site, or possibly some other bacterial discharge mechanism. For this reason, this location near the former two illicit drainage pipes will continue to be monitored and sampled, as feasible.

High levels of ruminant-specific *Bacteroidales* were found in MS4 water samples obtained in November and December 2015. The November samples were submitted to the private lab Source Molecular for cow- and cattle-waste specific DNA analyses, as specific sources of this ruminant waste were not known. This is because in addition to cows and cattle in the Boise basin, there are also wild elk and deer present at times, as well as domestic ruminants (alpacas, llamas, and possibly goats and sheep). Results from Source Molecular for cattle and cow-specific waste markers indicate that there was likely some presence of cattle/cow waste in the stormwater system at time of sampling (November 1, 2015). However, because of a lack of spatially and temporally adequate data (e.g., a sufficient number of sample locations and sample events), at the time of this report in January 2016 no specific parcels in the Boise Creek basin have been identified as being definitive sources of cattle/cow waste runoff into the stormwater system. Further work in 2016, including land use analysis and more sampling and analytical testing, may lead Stormwater Services to identifying specific parcels as sources of cow/cattle waste affected runoff into the stormwater system.



JOVITA CREEK BASIN

For the following, the documents submitted for Annual Report 2014 may be consulted. These documents were submitted concurrently with this write-up.

- Preliminary Basin Investigation
- MS4 Basin Overview
- Basin Map
- MS4 Basin Boundaries
- Land Use
- Surface Water Drainage
- Investigation Site Selection
- Field Investigation Tasks and Findings, 2014
- Agencies Helping to Identify & Eliminate Confirmed and Suspected Bacterial Sources

In 2015, more field reconnaissance in Jovita Basin MS4 was conducted. Locations with high bacterial results from 2014 sampling and analysis were re-visited, with the goal of finding possible sources such as failing septic systems or domestic animal waste mismanagement. No such sources were identified. Some additional field screening and sampling will be conducted before the end of the permit requirement in February 2016.

-----*End of Report*-----

Attachment 2015 Annual Report Question #69b:

Attach description of how the requirement from Question 69 was met.

Used results of measuring the understanding and adoption of targeted behaviors among at least one audience in at least one subject area to direct education and outreach resources and evaluate changes in adoption of targeted behaviors. (Required no later than February 2, 2016, S5.C.10.c). Attach description of how the requirement from Question 69 was met.

**Evaluation of behavior change for adapting approaches; King County Outreach Program
Don't Drip and Drive Vehicle Maintenance 2014-2015**

The Don't Drip and Drive program has engaged and empowered vehicle owners to find and fix vehicle leaks. Data from King County's Environmental Behavior Index suggested that most vehicle owners would repair a vehicle leak within three months of discovery. Further research found that many vehicle owners are unaware of vehicle leaks.

Pierce County received a Grant of Regional or Statewide Significance from the Department of Ecology in 2014 to implement Phase 2 of the Don't Drip and Drive vehicle maintenance program. To help people find out whether their vehicle was leaking and help them get leaks fixed more quickly, the program included:

- Advertising and a website to make people aware of leaks and the impacts on Puget Sound and provide information about finding and fixing leaks.
- Partnerships with 102 auto repair shops around the region who provided a free leak inspection and up to \$50 off of repairs.
- Free leak check events at public locations or large employers which let people know whether they had a leak and provide them with program resources.
- Free half-day auto leak repair workshops with education about vehicle systems, maintenance and a complete vehicle inspection for every attendee.

The program evaluated the effectiveness of each element and recommended improvements. In 2016, King County received a Grant of Regional or Statewide Significance on behalf of the Don't Drip and Drive team for Phase 3 of the program. Phase 3 will include many of the recommended improvements and incorporate new elements to:

- Expand multimedia advertising using successful messaging strategy (Phase 2 included online ads only).
- Make website improvements, including online registration, reporting for participating repair shops and workshop registration.
- Advertise leak check events broadly and allowing people to self-select – targeting those who suspect they might have a leak rather than testing all of cars that use a parking area. This may allow us to reach more leakers.
- Continue repair shop partnerships and assign a staff person for repair shop support to improve implementation and reporting.
- Recruit new quick lube shops as partners; they do oil changes but not leak repairs. The quick lube shops will notify vehicle owners when they see evidence of a leak and provide them with program resources to help get the leak repaired.
- Include Spanish-language outreach and web information.
- Expand vehicle leak workshops beyond King County for the first time. Workshops will likely be held in Snohomish, Pierce and Thurston counties by establishing new partnerships with technical colleges in those areas.

Pierce County worked with a steering committee comprised of representatives from King and Snohomish counties, Ecology and Futurewise to plan, implement and evaluate the program on behalf of the STORM (Stormwater Outreach for Regional Municipalities) network. King and Pierce County, Ecology and Futurewise will continue to serve as key members of the steering committee for Phase 3.

Program planning will take place through summer 2016 with a public launch in fall 2016. The program evaluation report will be finalized by June 2017. Program website is available at fixcarleaks.org; report appendices, evaluation and partner toolkit can be accessed at piercecountywa.org/dontdripanddrive.

Attachment 2015 Annual Report Question #67:

Attach description of public education and outreach efforts conducted per S5.C.10.

Attachment 2015 Annual Report Question #62e:

Attach documentation of alternative catch basin inspection approach, if used (S5.C.9.d.i.(1), (2), or (3)).

2.1.9 Operations and Maintenance Program – S5.C.9

- d. Maintenance of Catch Basins Owned or Operated by the Permittee*
- i. Each Permittee shall annually inspect catch basins and inlets owned or operated by the Permittee, or implement alternatives below.*
- Alternatives to the standard approach of inspecting catch basins annually: Permittees may apply the following alternatives to all or portions of their system.*
- (1) The annual catch basin inspection schedule may be changed as appropriate to meet the maintenance standards based on maintenance records of double the length of time of the proposed inspection frequency. In the absence of maintenance records for catch basins, the Permittee may substitute written statements to document a specific, less frequent inspection schedule. Written statements shall be based on actual inspection and maintenance experience and shall be certified in accordance with G19 Certification and Signature.*
 - (2) Annual inspections may be conducted on a “circuit basis” whereby 25% of catch basins and inlets within each circuit are inspected to identify maintenance needs. Include an inspection of the catch basin immediately upstream of any system outfall or discharge point, if applicable. Clean all catch basins within a given circuit for which the inspection indicates cleaning is needed to comply with maintenance standards established under S5.C.9.a., above.*
 - (3) The Permittee may clean all pipes, ditches, catch basins, and inlets within a circuit once during the permit term. Circuits selected for this alternative must drain to a single point.*
- ii. The disposal of decant water shall be in accordance with the requirements in Appendix 6 – Street Waste Disposal.*
- iii. Compliance with the inspection requirements of S5.C.9.d.i. above, shall be determined by the presence of an established inspection program designed to inspect all catch basins and achieving at least 95% of required inspections.*

Each custodial agency within King County is responsible for the inspection and maintenance of their respective properties and associated stormwater assets.

Of the custodial agencies, Roads carries the largest catch basin inventory. Roads implements a circuit-based inspection and maintenance program for catch basins and inlets in the road ROW. The circuit approach focuses on the inspection of a subset of catch basins in each drainage circuit to determine where to focus maintenance activities. The program includes annual staff training, completion of inspection checklists, data input into a geospatial database, data quality assurance/quality control, work order generation, requisite maintenance, and documentation of maintenance activities.

Most other custodial agencies have a small number of catch basins (typically less than 500) in their facility inventory. These agencies inspect 100 percent of their catch basin inventory at least annually, with a very limited number on a modified schedule, and

conduct maintenance on those that fail to meet the maintenance standards found in the SWDM. These agencies include SWD, WTD, Transit, Parks, and FMD.

Roads operates a regional stormwater decant station in Renton and temporary decant stations at three other maintenance facilities run by Roads. These decant stations are a key element in the disposal of stormwater removed from the County's MS4 during catch basin cleaning activities. All stormwater accepted at Roads' decant stations is disposed of through the sanitary sewer.

The KCIA has implemented an alternative approach due to several airport operation challenges, which is in accordance with S5.C.9.d.i. (3). KCIA has also enhanced daily mechanical sweeping of paved areas. KCIA has established catch basin cleaning activity areas into east, west and central areas of the airport. KCIA cleans all pipes, ditches, catch basins, and inlets in each established circuit once during the permit term. The alternative cleaning schedule repeats every three years. Each established circuit drains to a single point.

Results of annual stormwater facility inspections, annual IC/IDDE inspections and daily pavement sweeping show that this frequency is optimal. Oil water separators are maintained weekly. Catch basins are also cleaned on as needed basis in accordance with the Airport's Spill Response Policy and the occurrence of construction activities. Cleaning of catch basins and sweeping are also required for tenants as well.

KCIA performs these activities in compliance with its Industrial Stormwater General Permit (ISGP) requirements and accordance with its ISGP SWPPP requirements include monthly facility inspections, quarterly stormwater discharge monitoring and reporting, corrective actions, training, and annual reporting.

All maintenance needs identified through inspections are addressed within the timelines established in S5.C.9.a.ii.

Attachment 2015 Annual Report Question #59:

If reduced inspection frequency for municipally owned or operated stormwater treatment and flow control BMPs/facilities for the first time during this permit cycle, attach documentation per S5.C.9.c.i.

2.1.9 Operations and Maintenance Program – S5.C.9

- c. *Maintenance of stormwater facilities owned or operated by the Permittee*
- i. *Each Permittee shall implement a program to annually inspect all permanent stormwater treatment and flow control BMPs/facilities owned or operated by the Permittee. Permittees shall implement appropriate maintenance action(s) in accordance with adopted maintenance standards.*
- Permittees may reduce the inspection frequency based on maintenance records of double the length of time of the proposed inspection frequency. In the absence of maintenance records, the Permittee may substitute written statements to document a specific less frequent inspection schedule. Written statements shall be based on actual inspection and maintenance experience and shall be certified in accordance with G19 Certification and Signature.*
- ii. *Each Permittee shall implement a program to conduct spot checks of potentially damaged permanent stormwater treatment and flow control BMPs/facilities after major storm events (24 hour storm event with a 10 year or greater recurrence interval). If spot checks indicate widespread damage/maintenance needs, inspect all stormwater treatment and flow control BMPs/facilities that may be affected. Conduct repairs or take appropriate maintenance action in accordance with maintenance standards established under S5.C.9.a., above, based on the results of the inspections.*
- iii. *Compliance with the inspection requirements of S5.C.9.c.i., and ii. above, shall be determined by the presence of an established inspection program designed to inspect all sites and achieving at least 95% of required inspections.*

King County owned or operated facilities fall into two general categories: residential facilities serving subdivisions and facilities associated with County properties.

SWSS is responsible for inspecting and maintaining approximately 1,000 residential facilities throughout unincorporated King County and for cities with which the County contracts. As with private facilities, residential facilities with consistent compliance may be eligible for a phased inspection schedule.

SWSS uses Roads crews and vendor contractors to perform facility maintenance. Field inspection data for these facilities are entered into MIS by the inspector, resulting in a printed work authorization to be forwarded to crews.

Inspectors also identify noxious weed removal needs and capital repairs or corrections, if needed. Additionally, citizen complaints may warrant a site inspection to identify corrections. The maximum frequency between inspections is three years, but problem sites may require annual inspections and maintenance.

Inspection and maintenance of facilities associated with King County properties are the responsibility of the custodial agency. Custodial facility inspections are conducted by

SWSS or the custodial agency and range in frequency from several times per year to once annually.

Spot inspections conducted after large rain events focus on the areas of greatest intensity based on rain gage data.

Inspection programs are designed to inspect 100 percent of the facilities owned or operated by King County and at least 95 percent of required inspections are completed annually.

Attachment 2015 Annual Report Question #55:

If using a reduced inspection frequency on stormwater treatment and flow control BMPs/facilities regulated by the Permittee for the first time during this permit cycle, attach documentation per S5.C.9.b.ii.

2.1.9 Operations and Maintenance Program – S5.C.9

b. Maintenance of stormwater facilities regulated by the Permittee:

i. Each Permittee shall evaluate and, if necessary, update existing ordinances or other enforceable documents requiring maintenance of all permanent stormwater treatment and flow control BMPs/facilities regulated by the Permittee (including catch basins that are part of the facilities regulated by the Permittee), in accordance with maintenance standards established under S5.C.9.a., above.

ii. Each Permittee shall implement an on-going inspection program to annually inspect all stormwater treatment and flow control BMPs/facilities regulated by the Permittee to enforce compliance with adopted maintenance standards as needed based on inspection. The inspection program is limited to facilities to which the Permittee can legally gain access, provided the Permittee shall seek access to all stormwater treatment and flow control BMPs/facilities regulated by the permittee.

Permittees may reduce the inspection frequency based on maintenance records of double the length of time of the proposed inspection frequency. In the absence of maintenance records, the Permittee may substitute written statements to document a specific less frequent inspection schedule. Written statements shall be based on actual inspection and maintenance experience and shall be certified in accordance with G19 Certification and Signature.

iii. Each Permittee shall manage maintenance activities to inspect all permanent stormwater treatment and flow control BMPs/facilities, and catch basins, in new residential developments every six months, until 90% of the lots are constructed (or when construction has stopped and the site is fully stabilized), to identify maintenance needs and enforce compliance with maintenance standards as needed.

iv. Compliance with the inspection requirements of S5.C.9.b.ii and iii, above, shall be determined by the presence of an established inspection program designed to inspect all sites, and achieving inspection of 80% of all sites.

v. The Permittee shall require cleaning of catch basins regulated by the Permittee if they are found to be out of compliance with established maintenance standards in the course of inspections conducted at facilities under the requirements of S5.C.7. Source Control Program for Existing Development, and S5.C.8. Illicit Connections and Illicit Discharges Detection and Elimination, or if the catch basins are part of the stormwater facilities inspected under the requirements of S5.C.9. Operation and Maintenance Program.

The following KCCs authorize King County personnel to inspect and require maintenance of stormwater facilities.

- KCC 9.04.050 states that “Maintenance of all drainage facilities in compliance with King County maintenance standards is the responsibility of the applicant or property owner as described in the Surface Water Design Manual, except those facilities for which King County assumes maintenance and operation as

described in K.C.C 9.04.115 and 9.04.120 and the Surface Water Design Manual”.

- KCC 9.12.050 gives designated employees authorization to “make such inspections and take such actions as may be required to enforce the provisions” of KCC 9.12.

Additionally, developers are required to record easements and covenants providing the County with right-of-entry and inspection of private drainage and stormwater control systems.

Private facilities regulated by King County are inspected per Permit requirements. Inspections are generally conducted between July and October.

In any given year, half of the private commercial facility inventory is visited by an inspector to confirm full compliance based on the maintenance standards in the SWDM. If any deficiencies are discovered, a Maintenance Correction Letter is sent, giving the property owner sufficient time to correct the problem before the end of the year. The property owner notifies SWSS when the work has been completed. Extensions may be granted if circumstances warrant and permit timelines can accommodate the extension. Progressive enforcement may be used when maintenance is not completed within the timelines specified by the County.

The other half of the private commercial facilities regulated by King County complete a self-certified inspection in which they confirm full functionality of all facilities on their property.

For those properties with a history of consistent compliance, the inspection frequency may be reduced contingent upon maintenance records.

All compliance activities are tracked using a proprietary Maintenance Information System (MIS). At the end of the year, SWSS provides a SWM Fee discount report to the WLRD SWM Fee billing supervisor who then gives the report to the King County Department of Assessments. Property owners in compliance receive a SWM fee discount.

Attachment 2015 Annual Report Question #48:

Attach a summary of actions taken to characterize, trace and eliminate each illicit discharge found by or reported to the permittee. For each illicit discharge, include a description of actions according to required timelines per S5.C.8.d.iv.

2.1.8 Illicit Connections and Illicit Discharges Detection and Elimination – S5.C.8

The SWMP shall include an ongoing program designed to prevent, detect, characterize, trace, and eliminate illicit connections and illicit discharges into the MS4.

Minimum performance measures:

- a. *The program shall include procedures for reporting and correcting or removing illicit connections, spills and other illicit discharges when they are suspected or identified. The program shall also include procedures for addressing pollutants entering the MS4 from an interconnected, adjoining MS4.*

Illicit connections and illicit discharges shall be identified through field screening, inspections, complaints/reports, construction inspections, maintenance inspections, source control inspections, and/or monitoring information, as appropriate.

King County achieves compliance with S5.C.8 through implementation of the programs described in this section (pages 45-52).

- b. No later than February 2, 2018, each Permittee shall evaluate and, if necessary, update existing ordinances or other regulatory mechanisms to effectively prohibit non-stormwater, illicit discharges, including spills, into the Permittee's MS4.
- i. Allowable Discharges: The ordinance or other regulatory mechanism does not need to prohibit the following categories of non-stormwater discharges:
- (1) Diverted stream flows
 - (2) Rising ground waters
 - (3) Uncontaminated ground water infiltration (as defined at 40 CFR 35.2005(b)(20))
 - (4) Uncontaminated pumped ground water
 - (5) Foundation drains
 - (6) Air conditioning condensation
 - (7) Irrigation water from agricultural sources that is commingled with urban stormwater
 - (8) Springs
 - (9) Uncontaminated water from crawl space pumps
 - (10) Footing drains
 - (11) Flows from riparian habitats and wetlands
 - (12) Non-stormwater discharges authorized by another NPDES or State Waste Discharge permit
 - (13) Discharges from emergency firefighting activities in accordance with S2 Authorized Discharges
- ii. Conditionally Allowable Discharges: The ordinance or other regulatory mechanism, may allow the following categories of non-stormwater discharges only if the stated conditions are met:
- (1) Discharges from potable water sources including, but not limited to, water line flushing, hyperchlorinated water line flushing, fire hydrant system flushing, and pipeline hydrostatic test water. Planned discharges shall be dechlorinated to a total residual chlorine concentration of 0.1 ppm or less, pH-adjusted if necessary, and volumetrically and velocity controlled to prevent resuspension of sediments in the MS4.
 - (2) Discharges from lawn watering and other irrigation runoff. These discharges shall be minimized through, at a minimum, public education activities (see S5.C.10.) and water conservation efforts.

- (3) *Dechlorinated swimming pool, spa, and hot tub discharges. The discharges shall be dechlorinated to a total residual chlorine concentration of 0.1 ppm or less, pH-adjusted and reoxygenated if necessary, and volumetrically and velocity controlled to prevent resuspension of sediments in the MS4. Discharges shall be thermally controlled to prevent an increase in temperature of the receiving water. Swimming pool cleaning wastewater and filter backwash shall not be discharged to the MS4.*
 - (4) *Street and sidewalk wash water, water used to control dust, and routine external building washdown that does not use detergents. The Permittee shall reduce these discharges through, at a minimum, public education activities (see S5.C.10.) and/or water conservation efforts. To avoid washing pollutants into the MS4, Permittees shall minimize the amount of street wash and dust control water used.*
 - (5) *Other non-stormwater discharges shall be in compliance with the requirements of a pollution prevention plan reviewed by the Permittee which addresses control of such discharges.*
- iii. The Permittee shall further address any category of discharges in S5.C.8.b.i or ii above if the discharges are identified as significant sources of pollutants to waters of the State.*

KCC 9.12 authorizes the allowable discharges and conditionally allowable discharges but requires the application of BMPs specified in the SPPM at any property discharging hyperchlorinated line flushing, swimming pool water, and street and sidewalk wash water. PHSKC regulates public swimming pools and complies with adopted stormwater standards outlined in the SPPM for dechlorination, pH adjustment, and velocity controls. Discharges from irrigation or lawn watering are addressed as part of the Natural Yard Care education program. Other non-stormwater discharges are also prohibited or conditionally allowed by KCC 9.12.

c. Each Permittee shall implement an ongoing program designed to detect and identify non-stormwater discharges and illicit connections into the Permittee's MS4. The program shall include the following components:

i. Procedures for conducting investigations of the Permittees MS4, including field screening and methods for identifying potential sources. These procedures may also include source control inspections.

The permittee shall implement a field screening methodology appropriate to the characteristics of the MS4 and water quality concerns. Screening for illicit connections may be conducted using the *Illicit Discharge Detection and Elimination: A Guidance Manual for Program Development and Technical Assessments*, Center for Watershed Protection, October 2004; or another method of comparable or improved effectiveness. The Permittee shall document the field screening methodology in the relevant Annual Report.

- (1) Each Permittee shall implement an ongoing field screening program of, on average, 12% of the Permittee's known conveyance systems each calendar year.
- (2) Each City shall field screen all the conveyance systems within the Permittee's incorporated area at least once between February 2007 and July 31, 2018.
- (3) Each County shall field screen all the conveyance systems within the Permittee's urban/higher density rural sub-basins at least once between February 2007 and July 31, 2018.

King County addresses this MS4 field screening requirement through the implementation of two departmental programs. These programs are:

SWSS CSP:

SWSS will conduct a Conveyance Screening Program (CSP) in 2016 to check known stormwater outfalls and other system connections for dry weather flow and other evidence, using these as indicators of possible illicit discharge. At least 12 percent of known, mapped locations where stormwater leaves the County's MS4 will be inspected for evidence of illicit connections/illicit discharges (IC/ID) under the CSP program. MS4 locations identified for further investigation will trigger follow-up *in situ* field screening to further assess the likelihood of IC/ID. If warranted, laboratory analytical samples will be collected; sampling and analysis depends on both the follow-up screening results and on nearby observed land uses (e.g., potential pollution sources, including failing septic systems, illicit sewer connections, commercial/industrial sites or other possible pollutant sources).

In 2016, the CSP will focus on urban and higher density areas throughout King County. It will also focus throughout the Bear/Evans Creek and Issaquah Creek drainage basins, including urban, higher density rural and rural areas.

Roads CBIMP:

Roads will conduct its annual Catch Basin Inspection and Maintenance Program (CBIMP). Roads plans to inspect 100 percent of known, mapped catch basin circuits on an annual basis, including inspecting a minimum of 25 percent of the catch basins within each circuit. It is anticipated that a minimum of 30 percent of known, mapped, Roads-owned catch basins County-wide will be inspected annually during CBIMP tasks. While implementing CBIMP, Roads staff will actively look for evidence of IC/ID and will record whether or not such evidence is observed. Catch basins identified for further investigation will trigger follow-up *in situ* field screening to further assess the likelihood of IC/ID.

County personnel involved in the SWSS CSP and Roads' CBIMP have received and, as needed, will continue to receive comparable training to ensure consistency across the program elements.

- ii. A publicly-listed and publicized hotline or other telephone number for public reporting of spills and other illicit discharges.*

Citizen reports are received by the County in a number of ways.

- Roads 24-hour hotline (206-296-8100 or 800-KCROADS)
- SWSS Water Quality hotline (206-477-4811)
- Illegal Dumping Hotline (206-296-SITE or 866-431-7483)
- DPER inspector contact information posted on signage at each development/redevelopment project site in unincorporated King County that is permitted by DPER
- Illegal Dumping web form (<http://your.kingcounty.gov/solidwaste/cleanup/report-dumping.asp>)
- Online report form for drainage and water quality problems (<http://www.kingcounty.gov/environment/waterandland/stormwater/problem-investigation-line/report-form.aspx>)

- iii. An ongoing training program for all municipal field staff, who, as part of their normal job responsibilities might come into contact with or otherwise observe an illicit discharge or illicit connection to the MS4, on the identification of an illicit discharge and/or connection, and on the proper procedures for reporting and responding to the illicit discharge and/or connection. Follow-up training shall be provided as needed to address changes in procedures, techniques, requirements, or staffing. Permittees shall document and maintain records of the training provided and staff trained.*

- d. Each Permittee shall implement an ongoing program designed to address illicit discharges, including spills and illicit connections, into the Permittee's MS4. The program shall include:*

Each King County agency with field personnel subject to this requirement is responsible for training those employees to identify an illicit discharge or connection and to properly report and respond. The County continues to review its programs and identify additional personnel that need this training. The County also continues to assess the need for follow-up training as regulations, procedures, or personnel change.

Training records are currently managed by each agency. However, an effort is underway to explore options for standardizing and/or centralizing tracking of permit-related training.

- i. Procedures for characterizing the nature of, and potential public or environmental threat posed by, any illicit discharges found by or reported to the Permittee. Procedures shall address the evaluation of whether the discharge must be immediately contained and steps to be taken for containment of the discharge.*
- ii. Procedures for tracing the source of an illicit discharge; including visual inspections, and when necessary, opening manholes, using mobile cameras, collecting and analyzing water samples, and/or other detailed inspection procedures.*
- iii. Procedures for eliminating the discharge; including notification of appropriate authorities; notification of the property owner; technical assistance; follow-up inspections; and escalating enforcement and legal actions if the discharge is not eliminated.*
- iv. Compliance with the provisions in S5.C.8.d.i, ii, and iii, above, shall be achieved by meeting the following timelines:*
 - (1) Immediately respond to all illicit discharges, including spills, which are determined to constitute a threat to human health, welfare, or the environment consistent with General Condition G3.*
 - (2) Investigate (or refer to the appropriate agency with authority to act) within 7 days, on average, any complaints, reports or monitoring information that indicates a potential illicit discharge.*
 - (3) Initiate an investigation within 21 days of any report or discovery of a suspected illicit connection to determine the source of the connection, the nature and volume of discharge through the connection, and the party responsible for the connection.*
 - (4) Upon confirmation of an illicit connection, use enforcement authority in a documented effort to eliminate the illicit connection within 6 months. All known illicit connections to the MS4 shall be eliminated.*
- e. Permittees shall train staff who are responsible for identification, investigation, termination, cleanup, and reporting of illicit discharges, including spills and illicit connections, to conduct*

The County implements a number of programs to address illicit connections and illicit discharges. These programs were created to address issues that occur on King County properties and throughout the ROW in unincorporated King County.

Generally, illicit connections are handled through SWSS, whereas, dumped waste and spilled materials are managed through the County agency responsible for the property upon which the incident occurred.

Any illicit connection identified by a County employee or through an external party (for example, citizen complaint) is reported to SWSS and an investigation is initiated. A Water Quality Engineer traces the source to identify the responsible party and uses progressive enforcement to achieve the elimination of the illicit connection. Records related to the investigation are managed in the SWSS Complaint Tracker database.

When the County receives a report of an illicit discharge, including spilled or dumped materials, outside of its jurisdiction, the appropriate municipality is notified of the situation.

Reports of illicit discharges within King County's jurisdiction are routed to the appropriate agency for response. Some agencies, such as Roads and Transit, have in-house capacity and training to conduct spill response activities for most commonly-occurring spills (for example, vehicular fluids or paint). Other agencies, such as FMD, do not possess in-house spill response capacity and rely on spill response contractors or request support from other County agencies. The County maintains multiple on-call spill response contracts to facilitate timely responses. The County has also built a collaborative working relationship with Ecology's Northwest Regional Office Spills Program and the County occasionally calls upon this group for spill response assistance.

For protection of human health, property and the environment, spill incidents exceeding the County's capacity for in-house response are always referred to a spill response contractor.

these activities. Follow-up training shall be provided as needed to address changes in procedures, techniques, requirements, or staff. Permittees shall document and maintain records of the training provided and the staff trained.

f. Each Permittee shall either participate in a regional emergency response program, or develop

King County trains field personnel on the identification, investigation, termination, cleanup and reporting of illicit discharges and illicit connections, as appropriate for their job duties. As the agencies most likely to have their personnel involved in spill response, Roads and Transit have developed customized hazardous waste and spill response training for personnel responding to illegally dumped or spilled materials. This training has been adapted for use by other County agencies and other local jurisdictions. The training also includes guidelines for when an outside spill response contractor should be called in.

Additionally, tenants and operators at the King County International Airport (KCIA) receive annual spill response training, including procedures for notification, response

and reporting, as well as preventative measures.

The County continues to review its programs and identify additional personnel that need this training. It also continues to assess the need for follow-up training as regulations, procedures, or personnel change. Training records are currently managed by each agency. However, an effort is underway to explore options for standardizing and/or centralizing tracking of permit-related training.

and implement procedures to investigate and respond to spills and improper disposal into the MS4 owned or operated by the Permittee.

- g. Recordkeeping: Each Permittee shall track and maintain records of the activities conducted to meet the requirements of this section.*

The County maintains several spill response programs, as described above, under S5.C.8.d.

King County has six programs that track and maintain records of the IDDE program, including documentation of inspections, complaint/spill response, and other enforcement records. These programs are outlined below:

- 1) SWSS maintains tracking programs, including a complaint tracker and water quality compliance tracker which track response, findings, and enforcement actions.
- 2) Roads tracks and maintains electronic and paper copies of IDDE records through Roads' Service Request system in Cityworks and various internal tracking forms maintained by the Emergency Response Unit. These include forms and records specific to the spill response program, catch basin inspection records, and drainage evaluation records.
- 3) The Illegal Dumping Hotline's application operated by SWD records and tracks reported citizen complaints.
- 4) Transit's Environmental Compliance Office maintains electronic spreadsheets detailing fleet-related spills, conveyance system IDDE inspections, and employee training.
- 5) PHSKC maintains a proprietary database designed for public health agencies that maintains records of inspections, complaints, responses and enforcement actions.
- 6) Airport tracks and maintains spill and IC/ID records for incidents occurring at the KCIA.

Staff time and resources spent implementing these programs are tracked electronically through the County's Oracle Finance System.

As appropriate, spills and other select incidents are reported to Ecology's Environmental Report Tracking System database.

Attachment 2015 Annual Report Question #40b:

Cite field methodology used in the Comments field.

2.1.8 Illicit Connections and Illicit Discharges Detection and Elimination – S5.C.8

c. *Each Permittee shall implement an ongoing program designed to detect and identify non-stormwater discharges and illicit connections into the Permittee's MS4. The program shall include the following components:*

i. *Procedures for conducting investigations of the Permittees MS4, including field screening and methods for identifying potential sources. These procedures may also include source control inspections.*

The permittee shall implement a field screening methodology appropriate to the characteristics of the MS4 and water quality concerns. Screening for illicit connections may be conducted using the Illicit Discharge Detection and Elimination: A Guidance Manual for Program Development and Technical Assessments, Center for Watershed Protection, October 2004; or another method of comparable or improved effectiveness. The Permittee shall document the field screening methodology in the relevant Annual Report.

- (1) Each Permittee shall implement an ongoing field screening program of, on average, 12% of the Permittee's known conveyance systems each calendar year.*
- (2) Each City shall field screen all the conveyance systems within the Permittee's incorporated area at least once between February 2007 and July 31, 2018.*
- (3) Each County shall field screen all the conveyance systems within the Permittee's urban/higher density rural sub-basins at least once between February 2007 and July 31, 2018.*

King County addresses this MS4 field screening requirement through the implementation of two departmental programs. These programs are:

SWSS CSP:

SWSS will conduct a Conveyance Screening Program (CSP) in 2016 to check known stormwater outfalls and other system connections for dry weather flow and other evidence, using these as indicators of possible illicit discharge. At least 12 percent of known, mapped locations where stormwater leaves the County's MS4 will be inspected for evidence of illicit connections/illicit discharges (IC/ID) under the CSP program. MS4 locations identified for further investigation will trigger follow-up *in situ* field screening to further assess the likelihood of IC/ID. If warranted, laboratory analytical samples will be collected; sampling and analysis depends on both the follow-up screening results and on nearby observed land uses (e.g., potential pollution sources, including failing septic systems, illicit sewer connections, commercial/industrial sites or other possible pollutant sources).

In 2016, the CSP will focus on urban and higher density areas throughout King County. It will also focus throughout the Bear/Evans Creek and Issaquah Creek drainage basins, including urban, higher density rural and rural areas.

Roads CBIMP:

Roads will conduct its annual Catch Basin Inspection and Maintenance Program (CBIMP). Roads plans to inspect 100 percent of known, mapped catch basin circuits on an annual basis, including inspecting a minimum of 25 percent of the catch basins within each circuit. It is anticipated that a minimum of 30 percent of known, mapped, Roads-owned catch basins County-wide will be inspected annually during CBIMP tasks. While implementing CBIMP, Roads staff will actively look for evidence of IC/ID and will record whether or not such evidence is observed. Catch basins identified for further investigation will trigger follow-up *in situ* field screening to further assess the likelihood of IC/ID.

County personnel involved in the SWSS CSP and Roads' CBIMP have received and, as needed, will continue to receive comparable training to ensure consistency across the program elements.

ii. A publicly-listed and publicized hotline or other telephone number for public reporting of spills and other illicit discharges.

Citizen reports are received by the County in a number of ways.

- Roads 24-hour hotline (206-296-8100 or 800-KCROADS)
- SWSS Water Quality hotline (206-477-4811)
- Illegal Dumping Hotline (206-296-SITE or 866-431-7483)
- DPER inspector contact information posted on signage at each development/redevelopment project site in unincorporated King County that is permitted by DPER
- Illegal Dumping web form (<http://your.kingcounty.gov/solidwaste/cleanup/report-dumping.asp>)
- Online report form for drainage and water quality problems (<http://www.kingcounty.gov/environment/waterandland/stormwater/problem-investigation-line/report-form.aspx>)

Attachment 2015 Annual Report Question #36:

Attach a summary of actions taken to implement the source control program per S5.C.7.b.iii and S5.C.7.b.iv.

2.1.7 Source Control Program for Existing Development – S5.C.7

- iii. *Permittees shall implement an inspection program for sites identified pursuant to S5.C.7.b.ii above.*
 - (1) *All identified sites with a business address shall be provided, by mail, telephone, electronic communications, or in person, information about activities that may generate pollutants and the source control requirements applicable to those activities. This information may be provided all at one time or spread out over the permit term to allow for some tailoring and distribution of the information during site inspections.*

Direct mailing and telephoning is not an effective means of communication because there are no County records that identify the operator of a given site, their contact information, or the type of business occupying the site. Instead, information about activities that may generate pollutants and the source control requirements applicable to those activities is provided in person during a site inspection, or if no one is present, by mail. This provides the benefit of customizing the information provided to the needs of each particular site. This information is also available on King County's website (<http://www.kingcounty.gov/environment/waterandland/stormwater/documents/pollution-prevention-manual.aspx>).

- (2) *The Permittee shall annually complete the number of inspections equal to 20% of the businesses and/or properties listed in their source control inventory to assure BMP effectiveness and compliance with source control requirements. The Permittee may count follow up compliance inspections at the same site toward the 20% inspection rate. The Permittee may select which sites to inspect each year and is not required to inspect 100% of sites over a 5-year period. Sites may be prioritized for inspection based on their land use category, potential for pollution generation, proximity to receiving waters, or to address an identified pollution problem within a specific geographic area or sub-basin.*

Approximately 400 stormwater pollution prevention inspections are planned for 2016, roughly 20 percent of our estimated inventory.

Annexations may occur within King County over the next few years. Combined with the addition of new businesses and the closing of other businesses, there is some uncertainty about the number of businesses in unincorporated King County from year to year. The number of sites under this program will be in constant flux, requiring annual analysis to determine the 20 percent inspection goal.

- (3) *The Permittee shall annually complete the number of inspections equal to 20% of the businesses and/or properties listed in their source control inventory to assure BMP effectiveness and compliance with source control requirements. The Permittee may count follow up compliance inspections at the same site toward the 20% inspection rate. The Permittee may select which sites to inspect each year and is not required to inspect 100% of sites over a 5-year period. Sites may be prioritized for inspection based on their land use category, potential for pollution generation, proximity to receiving waters, or to address an identified pollution problem within a specific geographic area or sub-basin.*

SWSS investigates all water quality complaints from citizens and County agencies as

well as those referred to SWSS by outside agencies. Complaints can be made through online submissions

(<http://www.kingcounty.gov/environment/waterandland/stormwater/problem-investigation-line.aspx>) or by calling the published complaint line (206-477-4811). Calls are first screened to determine if the problem is within unincorporated King County and stormwater quality-related (if not, the complainant is given the appropriate contact, whenever possible) and then assigned to an investigator for immediate follow-up. As part of the complaint resolution, technical assistance is provided on any required source control BMPs and a follow up letter and information is sent, if necessary. Additional inspections or enforcement may follow. Depending on the nature of the problem, additional agencies may be brought in to assist in achieving compliance. All legitimate (relevant) complaints are inspected.

i.v. Each Permittee shall implement a progressive enforcement policy to require sites to come into compliance with stormwater requirements within a reasonable time period as specified below:

- (1) If the Permittee determines, through inspections or otherwise, that a site has failed to adequately implement required BMPs, the Permittee shall take appropriate follow-up action(s) which may include: phone calls, reminder letters or follow-up inspections.*
- (2) When a Permittee determines that a facility has failed to adequately implement BMPs after a follow-up inspection, the Permittee shall take enforcement action as established through authority in its municipal code and ordinances, or through the judicial system.*
- (3) Each Permittee shall maintain records, including documentation of each site visit, inspection reports, warning letters, notices of violations, and other enforcement records, demonstrating an effort to bring facilities into compliance. Each Permittee shall also maintain records of sites that are not inspected because the property owner denies entry.*
- (4) A Permittee may refer non-emergency violations of local ordinances to Ecology, provided, the Permittee also makes a documented effort of progressive enforcement. At a minimum, a Permittee's enforcement effort shall include documentation of inspections and warning letters or notices of violation.*

SWSS has had an enforcement program in place since 1995. The procedures for progressive enforcement include issuing a detailed Corrective Action Letter that specifies exactly what needs to be done in order to come into compliance and sets a deadline. King County personnel work with property owners, tenants, and business operators to assist them achieve compliance. Their assistance may include additional site visits, bringing in outside resources such as vouchers for hazardous waste disposal and storage, facilitating conversations between property owners and tenants, providing written materials, posting BMP signs, or phone calls and emails. When compliance is achieved, a Compliance Letter is sent.

King County makes every effort to bring facilities into compliance using site audits and technical assistance but in the very rare instance where compliance is not achieved, notices of violation are issued and additional enforcement action taken. Additionally, commercial sites are denied a discount on their SWM fee if source control BMPs are not implemented and if the onsite stormwater system is not properly maintained.

Records of inspection results, site photos, correspondence, etc., are all kept in paper and electronic formats. There are activity logs for each site, which document inspections dates, contacts, illicit connections, referrals to other agencies, etc.

- iv. Permittees shall train staff who are responsible for implementing the source control program to conduct these activities. The ongoing training program shall cover the legal authority for source control, source control BMPs and their proper application, inspection protocols, lessons learned, typical cases, and enforcement procedures. Follow-up training shall be provided as needed to address changes in procedures, techniques, requirements, or staff. Permittees shall document and maintain records of the training provided and the staff trained.*

King County has an ongoing training program for employees conducting source control work. SWSS, the primary agency implementing the source control program, trains staff and updates staff training, as needed. King County continues to update its list of staff requiring training under this section and addresses their training as they are identified whether current employees or new hires.

Attachment 2015 Annual Report Question #34b:

Attach an updated list of planned, individual projects schedules for implementation during this permit term with the information and formatting specified in Appendix 11 (S5.C.6.c).

STRUCTURAL STORMWATER CONTROL PROGRAM

Projects planned and implemented as part of King County's Structural Stormwater Control Program seek to reduce stormwater quantity and quality impacts to waters of the state caused by existing developed land, and to prevent such impacts anticipated to be caused by future land development that are not adequately addressed through regulations or other required programmatic actions of the County's Stormwater Management Program (SWMP). Such impacts include, but are not limited to: increased runoff peaks, durations, and volumes; loss of groundwater recharge; increased pollutants in discharges; increased erosion and sedimentation; physical, chemical, and biological damage to aquatic habitat and biota; increased flooding and property damage; and, increased risks to human health and safety. The overall goal is intended to be achieved incrementally over time through implementation of the program's capital projects each year.

The planning process used to develop the Structural Stormwater Control Program, including:

- The geographic scale of the planning process.
- Issues and regulations addressed.
- Steps in the planning process.
- Types of characterization information considered.
- Amount budgeted for implementation.
- The public involvement process.
- A description of the prioritization process, procedures and criteria used to select the Structural Stormwater Control projects.

King County's planning process for its Structural Stormwater Controls Program is described below for the five types of projects that must be considered as part of the Structural Stormwater Controls Program per Permit Condition S.5.C.6.a.i.(1) through (5).

Stormwater Retrofit Projects

For stormwater retrofit projects (project types (1), (2), and (3) specified in Permit condition S.5.C.6.a.i), the planning process is currently in a state of flux as the County tries different planning approaches to identify, assess, and prioritize such projects for future funding. The stormwater retrofit projects considered include new flow control facilities/BMPs, new treatment facilities/BMPs, and retrofit of existing treatment and/or flow control facilities. The three approaches currently underway include the following:

Small Stream Basin Retrofit Planning Program

One of King County's approaches to stormwater retrofit planning is to focus on small, substantially developed stream basins. In such basins, the harmful effects of stormwater runoff from developed land are more pronounced and directly measureable due to less dilution by water from other sources (i.e., runoff from undeveloped land or groundwater inflow). In addition, full basin retrofitting will take less time and expense, so the expected benefits of retrofitting can be achieved and measured sooner in order to inform future retrofitting in larger basins. Another aspect of this approach is to focus on basins wherein degradation of stream health and water quality has been measured by monitoring data. This provides baseline data for assessing the effectiveness of retrofit actions.

In 2012, the County completed a high level capital needs assessment of 64 small stream basins scattered across unincorporated King County that have documented degradation of stream health and water quality based on two sets of available monitoring data. One was benthic index of biologic integrity (BIBI) data available at <http://www.pugetsoundstreambenthos.org/> and the other was water quality assessment data available at <http://apps.ecy.wa.gov/wqawa2008/viewer.htm>. The 64-basin assessment (updated in 2013 to 67 basins) is a compilation of key information for each basin (e.g., basin size, land covers, soil types, BIBI scores, impaired water body listings, etc.) which is used to prioritize the basins for stormwater retrofitting efforts. Included in the prioritization information is Ecology's integrity score, which comes from Ecology's Stormwater Target Watersheds map provided in their 2013 Solicitation for Proposals to Conduct Stormwater Retrofit Planning and Pre-design. The 67 basins are currently prioritized to favor the following:

- Relatively small basin size with a significant amount of developed land
- Presence of BIBI monitoring stations with baseline data from which to measure retrofit effectiveness
- Baseline BIBI data in the fair or worse range for the basin
- Developed vs. predeveloped runoff peaks indicating a likely unstable or scoured stream channel
- Location within an Ecology stormwater target watershed with a high integrity score

The funding for this program was established for the first time in 2013/14 and has been used to leverage grant funding for two small basins so far: Evans Creek Tributary 108; and, May Creek Tributary 291A. A third basin, Monticello Creek, will also receive funding from this program for the County's share of the match required for an Ecology retrofit planning grant just applied for by the City of Redmond. Program funding and grant funding add up to about \$300,000 for each of these basins. This cost includes basin characterization, runoff modeling, and design of a basin-wide system of conceptual retrofits that work together to meet a regulatory performance standard at the mouth of the basin (e.g., one or more of Ecology's regulatory performance standards for LID, flow control, and treatment). The cost also includes public outreach on the planning effort and

several pre-designs of retrofit projects selected from the basin-wide system of conceptual retrofits based on cost vs. benefit. The pre-designs will be used to compete for construction grant funding expected to be offered by Ecology later this year.

Additional funding appropriation for this program will be requested in the 2017/18 biennium budget request. This funding will be used to (1) do conceptual retrofit planning in two new high priority small stream basins, (2) do additional pre-designs for the small stream basins where conceptual planning has already been done, and (3) leverage grant funding for construction of retrofit projects.

A variation of this planning approach will be explored wherein opportunity sites are identified within a basin for retrofit projects that can be designed to meet a regulatory performance standard for the developed area draining to the site. Such an approach can potentially generate pre-designs more quickly because the step of basin-wide systematic design is skipped.

Larger Basin Plans

The County has and will continue to participate in larger basin planning efforts to identify stormwater control projects and other actions to mitigate the stormwater impacts of past, present, and future development. During this permit term, the County is leading three multi-jurisdictional planning efforts that have or will identify stormwater retrofit needs. These include the WRIA 9 Stormwater Retrofit Plan, the Miller/Walker Creeks Stormwater Retrofit Plan, and the Bear Creek Stormwater Basin Plan. Public outreach was or will be a component of all these planning efforts.

The WRIA 9 stormwater retrofit planning effort, now nearing completion, is an EPA-grant-funded effort with an estimated cost of \$1.3 million. It has identified unit retrofit needs (i.e., number of rain gardens, number of rain barrels, and number of detention facilities) across the developed landscape that would collectively achieve flow regime restoration goals in the many streams that are tributary to the Green/Duwamish River. Although the effort did not identify, site, or pre-design specific retrofit projects, it did estimate the overall cost of stormwater flow control retrofitting in each of the stream basins that comprise the study area and suggested that a large share of the retrofitting could be achieved through regulatory redevelopment requirements as each basin slowly redevelops over the next 30 to 100 years. Such information will be useful in prioritizing and structuring future, more detailed retrofit planning efforts in the watershed.

The Miller/Walker Creeks stormwater retrofit planning effort is funded through an Ecology/National Estuary Program grant. The estimated project cost is approximately \$250,000. It will identify, assess, and prioritize 80 sites across the basin for stormwater retrofit projects. The criteria for prioritization are currently being developed by the multi-jurisdictional project management team. The planning effort will select at least three sites and develop pre-designs for retrofit projects at those sites. The pre-designs

will be used to compete for construction grant funding expected to be offered by Ecology later this year and in coming years.

The Bear Creek stormwater basin planning effort is estimated to cost over \$2 million and is a multi-jurisdictional effort being performed by King County to comply with the Permit's watershed-scale stormwater planning requirement. Because the Bear Creek basin is largely developed, a major focus of the effort will be to identify a conceptual list of retrofit projects for future implementation. Further planning will be needed after the basin plan to develop pre-designs for these projects to seek local funding and state/federal grant funding for implementation. The order of project implementation will be likely be prioritized based on cost vs. benefit.

Property Acquisition Projects for Flow Control/Water Quality Benefits

King County prioritizes acquisitions based on a variety of information, including but not limited to salmon recovery plans, the Flood Hazard Management Plan, basin plans, habitat studies, recreation plans, stormwater management plans, and staff expertise.

Generally, lands identified for acquisition have conservation value in one or more of the following categories: agricultural production, forestry, ecological protection and restoration, flood risk reduction, passive recreation, strategic growth management community separators, and stormwater benefits (both by preserving naturally high functioning sites and by acquiring sites for facilities). It is often the case that a single property will meet more than one conservation objective. For example, a forested property in the headwaters of a rural stream system may have fish and wildlife benefits, forest health benefits, and stormwater benefits related to preserving water quality and retaining surface water.

Increasingly, staff who plan acquisition strategies are examining the landscape for acquisitions that would achieve multiple benefits. In many cases such planning efforts are informed by sophisticated modeling efforts, including the Department of Ecology's Watershed Characterization model. The Watershed Characterization model is particularly useful in stormwater acquisition planning for its ability to identify basins across the landscape where additional protection and restoration actions would have the greatest impact on improving water quality and water flow functions.

King County has also developed a process to address Type 2 drainage problems in the Structural Stormwater Control program. King County's Stormwater Services Section is made aware of Type 2 drainage problems either through drainage complaints or while conducting outfall reconnaissance surveys. If a Type 2 drainage problem is found, each problem is to be evaluated through a feasibility study to prioritize the problem and identify potential solutions. Upon completion of the feasibility study, a plan is enacted to address and correct the problem area.

Maintenance Projects with Capital Construction Cost \geq \$25,000

The planning process for these types of projects includes the following steps:

- 1) A problem is identified during regular inspection of a stormwater control facility/best management practice (BMP) that appears to require capital construction to fix.
- 2) An engineering review is performed to confirm the problem and a rough estimated cost to fix.
- 3) The problem is referred to the stormwater capital program where more detailed assessment and costing is done to create a capital project.
- 4) The problem is prioritized with other stormwater capital projects for funding.

**STRUCTURAL STORMWATER CONTROLS LIST
KING COUNTY
2015**

Project Name	Type ¹	Start Year	Status ²	End Year	Cost Estimate ³	Funding (%)			WQ Benefit (Est. TSS or TS reduction lbs/yr) ⁴	Hydro Benefit (Est. Avg. % flow reduction) ⁵	Hydro Benefit Option #	Retrofit Incentive ⁶	Other Benefit	Monitoring Planned (Y/N)	Lat / Long (X, Y)	Receiving water body name	Comments
						Local	State	Federal									
Clough Creek Buyout and Sediment Facility	1	2013	1. Planning	2018	\$1.7M	51	7	42	N/A	N/A	N/A	N/A	None	Yes	47.47354/-121.78639	Clough Creek	Alternative analysis underway - chosen alternative and amount of FEMA grant may change funding percentages.
Issaquah Hobart Road at NE 113th St	1	2013	2. Design and permitting	2014	\$200K	100			N/A	100	2a	0.75	None	Yes	47.48462/-122.02791	Issaquah Creek	Provide bioretention.
Kirkland Pump Station Upgrade	1	2002	3. Construction	2014	\$75K	100			N/A	100	2a	N/A	None	No	47.676445/-122.203728	Lake Washington	Joint King County-City of Kirkland project. Install silva-cell system to increase infiltration around landscaped area and pervious asphalt paving on the street. Upon completion, the street will be turned over to the City.
Evans Creek Tributary 108 Basin-wide Retrofit Siting	2	2013	4. Complete/Maintenance	2014	\$300K	24	86		N/A	N/A	N/A	N/A	None	Yes	47.675415/-122.056882	Evans Creek	Planning and predesign for three retrofit projects with detention and bioretention stormwater facilities.
May Creek Tributary 291A Small Basin Retrofit	2	2013	4. Complete/Maintenance	2014	\$216K	45	55		N/A	N/A	N/A	N/A	None	Yes	47.49543/-122.12522	May Creek	Planning, predesign, and final design to for one retrofit project with detention and bioretention stormwater facilities.
North Base Stormwater ISGP Upgrade	2	2013	1. Planning	2015	\$500K	100			N/A	N/A	N/A	7	None	Yes	47.74691/-122.3013	Thornton Creek	Additional treatment units installed within an existing stormwater system. Monitoring will take place at outfall.
Cedar Grove Road Water Quality Pond	2	2013	2. Design and permitting	2014	\$200K	100			N/A	N/A	N/A	6	Habitat	Yes	47.43985/-122.06384	Cedar River	Construct water quality pond to reduce sediment load from road. Pit sites along the road have significant track out. Source control enforcement is also being pursued.
Avondale Rd	2	2013	2. Design and permitting	2014	\$150K	100			N/A	100	2a	0.5	None	Yes	47.71543/-122.09057	Cottage Creek	Retrofit bioretention swale within right-of-way to treat runoff from high use intersection.
Kerristan Rd Flow Dispersion	2	2013	4. Complete/Maintenance	2013	\$74K	100			N/A	100	2b	1.5	None	Yes	47.42845/-121.9294	Rock Creek	Disperse flow to reduce erosion and increase infiltration.
Covington-Sawyer Rd at 179 Ave SE	2	2013	2. Design and permitting	2015	\$200K	100			N/A	100	2a	0.25	None	Yes	47.295278/-122.273333	Soos Creek	Bioretention system.
Dockton Rd	2	2014	2. Design and permitting	2014	\$500K	100			N/A	100	2a	0.7	None	Yes	47.41245/-122.43744	Puget Sound	Construct bioinfiltration swale.
Black Diamond Ravensdale Rd	2	2014	2. Design and permitting	2014	\$60K	100			N/A	100	2a	1	None	Yes	47.34711/-121.98993	Ground	Construct bioinfiltration swale.
140th Avenue SE at SE Petrovitsky Road	2	2014	2. Design and permitting	2014	\$100K	100			N/A	N/A	N/A	1	None	Yes	47.44557/-122.15501	Cedar River	Enhance existing retention/detention pond to treat runoff from high use intersection.
Issaquah Hobart Road SE at SE May Valley Road	2	2014	2. Design and permitting	2014	\$100K	100			N/A	N/A	N/A	0.4	None	Yes	47.48462/-122.02791	Issaquah Creek	Construct water quality swale to treat high use intersection stormwater runoff.
SMag CSO Control Project Storage Facility	2	2014	3. Construction	2015	\$254K	Applied for state funding			7	100	2c	0.49	None	No	47.63298/-122.38664	Elliott Bay	Landscape infiltration via underdrains; driveway and roof runoff collected and routed to bioswales.
North Beach Pump Station and CSO Control Facility	2	2014	3. Construction	2015	\$140K				1	N/A	2c	0.08	None	No	47.701533/-122.390417	Puget Sound	State partially funded design. State funding of construction TBD. Area contributing to project for water quality benefit evaluation is drainage area to StormFilter catch basin insert.
Seola Creek Basin Facility Upgrade and Retrofit	3	2010	2. Design and permitting	2015	\$1.5M	35	65		30,911	18	1	304	None	Yes	47.51044/-122.36880	Seola Creek	Retrofit to add a wetpool to a flow control facility; partially funded by Ecology Grant 1200062.

**STRUCTURAL STORMWATER CONTROLS LIST
KING COUNTY
2015**

Project Name	Type ¹	Start Year	Status ²	End Year	Cost Estimate ³	Funding (%)			WQ Benefit (Est. TSS or TS reduction lbs/yr) ⁴	Hydro Benefit (Est. Avg. % flow reduction) ⁵	Hydro Benefit Option #	Retrofit Incentive ⁶	Other Benefit	Monitoring Planned (Y/N)	Lat / Long (X, Y)	Receiving water body name	Comments
						Local	State	Federal									
Tuscani Facility Remediation	3	2011	4. Complete/Maintenance	2013	\$124K	100			118	100	1	8.2	None	Yes	47.70591/-122.07458	Bear Creek	Retrofit of flow control facility to stormwater wetland.
Military Rd at S 342nd	3	2013	3. Construction	2014	\$300K	100			N/A	100	2a	0.25	None	Yes	47.343611/-122.100833	Green River	Provide bioretention.
Kerriston Culvert	5	2014	2. Design and permitting	2014	\$540K	100			N/A	N/A	N/A	0.25	Fish passage	Yes	47.436164/-121.853633	Rock Creek	Control overflow from washing fines off gravel road surface; project is one element of a S4.F response undertaken by King County to address stormwater impacts caused by this gravel road.
Cedar Valley Facility Remediation	5	2013	4. Complete/Maintenance	2013	\$77K	10	90		164	100	1	11.4	None	Yes	47.38643/-122.01941	Cedar River	Conversion of a settling pond into a wetpond; partially funded by Ecology Grant G1100216.
Evans Creek Tributary 108 Detention Vault Retrofits	3	2016	2. Design and Permitting	2018	\$378K	28	72		32	100	1	1	None	Yes	47.67299/-122.06376	Evans Creek	Design and construct two stormwater retrofit detention vaults in right of way, in front of addresses 20620 and 20626 NE 76th Place and 20508 NE 78th Street. Partially funded by Ecology.
May Creek Tributary 291A Stormfilter Retrofit	3	2016	2. Design and Permitting	2018	\$141K	45	55		14	N/A	N/A	1	None	No	47.48626/-122.12312	May Creek	Grant WQC-2016-KCWLRD-00056. Design and construct a StormFilter system in right of way in front of parcel 3243200030 near Renton, WA. Partially funded by ecology Grant WQC-2016-KCWLRD-00170.

Notes
 N/A - not available or not applicable
 WQ - water quality
 TSS - total suspended solids
 TS - total solids
 FEMA - Federal Emergency Management Agency

² **Status** (as of December 31st of the reporting year)
 1. Planning
 2. Design and permitting
 3. Construction
 4. Complete/ Maintenance
 5. Project Cancelled
 6. Property acquisition

⁵ **Hydro Benefit**
 1. Project's volume ratio
 2a. 100%
 2b. 100%
 2c. Project's volume ratio
⁶ **Retrofit Incentive** - From Washington State Department of Ecology *Retrofit Incentive Table*

¹ **Type**
 1. New flow control facility, including Low Impact Development (LID) Best Management Practices (BMPs)
 2. New treatment facility (or treatment and flow control facility), including LID BMPs
 3. Retrofit of existing treatment and/or flow control facility
 4. Property acquisition for water quality and/or flow control benefits (not associated with future facility)
 5. Maintenance with capital construction costs ≥ \$25,000

³ **Cost Estimate** - Costs to be updated to reflect final costs when Status 4 or 6 is reached.
⁴ **WQ Benefit** - KC S8.d loading rates used for LDR, HDR, Commercial land use types

Attachment 2015 Annual Report Question #30:

Attach a summary of the LID review and revision process that includes the requirements listed in S5.C.5.b.ii.

LID Code-related requirements - Reporting Template for King County

Measures to minimize:

Document Name: Code chapter, rules, standards, and other enforceable documents	Section reference, date last updated, page number, etc	Name of Reviewer(s)	Action taken to meet Permit requirements	Describe/Note How Revision(s) made to meet permit requirements <u>OR</u> if No revision(s) was made to this document, explain why.	Impervious surfaces	loss of native vegetation	stormwater runoff
KCC Title 9--Surface Water Management	KCC 9.04--Surface Water Runoff Policy--updates before council	Curt Crawford, Mark Wilgus, David Batts, Jeff Pray, Molly Johnson, Lydia Reynolds	Amend existing code	Title 9.04 is being updated to be consistent w/changes proposed within the revised KC Surface Water Design manual. A new Core Requirement 9 addressing LID/FCBMPs requirements has been added to provide emphasis and clarity in the code and SWDM. The current SWDM (2009) implemented by this code requires broad application of FCBMPs. The proposed edits to the 2009 KCSWDM required for equivalency to ECY's SMMWW require LID/FCBMPs to be applied potentially more broadly by evaluating implementation using a max feasible approach. KC's proposal includes the maximum feasibility approach and also a minimum floor level application regardless of feasibility facilitated by including BMPs not subject to soil type related feasibility criteria such as native vegetation preservation and reduced impervious footprint BMPs as options to achieve these minimum levels. Preferred BMP of full dispersion must be first evaluated and this requires native vegetation preservation. Target surfaces requiring LID implementation now include roadways consistent w/Ecology requirements. KC requirements will also include requiring LID BMPs for existing impervious surfaces added after Jan 2001 that are not already mitigated-this goes further than Ecology re: BMP/LID application.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
King County Surface Water Design Manual (SWDM)	KCSWDM--adopted as a public rule that will be signed once council acts on the ordinance above	Curt Crawford, Mark Wilgus, David Batts, Jeff Pray, Molly Johnson, Lydia Reynolds	Amend existing code	The KC SWDM was updated to achieve equivalency w/Ecology's SMMWW. See above.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
KCC 9.08--Surface Water Management Program	KCC 9.08.070--Rate structure--last update in 2010	Mark Wilgus	No changes/ action taken	This portion of the code already provides rate structure that ties rates to amount of increased surface and stormwater.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
KCC 9.08--Surface Water Management Program	KCC 9.08.080--Rate adjustments and appeals--last update in 2012	Mark Wilgus	No changes/ action taken	By providing a discount on the rate of stormwater fees for maintaining 65% forest and no more than 20% impervious dispersed through retained forest, this section of the code already incentivizes minimizing impervious surfaces, preservation of native vegetation, and the use of dispersion techniques.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
KCC 14.42--King County Road Standards	KCC 14.42.030--Applicability of Road Standards--awaiting council action on update	Lydia Reynolds, Mark Wilgus	Amend existing code	The revised SWDM, which controls all development in unincorporated King County as well as King County projects outside the unincorporated area, REQUIRES the use of LID in road projects to the maximum extent feasible. Standard details and specifications for the use of LID for roads will be incorporated into the KC Road Design and Construction Standards at its next update. In the interim, the KC Road Engineer will provide to the KC Dept. of Permitting requirements and standards for LID used on road projects. Projects proposing LID on road projects that vary from the standards and requirements will require specific review and approval by the KC Road Engineer or designee. A new section is being added to KCC 14.42.030 clarifying that LID must be used on road projects consistent with the requirements of the revised SWDM.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

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King County Road Standards	last update 2007	Molly Johnson, Lydia Reynolds, Mark Wilgus	No changes/ action taken	King County reduced road widths as part of the critical areas effort in 2004? 2007? the Road Standards were amended to reduce road widths as follows: Rural Roadways Subcollector Roadways: The total roadway width for a rural subcollector roadway reduced from 38 feet to 34 feet. Minor Access Roadways: The total roadway width for a rural minor access roadway reduced from 28 feet to 24 feet. 4 Lots (or fewer) Short Plat Roadways: The total roadway width for rural 4 lots or fewer short plats reduced from 28 feet to 20 feet. An option of providing a cul-de-sac or hammerhead as a turnaround provided. Urban Roadways Private Access Tracts (PAT): The minimum tract width for a PAT reduced from 26 feet to 20 feet. The pavement width for a PAT reduced from 22 feet to 18 feet.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
KCC Title 15--Airport	last update 2008	Peter Dumaliang, Luanne Coachman	No changes/ action taken	The airport code does not address development on the airport property. When the airport does develop, or redevelop, it is subject to King County development regulations, including the SWDM, which provides for the use of LID where feasible.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
KCC Title 16.82--Clearing and Grading	KCC 16.82.100 G1--subsection .100 last update 2008	Randy Sandin, Kim Claussen	No changes/ action taken	This portion of the code already requires, with few exceptions, that soils in a development that are not covered by impervious surface be restored to their moisture holding capacity pre-disturbance.	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
KCC Title 16.82--Clearing and Grading	KCC16.82.150-152--Clearing Standards	Randy Sandin, Curt Crawford	No changes/ action taken	These sections limited the amount of area that could be cleared in an effort to maximize pervious surfaces in the rural residential zone. However, they were invalidated by the Washington State Supreme Court.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
KCC Title 16.82--Clearing and Grading	KCC 16.82.156--Significant Trees--last update 2004	Randy Sandin, Kim Claussen	No changes/ action taken	Requires the retention of significant trees and describes conditions related to the retention.	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

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KCC Title 17--Fire Code	KCC 17.04.370--Fire apparatus access roads (IFC 503)--last update 2004	Chris Ricketts, Luanne Coachman	No changes/ action taken	The Fire Code is not suited to the further implementation of LID. However, King County did adopt the International Fire Code's minimal width for fire apparatus access roads of 20 feet.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
KCC Title 18--Environmental Sustainability Programs	KCC 18.17--last update 2013	Luanne Coachman, Nori Catabay, Patti Southard	No changes/ action taken	Title 18.17 promotes the use of sustainable design by requiring that King County's capital projects achieve LEED or Sustainable Infrastructure Scorecard certification, or use an alternative green building or sustainable development rating system. Among the alternatives is Salmon Safe, which focuses heavily on green stormwater infrastructure and source control, habitat restoration, and improved water quality. KCC 18.17 requires use of the SWDM regardless of the jurisdiction in which the project is located unless that jurisdiction's manual is more stringent than the County's. This section virtually ensures that all King County projects prioritize stormwater management and will use LID where feasible.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
KCC Title 19A--Land Segregation	Last update 2013	Luanne Coachman, Randy Sandin, Kim Claussen	No changes/ action taken	Title 19A focuses on the process of land segregation. The substantive requirements for development occur in 21A. Title 19A is not an appropriate vehicle for promoting LID.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
KCC Title 20--Planning	KCC 20.10--Countywide Planning Policies--last update 2012 KCC 20.12--Comprehensive Plan--last update 2014 KCC 2014--Basin Plans update 2014--last update 2001	Luanne Coachman	No changes/ action taken	These chapters adopt the countywide planning policies, old basin and community plans, and other plans and policies containing substantive requirements for development, as well as the Comprehensive Plan. Of these, the Comprehensive Plan most directly influences development regulations and is the only one that is both accessible for revisions and an appropriate venue for furthering LID. It was reviewed separately.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
KCC Title 20--Planning	KCC 20.18--last update 2015	Luanne Coachman	No changes/ action taken	KCC 20.18 sets out the procedures for amending the comp plan and development regulations. Sections KCC 20.18.170 & 180 regulate King County's four to one program by which one acre may be added to the urban growth area for four acres preserved as rural area open space.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
KCC Title 20--Planning	KCC 20.36--Open Space, Agricultural, and Timer Lands Current Use Assessment--last update 2011	Mark Wilgus, Ted Sullivan, Bill Bernstein, Luanne Coachman	No changes/ action taken	Incentivizes the preservation of open space by taxing it at the current, rather than highest and best, use rate. To obtain the lower tax rate, the land must provide a public benefit in addition to promoting LID principles. We discussed adding to the list of situations in which the lower tax rate could be allowed those rural residential parcels that agree to maintain 65% open space and less than 10% impervious surface or provide full dispersion of runoff from impervious surfaces. However, we already incentivize these by reducing the stormwater controls required on these properties, which has made these the preferred and commonly used approaches to stormwater management in new development in the rural area.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>

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KCC Title 21A--Zoning	KCC 21A.12.030--Densities and dimensions--residential zones--last updated 2013	Luanne Coachman, Kim Claussen	No changes/ action taken	Sets limits for impervious surfaces in residential zones.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
KCC Title 21A--Zoning	KCC 21A.12.040--Densities and dimensions-resource and commercial/industrial zones--last updated 2013	Luanne Coachman, Kim Claussen	No changes/ action taken	Sets limits for impervious surfaces in resource, commercial, and industrial zones.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
KCC Title 21A--Zoning	KCC 21A.14.025 Cottage housing development--last updated 2005	Luanne Coachman	No changes/ action taken	Provides for clusters of small houses with common open space calculated at 250 square feet per unit.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
KCC Title 21A--Zoning	KCC 21A.14.040 Lot segregations--clustered development--last update 2013.	Luanne Coachman, Kim Claussen	No changes/ action taken	Allows smaller lots in the rural area with preservation of open space in separate tracts, though these tracts may be used for farming or forestry.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
KCC Title 21A--Zoning	KCC 21A.14.180-200 On-site recreation - space required et al	Kim Claussen	No changes/ action taken	Space for recreation is required to be set aside in residential developments, including subdivisions, mobile home parks, and multi-family developments.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
KCC Title 21A--Zoning	KCC 21A.16.085 B-D Landscaping - general standards for all landscape areas--last update 1994	Luanne Coachman, Kim Claussen	No changes/ action taken	Increases the water-holding and infiltrative capacity of soils in landscape areas by requiring the addition of mulch above, or organic matter in, those soils.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
KCC Title 21A--Zoning	KCC 21A.16.085 F Landscaping - general standards for all landscape areas--last update 1994	Luanne Coachman, Kim Claussen	Amend existing code	Amendments require the use of native plants, or those with similar cultural requirements.	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>

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KCC Title 21A--Zoning	KCC 21A.16.085 Landscaping - general standards for all landscape areas--last update 1994	Luanne Coachman	Developed new code	New subsection G authorizes the use of landscape areas for bioretention as long as they meet both the bioretention requirements of the SWDM and the landscaping requirements of KCC 21A.16.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
KCC Title 21A--Zoning	KCC 21A.24 Critical Areas	Randy Sandin, Luanne Coachman	No changes/ action taken	Requires critical area buffers, that are retained as open space, and also the preservation of critical areas	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
KCC Title 21A--Zoning	KCC 21A.24.020 Applicability--last updated 2004	Randy Sandin	No changes/ action taken	With few, exceptions, any alteration to an aquatic area, wetland, steep slope, landslide hazard area, or their respective buffer requires a permit. Even projects that are below the threshold for stormwater review are required to implement erosion and sediment control best management practices. This exceeds the minimum standards established by Ecology.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
KCC Title 21A--Zoning	KCC 21A.24.045 Allowed Alterations--last updated	Randy Sandin	No changes/ action taken	This section identifies what types of alterations are allowed within selected critical areas and conditions under which they are allowed. If an alteration is not included on the table, it may still be allowed as an exception. All alterations, whether allowed outright or as an exception are required to meet the development standards applicable to that critical area, INCLUDING, impact avoidance and mitigation.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
KCC Title 21A--Zoning	KCC 21A.24.045 D.19 Allowed Alterations--last updated 2013	Randy Sandin	No changes/ action taken	This provision was added in 2013 and was intended to encourage landowners to enhance critical areas under certain circumstances. With noxious weed removal, we do not require permits provided they are using methods such as mowing or hand held or light equipment that does not disturb the duff layer and they replant with native vegetation.	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
KCC Title 21A--Zoning	KCC 21A.24.045 D.23 Allowed Alterations	Randy Sandin	No changes/ action taken	Similar to D.19, requirements to use hand tools for vegetation management and BMPs to encourage native vegetation reduce soil compaction and support the proliferation of native plants.	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
KCC Title 21A--Zoning	KCC 21A.24.051 Agricultural Activities Development Standards--last updated 2013	Randy Sandin	No changes/ action taken	The allowance for alteration to certain critical areas for ongoing agricultural maintenance activities and for expansion of agricultural operations require preparation of a farm management plan. This provision of code provides for regulatory flexibility through adoption of best management practices to preserve soil health, minimize water quality impacts from farm operations, etc.	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

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KCC Title 21A--Zoning	KCC 21A.24.051 D.2 Agricultural Activities Development Standards	Randy Sandin	No changes/ action taken	Encourages LID principles, especially retention of native vegetation.	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
KCC Title 21A--Zoning	KCC 21A.24.051 D.3 Agricultural Activities Development Standards	Randy Sandin	No changes/ action taken	Encourages LID principles, especially implementation of water quality BMPs.	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
KCC Title 21A--Zoning	KCC 21A.24.051 E Agricultural Activities Development Standards	Randy Sandin	No changes/ action taken	Encourages LID principles, especially retention of native vegetation.	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
KCC Title 21A--Zoning	KCC 21A.24.055 Rural Stewardship Plans--last updated 2012	Randy Sandin	No changes/ action taken	This provision allows for regulatory flexibility through committing to a stewardship program that focuses on preserving or enhancing native vegetation, minimize3 impacts to high quality wetlands and aquatic areas, preserving or enhancing natural hydrologic conditions, etc.	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
KCC Title 21A--Zoning	KCC 21A.24.055 E. 3 & 4; F.2 & 3 Rural Stewardship Plans--last update 2013	Randy Sandin	No changes/ action taken	Encourages LID principles, especially retention of native vegetation.	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
KCC Title 21A--Zoning	KCC 21A.24.125--Avoiding Impacts to Critical Areas--last update 2004	Randy Sandin	No changes/ action taken	This encourages LID principles, at least within critical areas by requiring avoidance, minimization and mitigation.	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
KCC Title 21A--Zoning	KCC 21A.24.180 C & D--last update 2013	Randy Sandin	No changes/ action taken	These sections were added in 2013 and are intended to encourage the LID principle of preserving, maintaining and enhancing native vegetation.	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

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KCC Title 21A--Zoning	KCC 21A.24.185 Vegetation Management Plans--last update 2013	Randy Sandin	No changes/ action taken	These sections were added in 2013 and are intended to encourage the LID principle of preserving, maintaining and enhancing native vegetation.	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
KCC Title 21A--Zoning	KCC 21A.24.310 C Steep Slope Hazard Areas--last update 2004	Randy Sandin	No changes/ action taken	Requires retention of vegetation.	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
KCC Title 21A--Zoning	KCC 21A.24.325 A.3.b Wetlands-buffers--last update 2010	Luanne Coachman	No changes/ action taken	The list of "Measures to minimize impacts" includes LID BMPs for changes in water regime and planting native plants for degraded buffer conditions.	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
KCC Title 21A--Zoning	KCC 21A.24.335 A Wetlands-development standards and alterations--last update 2008	Luanne Coachman	No changes/ action taken	Requires the use of native plants in wetlands and wetland buffers.	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
KCC Title 21A--Zoning	KCC21A.24.365 C & E Aquatic Areas-development standards and alterations--last update 2008	Luanne Coachman	No changes/ action taken	Requires maintenance of moisture-holding capacity of the topsoil layer and either the preservation of the duff layer, or the use of it elsewhere on the site.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
KCC Title 21A--Zoning	KCC 21A.24.388 E Wildlife Habitat Conservation Areas and Wildlife Networks--last update 2004	Randy Sandin, Luanne Coachman	No changes/ action taken	Promotes the maintenance of natural soil conditions and reestablishing or enhancing native vegetation.	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
KCC Title 21A--Zoning	KCC 21A.25--Shorelines	Randy Sandin	No changes/ action taken	Contains areas of overlap with KCC 21A.24. Where there is a conflict between the two, the one most protective of the environment applies.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

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					Impervious surfaces	loss of native vegetation	stormwater runoff
KCC Title 21A--Zoning	KCC 21A.25.080 & 090 Sequence of Mitigation Measures - Priority--last update 2010	Randy Sandin	No changes/ action taken	Shoreline modifications must be mitigated to achieve no net loss of ecological functions.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
KCC Title 23--Code Compliance	last update 2013	Randy Sandin	No changes/ action taken	Title 23 establishes the procedures for enforcing the county's building, land use and environmental regulations. This chapter was completely rewritten in 1998 to change the focus from code enforcement to code compliance by promoting education and prevention. While warnings and voluntary compliance are desirable as an initial step towards code compliance, this chapter also provides that progressive enforcement and civil penalties be used as needed to assure and effect code compliance. This is probably not an area that could be modified to support LID.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
KCC Title 27--Development Permit Fees	last update 2014	Randy Sandin	No changes/ action taken	Title 27 establishes fees for review, inspection and monitoring of permits, approvals and other services provided by the Department of Permitting and Environmental Review. Permit fees are set based upon the cost of providing services which are based upon the processes DPER uses for performing reviews and inspections. The way to influence LID, either positively or negatively, is through amending permit processes, not through amending this title.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
King County Comprehensive Plan	review was done on the 2012 Comp Plan, which is currently being updated	Luanne Coachman	<i>Under the Growth Management Act, Comprehensive Plans are critical for setting out the policies upon which development regulations are based. The 2012 King County Comprehensive Plan contained the policies needed to support development based on LID principles and using LID BMPs. However, in many cases, the policies would benefit from stylistic updates to modernized the language, clarify the concepts, and introduce the LID name outside its silo in the Environment chapter. We proposed many of these stylistic improvements for incorporation into the 2016 Comprehensive Plan. Below is the language from the 2013 Comprehensive Plan that provides the basis for LID in development regulations. In instances where our recommendations for updated language were carried forward into the Executive Recommended Comprehensive Plan, we show both the old language and the new using underline and strikethrough format. In some cases, edits may be shown in text, but the status box shows No changes/action taken. This means that the changes being proposed in the Executive Recommended Comprehensive Plan are not related to changes associated with the LID Code Review and Revision process.</i>				
King County Comprehensive Plan	from the Urban Communities Chapter	Luanne Coachman	No changes/ action taken	U-111 Development standards for urban ((areas))centers should emphasize ways to allow maximum permitted densities and uses of urban land while not compromising the function of critical environmental areas. Mitigating measures should serve multiple purposes, such as drainage control, groundwater recharge, stream protection, air quality improvement, open space preservation, cultural and historic resource protection and landscaping preservation. When technically feasible, standards should be simple and measurable, so they can be implemented without lengthy review processes.	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
King County Comprehensive Plan		Luanne Coachman	No changes/ action taken	U-136 Site planning tools, such as clustering, shall be permitted in order to allow preservation or utilization of unique natural features within a development.	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

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King County Comprehensive Plan		Luanne Coachman	No changes/ action taken	U-185 Through the Four to One Program, King County shall actively pursue dedication of open space along the original Urban Growth Area line adopted in the 1994 King County Comprehensive Plan. Through this program, one acre of Rural Area <u>zoned</u> land may be added to the Urban Growth Area in exchange for a dedication to King County of four acres of permanent open space. Land added to the Urban Growth Area for ((naturally-appearing)) drainage facilities <u>that are designed as mitigation to have a natural looking visual appearance</u> in support of its development, does not require dedication of permanent open space.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
King County Comprehensive Plan		Luanne Coachman	No changes/ action taken	U-188 King County shall preserve the open space acquired through this program primarily as natural areas, passive recreation sites or resource lands for farming or forestry. King County may allow the following additional uses only if located on a small portion of the open space, provided that these uses are found to be compatible with the site's natural open space values and functions such as those listed in the preceding policy: a. Trails; b. Compensatory mitigation of wetland losses on the urban designated portion of the project, consistent with the King County Comprehensive Plan and the Critical Area Ordinance; and c. Active recreation uses not to exceed five percent of the total open space area. Support services and facilities for the active recreation uses may locate within the active recreation area only, and shall not exceed five percent of the active recreation area. An active recreation area shall not be used to satisfy the active recreation requirements for the urban designated portion of the project as required by K.C.C. Title 21A.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
King County Comprehensive Plan	from the Rural Areas and Natural Resource Lands Chapter	Luanne Coachman	No changes/ action taken	R-314 King County supports and shall work actively to facilitate the transfer of Rural Area and <u>Natural</u> Resource Lands development rights to: a. Preserve the rural environment, encourage retention of resource-based uses and reduce service demands; b. Provide permanent protection to significant natural resources; c. Increase the regional open space system; d. Maintain low density development in the Rural Area and <u>Natural</u> Resource Lands; e. Steer development growth inside the Urban Growth Area in ways that promote quality urban neighborhoods where residents want to work and live; and f. Provide mitigation for the impacts of urban development on global climate change by simultaneously reducing transportation-related greenhouse gas emissions and sequestering carbon through retention of forest cover <u>and conserving agricultural lands through zoning, land use planning, transfer of development rights and similar tools.</u>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

LID Code-related requirements - Reporting Template for King County

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King County Comprehensive Plan		Luanne Coachman	Amend existing code	<p>R-336 King County shall continue to support the rural development standards that have been established to protect the natural environment by addressing seasonal and maximum clearing limits, impervious surface limits ((, surface water management standards that emphasize preservation of natural drainage systems and water quality, groundwater protection,)) and resource-based practices.</p> <p>((These standards should be designed to provide appropriate exceptions for lands that are to be developed for kindergarten through twelfth grade public schools and school facilities, provided that the school project shall comply at a minimum with the requirements of the King County Surface Water Design Manual.)) Stormwater management practices should be implemented that emphasize preservation of natural drainage systems, protect water quality and natural hydrology of surface waters and groundwater. Rural development standards should also, where feasible, incorporate and encourage Low Impact Design principles for managing stormwater onsite by minimizing impervious surfaces, preserving onsite hydrology, retaining native vegetation and forest cover, capturing and reusing rainwater, controlling pollution at the source, and protecting groundwater. King County shall take care that requirements for onsite stormwater management complement requirements for onsite wastewater management.</p>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

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King County Comprehensive Plan	from the Environment Chapter	Luanne Coachman	Amend existing code	<p><i>From the intro to the Environment Chapter:</i> New approaches for stormwater management ((that mimic the natural functions of soil and forest cover in slowing and filtering stormwater runoff,)) known as Low Impact Development (LID)((techniques)), are providing additional options for stormwater management, especially in site development. ((In conjunction with a comprehensive stormwater management program of structural controls and best management practices, LID-techniques can result in reduced impacts from stormwater runoff and protection of the ecological functions of the landscape and surface waters. LID techniques work in tandem with structural controls and other best management practices to meet other objectives such as retention of canopy cover, riparian habitat and native soils that help protect biodiversity, improve air quality, and create a better and more sustainable environment and quality of life for King County citizens.)) <u>Low Impact Development Best Management Practices can mimic the natural functions of soil and forest cover in slowing and filtering stormwater runoff by infiltrating or dispersing stormwater onsite, or by capturing and reusing it. Used exclusively, or in conjunction with a comprehensive stormwater management program of structural controls and other best management practices, Low Impact Development Best Management Practices can reduce environmental impacts from stormwater runoff. Low Impact Development techniques also work in tandem with other strategies like retaining forest cover, preserving native plants and preserving native soil.</u></p> <p><u>These techniques help to meet other objectives such as retention of canopy cover, protection of riparian habitat and preservation of native soils that help protect biodiversity, improve air quality, and protect the ecological functions of the landscape and surface waters. These approaches help create a more sustainable environment and create a better quality of life for King County residents.</u></p>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

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King County Comprehensive Plan	From the Stormwater Quality section of the Environment Chapter	Doug Navetski, Luanne Coachman	Amend existing code	<p>Rivers, streams, lakes, wetlands, and groundwater must be protected from the adverse impacts of ((urbanization))development and land use change to continue functioning in a beneficial manner. Because ((urbanization))development both increases runoff from storms and reduces streamflows in dry months by limiting infiltration, control of the ((quantity))rate, volume and quality of stormwater runoff is critical. Unmitigated stormwater runoff can cause erosion, sedimentation and flooding with resulting adverse impacts on water quality, fish and wildlife habitat, property and human safety. In addition, stormwater runoff can carry pollutants such as oil, heavy metals, fertilizers, herbicides, pesticides and animal wastes into waters. Sedimentation from soil disturbed by clearing, grading, farming and logging can reduce river or stream channel capacity, fill lakes and wetlands, and smother aquatic life and habitat.</p> <p>King County stormwater management encompasses a wide range of ((programs))strategies that integrate proven, traditional approaches with new and innovative concepts, such as low impact development (LID) practices intended to ((minimize pollutants and mimic the natural flow of stormwater runoff))manage stormwater runoff onsite, reducing discharges of pollutants in stormwater runoff, and mimicking natural hydrology.</p>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
King County Comprehensive Plan				((These programs and practices include such actions as changing land use and development practices; encouraging public behaviors through education and social marketing that maximize natural hydrologic processes; improving pollution source control by legislating product or material restrictions; changing business practices and educating the public about pollution generating activities; implementing programs that minimize land clearing and preserve or restore native vegetation; housing clustering and smart growth to reduce development impacts and the construction and maintenance of conveyance; and flow control (detention or infiltration) and water quality treatment facilities and their associated drainage systems. Together these programs and practices will reduce pollution and flow impacts in King County's surface and ground waters.))	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
King County Comprehensive Plan				King County's stormwater management strategies include but are not limited to encouraging an approach to site development that includes clustering or smart growth, minimizes impervious surfaces, and maximizes the amount of native plants and soils; using education and social marketing to increase the public's awareness of water quality issues and encourage behaviors that support water quality; improving pollution source control by legislating product or material restrictions; improving business practices by educating business owners and operators about pollution generating activities and best management practices to mitigate them; and constructing and maintaining a stormwater infrastructure system that controls, conveys and treats stormwater runoff. Together these strategies will reduce pollution and flow impacts of stormwater runoff on King County's surface and ground waters.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

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King County Comprehensive Plan				<p>((King County supports the implementation of new approaches such as low impact development (LID) best management practices (BMPs) techniques as part of a comprehensive stormwater management program. LID requires the public to maintain stormwater features on their properties, including but not limited to rain gardens, dispersion areas, permeable pavement driveways, and vegetated roofs. As with any new approach or technology, the effectiveness and limitations of LID practices must be determined. These evolving technologies need to be studied further to determine operational effectiveness, long term maintenance needs, and appropriate placement.)) <u>As required by the National Pollution Discharge Elimination System (NPDES) Phase I Municipal Stormwater Permit, King County is making low impact development the preferred and commonly used approach to site development. As a result of using the low impact development approach, an increasing number of stormwater management best management practices including, but not limited to, rain gardens, dispersion, permeable driveways and walkways, vegetated roofs, and the capture and reuse of rainwater, will be constructed on private property and will rely on private maintenance for their continuing function.</u></p>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
King County Comprehensive Plan				<p>((Some stormwater practices require changes in how we live and work on the land. Successful implementation will include different product use, new land development approaches, and, in some areas, the setting aside of private land and its dedication to stormwater purposes. In addition, effective stormwater management will require a regional approach that includes landscape level analysis to identify areas of greatest need for additional management including retrofitting older developed areas and constructing facilities where no or minimal management exists now.)) <u>In addition to the stormwater strategies discussed above, as well as those discussed in <i>Chapter 8: Transportation</i>, effective stormwater management will require a basin or sub-basin approaches that identifies areas that were built out under old or nonexistent stormwater design standards. Basins where deficiencies in flow control or water quality are identified would be prioritized to correct those deficiencies. These retrofits could include upgrades to existing stormwater management structures or the placement of new ones, including onsite low impact development best management practices like bioretention or raingardens, or the replacement of impervious pavement with permeable.</u></p>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
King County Comprehensive Plan				<p><u>Long term stormwater management strategies may require changes in how people live and work on the land. Approaches could include using different products (green products), implementing new land development approaches such as cluster housing, and, in some areas, the setting aside of land and its dedication to riparian habitat, and maintaining natural vegetation.</u></p>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
King County Comprehensive Plan				<p>E-445 Stormwater runoff shall be managed through a variety of methods, with the goal of protecting surface water quality, in stream flows, and aquatic habitat; promoting groundwater recharge while protecting groundwater quality; reducing the risk of flooding; protecting public safety and properties; and enhancing the viability of agricultural lands.</p>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

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King County Comprehensive Plan	from the Forest Cover section of the Environment Chapter	Luanne Coachman	No changes/ action taken	E-447 King County recognizes that (protecting) <u>conserving</u> and restoring headwater and upland forest cover is important for preventing flooding, improving water quality, and protecting salmon and other wildlife habitat. The central role that forest cover plays in supporting hydrologic and other ecological processes should be reflected in policies and programs addressing stormwater management, flooding, wildlife, and open space.	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
King County Comprehensive Plan		Luanne Coachman	No changes/ action taken	E-448 King County's critical areas and clearing and grading regulations should provide for activities compatible with long term forest use, including use of recreational trails, firewood collection, forest fire prevention, forest management, and control of invasive plants.	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
King County Comprehensive Plan		Luanne Coachman	No changes/ action taken	E-449 (The county) <u>King County</u> shall promote retention of forest cover and significant trees using a mix of regulations, incentives, and technical assistance.	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
King County Comprehensive Plan	from the Soils and Organics section of the Environment Chapter	Luanne Coachman	No changes/ action taken	E-450 Site development practices should minimize soil disturbance and maximize retention of native vegetation and soils. Where soil disturbance is unavoidable, native soils should be stockpiled on site and reused on site in accordance with best management practices to the maximum extent (possible) <u>practicable</u> .	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
King County Comprehensive Plan		Luanne Coachman	No changes/ action taken	E-451 King County shall require the use of organic matter to restore disturbed soils on site developments.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
		Luanne Coachman	No changes/ action taken	E-456 King County shall promote, encourage, and require, where appropriate, the beneficial use of organic materials, including but not limited to their use in the following activities: agriculture and silviculture; road, park and other public project development; site development and new construction; restoration and remediation of disturbed soils; nursery and sod production; and landscaping. For these purposes, organic materials do not include fly ash.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
		Luanne Coachman	No changes/ action taken	E-458 King County will seek to enhance soil quality, and protect water quality and biodiversity across the landscape by developing policies, programs, and incentives that support the goal of no net loss of organic material.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
King County Comprehensive Plan	from the Wetlands section of the Environment Chapter	Luanne Coachman	No changes/ action taken	E-475 Areas of native vegetation that connect wetland complexes should be protected. Whenever effective, incentive programs such as buffer averaging, density credit transfers, or appropriate non-regulatory mechanisms shall be used for this purpose.	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>

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King County Comprehensive Plan		Luanne Coachman	No changes/ action taken	E-476 King County should identify upland areas of native vegetation that connect wetlands to upland habitats and that connect upland habitats to each other. The county should seek protection of these areas through acquisition, stewardship plans, and incentive programs such as the Public Benefit Rating System and the Transfer of Development Rights Program.	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
King County Comprehensive Plan		Luanne Coachman	No changes/ action taken	E-477 The unique hydrologic cycles, soil and water chemistries, and vegetation communities of bogs and fens shall be protected through the use of incentives, acquisition, best management practices, and implementation of the King County Surface Water Design Manual to control and/or treat stormwater within the wetland watershed.	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
King County Comprehensive Plan	from the Groundwater Resouces section of the Environment Chapter	Luanne Coachman	No changes/ action taken	E-494 King County should protect the quality and quantity of groundwater countywide by: ... c. Developing, with affected jurisdictions, best management practices for development and for forestry, agriculture, and mining operations based on adopted Groundwater Management Plans and Wellhead Protection Programs. The goals of these practices should be to promote aquifer recharge quality and to strive for no net reduction of recharge to groundwater quantity;... f. Encouraging forest retention and active forest stewardship; g. Incorporating into its land use and water service decisions consideration of potential impacts on groundwater quality and quantity, and the need for long-term aquifer protection; ...	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
King County Comprehensive Plan		Luanne Coachman	No changes/ action taken	E-495 King County should protect groundwater recharge quantity by promoting low impact development and other methods that infiltrate <u>stormwater</u> runoff where site conditions permit and where pollution source controls and stormwater treatment can prevent potential groundwater contamination.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
King County Comprehensive Plan		Luanne Coachman	No changes/ action taken	E-497 King County should protect groundwater in the Rural Area by: King County should protect groundwater in the Rural Area by: a. Preferring land uses that retain a high ratio of permeable to impermeable surface area, and that maintain and/or augment the natural soil's infiltration capacity and treatment capability for groundwater; ((and)) b. <u>Requiring risk assessments and monitoring, where appropriate, of rural potable water supplies in groundwater subareas, and coordinate findings with local and state governments, agencies, districts and local property owners to monitor potable water supplies at high risk and develop plans to mitigate for the loss or serious impairment of domestic water supply from wells and springs; and</u> c. <u>Requiring standards for maximum vegetation clearing limits, impervious surface limits, and, where appropriate, infiltration of surface water.</u>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

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King County Comprehensive Plan	from the Rivers and Streams section of the Environment Chapter	Luanne Coachman	No changes/ action taken	E-499e To maintain and restore stream health, sources of uncontrolled stormwater flows contributing to peak flows in small streams should be managed using on-site structural or non-structural flow control techniques.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
King County Comprehensive Plan	from the Watershed-Based Salmon Recovery section of the Environment Chapter	Luanne Coachman	No changes/ action taken	E-499l King County should seek to support Water Resource Inventory Area <u>salmon recovery</u> plan goals of maintaining intact natural landscapes through: a. Retaining low density land use designations such as Agriculture, Forestry and Rural <u>Area designations</u> ; b. Promoting Current Use Taxation and other incentives; c. Promoting stewardship programs including development and implementation of Forest Plans, Farm Plans, and Rural Stewardship Plans; d. Promoting the use of Low Impact Development methods; and e. Acquiring property or conservation easements in areas of high ecological importance with unique or otherwise significant habitat values.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
King County Comprehensive Plan	from the Erosion Hazard Areas section of the Environment Chapter	Luanne Coachman	No changes/ action taken	E-502 Land uses permitted in Erosion Hazard Areas shall minimize soil disturbance and should maximize retention and replacement of native vegetative cover.	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
King County Comprehensive Plan		Luanne Coachman	No changes/ action taken	E-504 King County should protect native plant communities by encouraging management and control of nonnative invasive plants, including aquatic plants. Environmentally sound methods of vegetation control should be used to control noxious weeds.	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
King County Comprehensive Plan		Luanne Coachman	No changes/ action taken	E-506 The use of native plants should be encouraged in landscaping requirements and erosion control projects, and in the restoration of stream banks, lakes, shorelines, and wetlands.	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
King County Comprehensive Plan	from the Conservancy Shoreline section of the Shorelines Chapter	Luanne Coachman	No changes/ action taken	S-517 King County shall require that new uses or development in the Conservancy Shoreline Environment preserve the existing character of the shoreline consistent with the purpose of the environment, including: a. Limiting the total effective impervious surface in the shoreline jurisdiction to no more than ten percent in order to maintain the existing hydrologic character of the site; and b. Allowing more effective impervious surface coverage on lots legally created prior to the date of adoption of this update to King County's Shoreline Master Program. In these cases, effective impervious surface coverage shall be limited to the maximum extent practicable.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

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King County Comprehensive Plan	from the Natural Shoreline section of the Shorelines Chapter	Luanne Coachman	No changes/ action taken	S-530 Except for removal of noxious weeds or invasive vegetation as provided for in S 645, King County shall not allow vegetation removal in the Natural Shoreline Environment that will reduce the capability of vegetation to perform normal ecological processes and functions.	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
King County Comprehensive Plan	from the Vegetation Conservation section of the Shorelines Chapter	Luanne Coachman	No changes/ action taken	S-640 King County shall adopt planning provisions to address vegetation conservation and restoration and regulatory provisions to address conservation of vegetation, as necessary, to assure no net loss of shoreline ecological processes and functions, to avoid adverse impacts to soil hydrology, and to reduce the hazard of slope failures or accelerated erosion.	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
King County Comprehensive Plan		Luanne Coachman	No changes/ action taken	S-641 Vegetation conservation provisions apply to all shoreline uses and developments, whether or not the use or development requires a shoreline substantial development permit.	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
King County Comprehensive Plan		Luanne Coachman	No changes/ action taken	S-643 King County should identify which ecological processes and functions are important to the local aquatic and terrestrial ecology, and then conserve sufficient vegetation to maintain these functions. Vegetation conservation areas are not necessarily intended to be closed to use and development, but should provide for management of vegetation in a manner adequate to assure no net loss of shoreline ecological processes and functions.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
King County Comprehensive Plan		Luanne Coachman	No changes/ action taken	S-644 King County should adopt development regulations for vegetated areas along streams, which once supported or could in the future support mature trees, that include buffers of sufficient width to facilitate the growth of mature trees and periodic recruitment of woody vegetation into the water body to support vegetation related shoreline functions.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
King County Comprehensive Plan		Luanne Coachman	No changes/ action taken	S-645 King County should adopt mechanisms to implement the vegetation conservation policies of this chapter. These mechanisms may include setback or buffer requirements, clearing and grading standards, regulatory incentives, environment designation standards, or other provisions. Selective pruning of trees for safety and view protection may be allowed. Removal of noxious weeds and invasive vegetation should be allowed as long as appropriate best management practices are followed.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
King County Comprehensive Plan	from the Water Quality, Stormwater and Non-Point Pollution section of the Shorelines Chapter	Luanne Coachman	No changes/ action taken	S-648 King County should ensure mutual consistency between shoreline management provisions and other regulations that address water quality and stormwater quantity, including Public Health—Seattle & King County standards, the King County Surface Water Design Manual, and King County surface water management regulations. The regulations that are most protective of ecological functions shall apply.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

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King County Comprehensive Plan	from the Transportation and Parking section of the Shorelines Chapter	Luanne Coachman	No changes/ action taken	S-759 Parking facilities in the shoreline jurisdiction are not a preferred use. King County shall allow parking facilities in the shoreline jurisdiction only when necessary to support an authorized use and when an alternatives analysis shows there are no feasible alternatives outside of the 200 ft shoreline jurisdiction. Parking facilities in the shoreline jurisdiction shall use Low Impact Designs, such as porous concrete and vegetated swales, and be planned, located and designed to minimize the environmental and visual impacts.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
King County Comprehensive Plan	from the Regional Open Space System section of the Parks, Open Space, and Cultural Resources Chapter	Luanne Coachman	No changes/ action taken	P-102 King County shall be a regional leader in the provision of a regional open space system consisting of parks, <u>regional</u> trails, natural areas, (working) <u>natural</u> resource lands, and flood hazard management lands. The regional network of open spaces provides benefits to all county residents including: recreation facilities, conservation of natural and working resource lands, improving air and water quality, flood hazard management and related programs and services, thereby contributing to the physical, mental and emotional well being of county residents.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
King County Comprehensive Plan		Luanne Coachman	No changes/ action taken	P-103 King County will preserve wildlife corridors, (and) riparian habitat, <u>contiguous forest land</u> , as well as open space areas separating Urban and Rural Areas as part of its open space system.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
King County Comprehensive Plan	from the Natural Areas section of the Parks, Open Space, and Cultural Resources Chapter	Luanne Coachman	No changes/ action taken	P-111 King County will manage its natural areas to protect, preserve and enhance important natural resource habitat, biological diversity, and the ecological integrity of natural systems.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
King County Comprehensive Plan		Luanne Coachman	No changes/ action taken	P-112 King County shall recognize and protect the natural character and ecological value of its natural areas. These areas are important for preserving fish and wildlife and their habitat, native vegetation, and features of scientific and educational value. Development and public use may be limited to preserve the natural state and reduce disturbance of the natural resources. Site improvements should be focused on providing educational and interpretive opportunities. Public access should be directed to the less fragile portions of a site to ensure continued protection of the ecological resources.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
King County Comprehensive Plan	from the Forestland section of the Parks, Open Space, and Cultural Resources Chapter	Luanne Coachman	No changes/ action taken	P-116 ((F)) <u>Working forest land</u> <u>and conservation easements</u> owned by King County shall provide large tracts of forested property in the Rural Forest Focus Areas, (and) the Forest Production District (FPD) <u>and Rural Area</u> that will remain in active forestry, protect areas from development or provide a buffer between commercial forestland and adjacent residential development.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

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					Impervious surfaces	loss of native vegetation	stormwater runoff
King County Comprehensive Plan	from the Achieving Open Space System section of the Parks, Open Space, and Cultural Resources Chapter	Luanne Coachman	No changes/ action taken	P-119 Open space lands should be acquired to expand and enhance the open space system as identified in the King County Open Space Plan: Parks, <u>Regional Trails and Natural Areas</u> ((-or when needed to meet adopted local park and recreation guidelines, or to protect contiguous tracts of working resource lands or ecological resources under the Acquisition Criteria in the King County Open Space Plan)).	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
King County Comprehensive Plan	from the Stormwater Management section of the Services, Facilities, and Utilities Chapter	Doug Navetski	Amend existing code	<p>((Current development practices can adversely impact both the quantity and quality of water entering the natural environment. Urban areas are largely covered with impervious surfaces (e.g., buildings, streets, parking lots) that cause increased runoff and are a source of pollutants. Pervious and semi pervious areas such as lawns and gardens can also be a source of pollutants from the application of fertilizers, insecticides, herbicides, and rodenticides. Management in the Rural Area is important, too, because of the potential adverse impacts of land clearing and impervious surface as well as potential pollutants in runoff from forestry, agricultural, and livestock practices.)) Stormwater runoff occurs when precipitation runs off the landscape and picks up pollutants, including pesticides, fertilizers, pet wastes, oils, metals, and many other chemicals. These pollutants enter surface and ground waters, disrupt ecosystems, and threaten public health. Runoff can also cause erosion, create higher peak flows in streams and rivers in winter and, because of reduced infiltration, create lower flows in summer.</p> <p><u>Early King County stormwater management strategies primarily focused on reducing the risk of localized flooding, without concern for potential adverse impacts on receiving water bodies. Over time, experts recognized the harm stormwater runoff was having on receiving waters and regulations have been put into place to address those impacts. Current stormwater management programs/policies focus on protecting the quality and beneficial uses of surface and ground waters and are a requirement of the federal Clean Water Act (CWA).</u></p>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
King County Comprehensive Plan				Prevention or mitigation of flooding, erosion, sedimentation, and water quality and habitat degradation is important for both the built and natural environments. ((Surface)) Stormwater water management activities address ((both)) the quantity and quality of ((water)) stormwater runoff entering the natural environment as well as its quality. As described in Chapter 4, the management of stormwater runoff is generally driven by the National Pollutant Discharge Elimination System (NPDES) Phase I Municipal Stormwater Permit (the Permit) and the County's Stormwater Management Program plan (SWMP) which can be found online at: http://www.kingcounty.gov/environment/waterandland/stormwater/pollution-discharge-permit/annual-reports.aspx	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

LID Code-related requirements - Reporting Template for King County

Measures to minimize:

Document Name: Code chapter, rules, standards, and other enforceable documents	Section reference, date last updated, page number, etc	Name of Reviewer(s)	Action taken to meet Permit requirements	Describe/Note How Revision(s) made to meet permit requirements <u>OR</u> if No revision(s) was made to this document, explain why .	Impervious surfaces	loss of native vegetation	stormwater runoff
King County Comprehensive Plan				The lack of stormwater controls in older developed areas is one of the most significant problems impacting receiving water bodies in King County and preventing Puget Sound recovery. Although King County has been developing and applying best available stormwater controls to new development since the late 1970s, the application of water quality controls and more effective flow controls did not occur until the early 1990s.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
King County Comprehensive Plan				Consequently, nearly all development occurring prior to 1990 has little or no flow control and no water quality control. In unincorporated King County, over two-thirds of the developed land was created prior to 1990. This amounts to about 150 square miles of land on which native forest was converted to impervious surfaces, lawn/landscape surfaces, and pasture/crop land surfaces without stormwater controls to mitigate the increased runoff and pollution generated by these surfaces.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
King County Comprehensive Plan				The County is also working to promote site development that preserves natural hydrologic processes by protecting and enhancing native vegetation and soils, reducing impervious surfaces, and managing stormwater onsite. This approach, termed Low Impact Development (LID), is used to reduce impacts on aquatic resources. In the King County Surface Water Design Manual, King County provides a menu of LID options for individuals planning new or re-development projects. King County will continue to help minimize new impervious surfaces through code and incentive programs that keep lands in forest and agricultural uses. Implementing LID satisfies requirements of the NPDES Permit, while helping to protect the region's streams, rivers, lakes, and Puget Sound from harmful pollutants.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
King County Comprehensive Plan				The County has identified watershed based management efforts as a strategy that simultaneously integrates floodplain connectivity, salmon recovery, habitat restoration, economic development, agricultural preservation, and principles of equity and social justice. The County will leverage alternative funding mechanisms, and engage in various partnerships with groups that include, but are not limited to, the existing NPDES permitted jurisdictions, Water Resource Inventory Areas (WRIAs), the PSP, and Local Integrating Organizations (LIOs) to undertake a collaborative watershed-based approach to restoring aquatic ecosystems.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
King County Comprehensive Plan				King County has been and will continue to be a leader in developing and implementing state-of-the-art stormwater management ((techniques including pollutants source control at businesses and homes, stormwater flow control and water quality treatment facilities, and low impact development (LID))) strategies including education and outreach, source control programs, basin or sub-basin planning for retrofitting in built out areas with inadequate stormwater controls, and mapping and maintenance of stormwater infrastructure. Strategies for managing stormwater runoff are continuing to evolve. Development of regional, collaborative approaches, including the creation of watershed basin plans across multiple disciplines, will be the next evolution of stormwater management.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

LID Code-related requirements - Reporting Template for King County

Measures to minimize:

Document Name: Code chapter, rules, standards, and other enforceable documents	Section reference, date last updated, page number, etc	Name of Reviewer(s)	Action taken to meet Permit requirements	Describe/Note How Revision(s) made to meet permit requirements <u>OR</u> if No revision(s) was made to this document, explain why.	Impervious surfaces	loss of native vegetation	stormwater runoff
King County Comprehensive Plan				((LID is an approach to land development that works to preserve a site's natural hydrological functions by protecting and enhancing native vegetation and soils, reducing impervious surface and managing stormwater at the sources. Similarly, King County also encourages the use of low-impact site design techniques to reduce impacts to aquatic resources. These techniques, where feasible, are well suited to development in rural residential zoned areas. LID is becoming an increasingly valuable tool for controlling polluted runoff that contributes to declining populations of federally protected aquatic species, meeting the requirements of the National Pollution Discharge Elimination System Municipal Stormwater Permit, and protecting and restoring the region's stream's, river and lakes and the Puget Sound.))	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
King County Comprehensive Plan				((The primary LID tools to be used in the Rural Area are forest retention and limiting impervious surface. King County shall continue to help limit impervious surface through code and incentive programs that help keep land in forest and agricultural use.))	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
King County Comprehensive Plan				F-272 To reduce flooding, erosion and sedimentation, prevent and mitigate habitat loss, enhance groundwater recharge and prevent groundwater and surface water quality degradation, <u>and promote the goals of the Growth Management Act, ((the surface waters of))</u> King County shall <u>((be))</u> managed <u>stormwater</u> through plans, programs and regulations developed by King County in cooperation with affected jurisdictions <u>and agencies</u> whenever possible.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
King County Comprehensive Plan				F-273 A watershed approach shall be taken <u>((to surface))</u> for stormwater management, with responsibility shared <u>((among))</u> <u>between</u> King County and affected jurisdictions. This approach should emphasize prevention of <u>((water quality))</u> <u>surface water and groundwater</u> degradation through education programs, <u>retrofits of existing stormwater controls or the placement of new controls</u> , and implementation of best management practices to reduce pollution entering the region's groundwater and surface waters, including Puget Sound.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
King County Comprehensive Plan				F-274 In the Rural Area, King County shall minimize the use of constructed facilities for <u>((surface-water))</u> <u>stormwater</u> management and, <u>through Low Impact Development</u> , maximize the use of natural systems, provided that the ecological functions of the natural systems are not harmed. The county should provide incentives to keep these natural systems intact. <u>((Natural systems are also))</u> <u>Low Impact Development is also preferred in the Urban Growth Area, but it is recognized that structural systems ((will))</u> <u>may</u> be needed to realize urban growth and density goals <u>in these areas</u> .	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
King County Comprehensive Plan				F-278 King County shall continue to encourage, support and require the use of low impact development as a part of its strategy to mitigate stormwater impacts from new development to the maximum extent feasible.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

LID Code-related requirements - Reporting Template for King County

Measures to minimize:

Document Name: Code chapter, rules, standards, and other enforceable documents	Section reference, date last updated, page number, etc	Name of Reviewer(s)	Action taken to meet Permit requirements	Describe/Note How Revision(s) made to meet permit requirements <u>OR</u> if No revision(s) was made to this document, explain why .	Impervious surfaces	loss of native vegetation	stormwater runoff
King County Comprehensive Plan				F-279 King County should incorporate state of the art stormwater management techniques including low impact development (principles and practices) into the design, construction and operation of all county facilities and county funded projects to the maximum extent feasible.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
King County Comprehensive Plan				F-280 King County shall continue to promote <u>the preservation of native vegetation and soils and the restoration of disturbed soils on rural residential zoned parcels to the maximum extent feasible.</u> ((D)) <u>Minimized impervious footprints and the dispersion of stormwater runoff from impervious surfaces into native vegetation in accordance with the Surface Water Design Manual ((is))are the preferred methods of stormwater management in the Rural Area.</u>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
King County Comprehensive Plan				F-281 King County should work with residential and commercial developers to incorporate state of the art stormwater management techniques, <u>such as Low Impact Development,</u> that protect native vegetation and soils, restore disturbed soils <u>by increasing the use of compost, facilitate reuse of resources such as recycled or harvested water,</u> reduce the carbon footprint of the project, and ((reduce)) <u>minimize</u> impervious surfaces.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

Attachment 2015 Annual Report Question #13:

Describe in comments field opportunities created for the [public to participate in the decision making processes involving the development, implementation and updates of the SWMP (S5.C.4.a).

2.1.4 Public Involvement and Participation – S5.C.4

Permittees shall provide ongoing opportunities for public involvement and participation in the Permittee's SWMP and implementation priorities.

Minimum performance measures:

- a. Permittees shall create opportunities for the public to participate in the decision-making processes involving the development, implementation and update of the Permittee's SWMP.*

As part of the annual update process, King County invites public comment on the contents of the SWMP Plan. King County will advertise the comment period through its website (www.kingcounty.gov/environment/wlr/sections-programs/stormwater-services-section/stormwater-program/public-review.aspx) and email notifications sent to thousands of potentially interested parties through established distribution lists. All feedback received during the public comment period will be reviewed and considered prior to finalization of the SWMP Plan.

In addition to input received during the SWMP Plan public comment period, King County welcomes feedback year round. Comments may be emailed to Stormwater@kingcounty.gov or mailed to Stormwater Management Team, King County Dept. of Natural Resources and Parks, 601 S. Jackson St., Suite 600, Seattle, WA 98104.

King County also engages the public in decision-making processes when it comes to siting, construction, and maintenance of County-initiated capital projects.

- b. Each Permittee shall post on their website their SWMP Plan, and the annual report required under S9.A no later than May 31 each year. All other submittals shall be available to the public upon request.*

No later than March 31st of each year beginning in 2015, King County will post its updated SWMP Plan online at www.kingcounty.gov/environment/wlr/sections-programs/stormwater-services-section/stormwater-program.aspx. Other submittals related to the Municipal Permit are available upon request by sending an email to Stormwater@kingcounty.gov.

Attachment 2015 Annual Report Question #92b:

List permit conditions described in non-compliance notification(s) in Comments field (G20).

King County had two G20 notifications in 2015. One of the G20 notifications related to permit conditions S5.C.9.b.i, S5.C.9.b.iv, and S5.C.9.d.i(2). The second G20 notification related to permit condition S5.C.9.a.ii(1).

Attachment 2015 Annual Report Question #91b:

Attach a summary of the status of implementation of any actions taken pursuant to S4.F.3 and the status of any monitoring, assessment, or evaluation efforts conducted during the reporting period (S4.F.3.d).

2015 Annual Report
Kerriston Road S4.F Update

This is an update to the previously provided S4.F notice submitted as part of the 2014 Annual Report, which was an update to the original S4.F dated May 25th, 2011, under the Phase I Municipal Stormwater National Pollutant Discharge Elimination System (NPDES) Permit. The S4.F involved the discharge of turbid water from Kerriston Road into receiving waters. In our August 26th, 2011 letter, we committed to keeping you informed of our progress implementing the focused maintenance plan. The purpose of this letter is to provide you with an update of the progress of that maintenance plan to date.

The focused maintenance plan (which was developed by staff from King County Road Services Division, Traffic and Road Maintenance Section (TRMS) during site inspections and was informed by technical assistance from Department of Ecology staff and staff from other agencies) identified 26 potential tasks, in addition to annual wet season inspections, that are summarized in the table below. All of the action items completed to date (23 of 26) have been conducted within the time frame proposed in the original maintenance plan.

In 2014 Task 25, replacement of culvert with fish passable structure, was completed in addition to annual wet season inspections and seasonal routine Best Management Plan (BMP) maintenance.

On December 17th, 2015, representatives from King County, Department of Ecology and the Tulalip Tribe conducted a site visit in order to inspect maintenance activities to date and further discuss remaining tasks.

The remaining uncompleted tasks are paving (Task 3), and the two stream relocation projects (Tasks 20 and 21). These three tasks were not assigned anticipated completion dates and continue to be evaluated on the basis of land ownership constraints, available budget and other additional resources needed in order to determine the feasibility of these three tasks. During the December 17th, 2015 site inspection, King County and the Tulalip Tribe representatives discussed potential partnerships and funding options that may allow for the completion of Tasks 20 and 21 in the future. These conversations will be ongoing.

In addition, the site inspection revealed the need to install check dams and sediment sumps in roadside ditches between mile markers 1.3 and 1.4. These efforts will be completed in 2016.

This update is intended to document our efforts to remain in compliance with conditions of our Phase 1 NPDES Municipal permit, to provide documentation of our status of implementation, and the results of any monitoring, assessment or evaluation conducted during the reporting period.

Kerriston Road Focused Maintenance Plan

Task #	Miles from end of asphalt	Left Side of Road (proceeding from end of asphalt)	Right Side of Road (proceeding from end of asphalt)	Permits Required	Estimated Completion Date	Actual Completion Date
1	0	Ditch and grade road, install CB, install cross culvert	Install culvert outlet structure	None	12/31/2013	10/25/2013
2	0.05	Clean sump/ditch		None	12/31/2012	11/02/2011
3	0.3	Pave crest to crest	Pave crest to crest	Yes, Type F buffer	Under evaluation	Under evaluation
4	1.3	Clean ditch, pull shoulder, install BMP check dam		Yes, Type F buffer	12/31/2012	11/02/2011
4a.	1.3		Install check dams and sediment sumps		12/31/2016	N/A
5	1.3		Grade 100 feet of shoulder	Yes, Type F buffer	12/31/2012	11/02/2011
6	1.3		Install 30 feet of new ditch out, pull shoulder	Yes, Type F buffer	12/31/2012	11/02/2011
7	1.4		Grade 50 feet of shoulder, install new ditch out	Yes, Type F buffer	12/31/2012	11/02/2011
7a.	1.4		Install check dams and sediment sumps		12/31/2016	N/A
8	1.4	Clean and maintain ditch out		Yes, Type F buffer	12/31/2012	11/02/2011
9	1.4	Clean and maintain ditch out		Yes, Type F buffer	12/31/2012	11/02/2011
10	1.4		Grade shoulder, install new ditch out	Yes, Type F buffer	12/31/2012	11/02/2011
11	1.5		Grade shoulder, install new ditch out	None	12/31/2012	11/02/2011
12	1.5	Grade shoulder, clean and maintain ditch out. Evaluate for BMP installation.		None	12/31/2012	11/02/2011
13	1.5		Grade shoulder, clean and maintain ditch out.	None	12/31/2012	11/02/2011
14	1.6		Grade shoulder, clean and maintain ditch out.	None	12/31/2012	11/02/2011

15	1.6	Grade shoulder, clean and maintain ditch out.		None	12/31/2012	11/02/2011
16	1.6		Grade shoulder, clean and maintain ditch out.	None	12/31/2012	11/02/2011
17	1.8	Grade shoulder		None	12/31/2012	11/02/2011
18	2.8	Remove sediment from roadside pullout		Yes, Type F buffer	12/31/2012	11/02/2011
19	2.8		Clean culvert inlet and ditch, install sediment control BMP	Yes, Type F buffer	12/31/2012	11/02/2011
20	3.5	Evaluate installation of cross tile to relocate stream out of roadside ditch		Yes, Type N water	Under evaluation	Under evaluation
21	3.6-3.7	Evaluate relocation of stream away from road		Yes, Type F water	Under evaluation	Under evaluation
22	3.7	Clean catch basin and cross tile, install rock in road bed		Yes, Type F buffer	12/31/2012	11/02/2011
23	3.7		Maintain ditch out	None	12/31/2012	11/02/2011
24	3.7	Clean culvert inlet and ditch, install sediment control BMP		None	12/31/2012	11/02/2011
25	3.8	Replace culvert with fish passable structure.	Replace culvert with fish passable structure.	Yes, Type F water and buffer	12/31/2016	09/12/2014
26	3.9	Grade 50 feet of shoulder to remove berm		Yes, Type F buffer	12/31/2012	11/02/2011

Additional Tasks Completed	Date Completed
Installation of approximately nine new ditch outs	11/02/2011
Cleaning of approximately 24 cross culverts	11/02/2011
Cleaning of one driveway culvert	11/02/2011
Wet season inspection	11/23/2011
Wet season inspection	11/19/2012
Wet season inspection/ BMP maintenance	11/12/2013
Wet season inspection/ BMP maintenance	11/25/2014
Wet season inspection	12/17/2017

Attachment 2015 Annual Report Question #72:

Attach a description of any stormwater monitoring or stormwater-related studies per S8.A.

2015 Annual Report Question 72: Description of any stormwater-related studies per S8.A

- King County maintains 72 water quality monitoring stations on creeks and rivers in King County. These stations are visited once per month, which can include storm events, for multiple water quality parameters. These data are used to characterize current water quality conditions in creeks and rivers in King County, and to assess how those conditions change over time. More information about this program can be found here: <http://green2.kingcounty.gov/streamsdata/>.
- King County maintains stream flow gages in most streams and creeks in King County. These flow gages track water quantity every 5 or 15 minutes. Flows during storm events are captured as part of this effort. These data are used to characterize current flow conditions in streams and creeks in King County, and to assess how those conditions change over time. More information about this program can be found here: <http://green2.kingcounty.gov/hydrology/>.
- King County conducts monitoring to identify sources of bacteria in several King County creeks. In 2015, bacteria source tracking investigations were conducted in Issaquah Creek, Newaukum Creek and Boise Creek. Investigations were also conducted in 2015 in Juanita Creek in cooperation with the City of Kirkland, and in Thornton Creek in cooperation with the City of Seattle. These investigations helped further identify where the high fecal coliform bacteria maybe coming from agricultural (e.g., dairy/cattle) sources and human sources. Collaborative source tracking work with the City of Kirkland in the Juanita Creek basin helped narrow down potential human sources of bacteria to a two block area where some older septic systems are known to exist. Work in the Thornton Creek basin with Seattle Public Utilities has resulted in the identification and elimination of two illicit discharges of raw sewage into the stormwater system in the creek through the use of continuous conductivity/temperature data loggers and automated water samplers.
- King County provides stormwater and surface water monitoring services to the City of Mercer Island. In 2015 King County collected one non-storm sample from two sites in Town Center, and three regular storm events.