

2.1.3 Coordination – S5.C.3

The SWMP shall include coordination mechanisms among departments within each jurisdiction to eliminate barriers to compliance with the terms of this permit.

The SWMP shall also include coordination mechanisms among entities covered under a municipal stormwater NPDES permit to encourage coordinated stormwater-related policies, programs and projects within a watershed.

Minimum performance measures:

- a. Implement intra-governmental (internal) coordination agreement(s) or Executive Directive(s) to facilitate compliance with the terms of this permit. Permittees shall include a written description of internal coordination mechanisms in the Annual Report, due no later than March 31, 2015.*

An order, signed by County Executive Dow Constantine, establishes the mechanism by which the various entities of County government participate in permit compliance. The order that originally took effect November 20, 2007 was superseded by a new order on June 10, 2014, which is still in effect, and may be read at the following website: <http://www.kingcounty.gov/operations/policies/executive/utilitiesaeo/put8191aeo.aspx>.

As directed by Executive Order, King County designated a Stormwater Permit Coordinator for the County and a Municipal Permit Lead in each agency subject to the requirements of the Permit. The Coordinator and Leads meet regularly to coordinate compliance activities. The Leads act as liaisons between the Coordinator and their own agencies, ensuring that each agency understands the implications of the Permit requirements on their operations. The Coordinator and Leads collaborate on development of standardized approaches to permit compliance. Permit deliverables, such as the Annual Report and SWMP Plan, are prepared by the Coordinator with support from the Leads.

- b. Implement; and within 2 years following the addition of a new Secondary Permittee, establish and implement:

 - i. Coordination mechanisms clarifying roles and responsibilities for the control of pollutants between physically interconnected MS4s of the Permittee and any other Permittee covered by a municipal stormwater permit.*
 - ii. Coordinating stormwater management activities for shared waterbodies, among Permittees and Secondary Permittees, as necessary to avoid conflicting plans, policies, and regulations.**

Permittees shall document their efforts to establish the required coordination mechanisms. Failure to effectively coordinate is not a permit violation provided other entities, whose actions the Permittee has no or limited control over, refuse to cooperate.

King County is instrumental in convening, supporting, and participating in numerous regional forums that develop and implement collaborative stormwater management programs. The breadth of the stormwater permits has inspired the creation of many regional groups focused on different aspects of stormwater management. King County plays an important role in the following forums:

- ≠ Stormwater Outreach for Regional Municipalities (STORM) is a regional coordination organization comprised of Phase I and Phase II Municipal NPDES permit holders whose purpose is to coordinate public education and outreach efforts related to stormwater pollution prevention. Ecology has awarded STORM several grants for public education and outreach related to stormwater. Using that funding, STORM built and launched Puget Sound Starts Here (www.pugetsoundstartshere.org) in 2009 and Don't Drip and Drive (<http://www.piercecountywa.org/index.aspx?NID=3339>) in 2012. STORM has an ongoing relationship with the Puget Sound Partnership (PSP) that focuses on coordinating shared outreach messages and complimentary outreach activities.
- ≠ Regional Operations And Maintenance Program (ROADMAP) is a regional coordination organization comprised of Phase I and Phase II municipal stormwater permit holders. Its purpose is to develop coordinated programs and tools to address operations and maintenance requirements. King County coordinates and facilitates ROADMAP meetings.
- ≠ The Regional Permit Coordinators Forum is a regional coordination organization comprised of Phase I and Phase II municipal stormwater permit holders whose purpose is to provide a forum to discuss permit- and stormwater-related issues and share information.
- ≠ The Phase I Permit Coordinators Group is a regional coordination organization comprised of Phase I municipal stormwater permit holders that have been meeting since before the issuance of the 1995 permit. The purpose of this group is to provide a forum to discuss permit- and stormwater-related issues concerning Phase I permit holders and to share current information.
- ≠ The Stormwater Managers Committee of the Washington State Chapter of the American Public Works Association (APWA) is a regional committee of stormwater professionals from both the public and private sector. This group has been an important partner in the region in addressing stormwater issues, developing local consensus on issues, and reporting out to regional agencies and governments. The APWA also provides a forum for the presentation of studies and new products.
- ≠ The Water Quality Partnership is a standing policy advisory committee on the State's water quality management functions. This committee is sponsored by Ecology and provides water quality professionals from both the public and private sector an opportunity to review information on Ecology programs presented by senior staff of Ecology. Subject matter includes budget, permits, regulations, state studies, and reports from other programs within Ecology. This group is often drawn upon to provide staffing for stakeholder groups.
- ≠ The Stormwater Work Group (SWG) was formed in 2008 to develop a coordinated stormwater monitoring program for the Puget Sound region. This

monitoring program is intended to provide the best scientific information needed to more effectively manage stormwater. The SWG convened at the request of Ecology and the PSP and is comprised of representatives from local, state, and federal governments, environmental and business organizations, tribes, and agriculture. The monitoring requirements in the 2013 Permit are based on recommendations from the SWG and differ substantially from monitoring requirements under previous permits.

- ≠ The Puget Sound Partnership was established by the state to highlight and focus recovery efforts for Puget Sound. King County contributes significant staff time and resources to the PSP by serving on multiple committees and groups within the PSP.
- ≠ The County also participates in the Salmon Recovery forums in Water Resource Inventory Areas (WRIAs) 7, 8 and 9, and 10. King County is the lead entity for WRIAs 8 and 9 and is the service provider to WRIA 8 and 9 staff as well as the Snoqualmie Forum (the King County portion of WRIA 7). In addition, King County is active in the collaborative planning and stormwater related improvements for the Miller, Walker, and Des Moines Creek basins.

The participation and relationships established within these groups form the basis for the timely coordination mechanisms and coordinated activities required by the Permit.

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.

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

- a. The Permittee shall implement a program to reduce pollutants in runoff from areas that discharge to MS4s owned or operated by the Permittee. The program shall include the following:*
- i. Application of operational and structural source control BMPs, and, if necessary, treatment BMPs/facilities to pollution generating sources associated with existing land uses and activities.*
 - ii. Inspections of pollutant generating sources at commercial and industrial properties to enforce implementation of required BMPs to control pollution discharging into MS4s owned or operated by the Permittee.*
 - iii. Application and enforcement of local ordinances at sites, identified pursuant to S5.C.7.b.ii, including sites with discharges authorized by a separate NPDES permit. Permittees that are in compliance with the terms of this permit will not be held liable by Ecology for water quality standard violations or receiving water impacts caused by industries and other Permittees covered, or which should be covered under an NPDES permit issued by Ecology.*
 - iv. Practices to reduce polluted runoff from the application of pesticides, herbicides, and fertilizer discharging into MS4s owned or operated by the Permittee.*

King County has had a stormwater source control program since 1995. Referred to as the Business Inspection Program, it identifies multifamily, commercial, and industrial sites that are potentially pollutant generating. On identified sites, it inspects both operational BMPs and onsite drainage facilities to ensure that the appropriate operational and structural source control BMPs are employed and properly maintained. If BMPs are lacking and/or inadequate, written notice is provided along with technical assistance, which details what must be done to achieve compliance. Failure to comply may trigger progressive enforcement. The authority to issue written notices and enforce their contents is found in KCC Chapter 9.12.

The County's SPPM, various King County websites, and King County public outreach efforts all encourage the elimination or reduction of pesticides, herbicides and fertilizers.

b. Minimum performance measures:

- i. Permittees shall enforce ordinance(s), or other enforceable documents, requiring the application of source control BMPs for pollutant generating sources associated with existing land uses and activities.*

Permittees shall update and make effective the ordinance(s), or other enforceable documents, as necessary to meet the requirements of this section no later than February 2, 2018.

The requirements of this subsection are met by using the source control BMPs in Volume IV of the Stormwater Management Manual for Western Washington, or a functionally equivalent manual approved by Ecology.

Operational source control BMPs shall be required for all pollutant generating sources. Structural source control BMPs shall be required for pollutant generating sources if operational source control BMPs do not prevent illicit discharges or violations of surface water, ground water, or sediment management standards because of inadequate stormwater controls. Implementation of source control requirements may be done through education and technical assistance programs, provided that formal enforcement authority is available to the Permittee and is used as determined necessary by the Permittee, in accordance with S5.C.7.b.iv, below.

King County uses KCC Chapter 9, KCC Chapter 23, and the SPPM to enforce the application of source control BMPs. The County adopted the SPPM in 1995, with updates occurring in 2005, 2009, and 2014 (currently under review by Ecology). The SPPM identifies potentially polluting activities at residential, commercial and industrial sites and the operational, structural, and/or treatment BMPs required to prevent pollutants from entering surface water, stormwater, and/or groundwater.

- ii. Permittees shall implement a program to identify commercial and industrial properties which have the potential to generate pollutants to the Permittee’s MS4. The program shall include a source control inventory which lists businesses and/or properties identified based on the presence of activities that are pollutant generating (refer to Appendix 8). The source control inventory shall also include other pollutant generating sources, such as mobile or home-based businesses and multifamily properties, which are identified based on complaint response. The Permittee shall update the inventory at least once every 5 years.*

SWSS developed an inventory of the land uses/businesses using the categories found in Appendix 8 of the Permit. King County has implemented an approach to develop the inventory list to meet this permit requirement. This approach is detailed in Appendix E.

King County uses a combination of historical inspection and complaint records, information available through the King County Department of Assessments, map review, and field inspections to determine potentially pollutant generating sites within unincorporated King County. Properties within the unincorporated area that are owned

by the County and have the potential to produce pollutants are included in this inventory. The inventory is updated annually. The inventory for 2015 contains approximately 2,200 sites.

- 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 435 stormwater pollution prevention inspections are planned for 2015, 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.

- iv. *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.

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.

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.*

King County addresses this MS4 field screening requirement through the implementation of a two-pronged, dual-agency Conveyance Screening Program (CSP). The CSP is comprised of the following programs designed to identify illicit connections and illicit discharges:

SWSS ODDS:

SWSS is conducting an Outfall, Discharge Point and Ditch Screening (ODDS) Program in years 2013-2018 to check known stormwater outfalls and other system connections for dry weather flow. On average, 12 percent of known, mapped stormwater outfalls and discharge points per year will be inspected for evidence of illicit connections/illicit discharges (IC/ID) under the ODDS program. Outfalls/discharge points 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 addition to observing and screening/sampling outfalls and discharge points, the ODDS Program will include some County stormwater conveyance ditches that do not have mapped connections to other stormwater features in the County's MS4. The idea being that isolated ditch segments may not connect to other portions of the County's MS4 and, therefore, would not necessarily be captured by screening focused on outfalls, discharge points, and catch basins. These segments will be assigned to field inspectors for IC/ID screening according to the same protocols developed for outfalls and discharge points.

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 12 percent of known, mapped 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 both the ODDS Program and the CBIMP have received and, as needed, will continue to receive comparable training to ensure consistency across the program elements.

(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.*

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>)

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

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.

- 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:*
- 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.*

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.

- 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 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.*

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.

- f. Each Permittee shall either participate in a regional emergency response program, or develop and implement procedures to investigate and respond to spills and improper disposal into the MS4 owned or operated by the Permittee.*

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

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

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.

King County 2014 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.”

The following are summaries of the nineteen illicit discharges/illicit connections documented by King County in 2014, as well as the actions taken to eliminate each illicit discharge. **Summary number 1 (Inglemoor High School) is for an illicit connection that was discovered in 2013 but was eliminated in 2014.** All Water Quality Complaints and Water Quality Audits have been resolved and closed, unless otherwise noted:

1. **Inglemoor High School (2013):** A piped illicit connection between the trash compactor and stormwater system was discovered in 2013 at Inglemoor High School.
2. **Mobile Home Park Laundry (01/13/14):** A piped illicit connection between a mobile home park laundry building washing machine area and the County’s municipal separate storm sewer (MS4) catch basin was found on January 13, 2014 during an Environmental Report Tracking System (ERTS) notification from the Washington State Department of Ecology. Stormwater Services (SWSS) staff responded to the notification by investigating, and identified the connection. This illicit connection was eliminated by property management re-routing the connection to the existing septic system. This re-connection was verified by SWSS staff on January 31, 2014.
3. **Motorhome Vehicle Fluids (2014):** Citizen reported in 2014 that oil and vehicle maintenance fluids were being discharged from a motorhome into a storm drain. This reported illicit discharge was addressed by Stormwater Services staff discussing correct BMPs with motorhome owner.
4. **Whitish Mystery Substance (2014):** A Water Quality Complaint called in by a citizen notified SWSS of a whitish substance in an MS4 catch basin in a residential area. SWSS staff investigated, and found a “varnish”-smelling substance in a few connected MS4 catch basins. SWSS contacted King County Roads maintenance staff and requested this discharge be addressed, as the MS4 here is in Roads’ jurisdiction. No source was found.
5. **Septic Water Discharge (03/15/14):** An illicit discharge of septic wastewater was found on March 15, 2014 by SWSS Mapping staff doing routine mapping tasks. The septic water was discharging down a hillside into the County MS4 catch basin. The malfunctioning septic system was repaired in July 2014.
6. **Vicafil Discharge (2014):** Vicafil (manufacturer brand name) lubricant for chain link fencing was reported and observed in 2014 to have discharged from Security Contractor Services property to the MS4 storm catch basins. Illicit discharge was addressed primarily by having property user implement better BMPs.
7. **Boise Creek Septic Discharge (06/04/14):** An illicit discharge of septic wastewater into an MS4 catch basin discharging to Boise Creek was found on June 4, 2014 by SWSS staff implementing FC TMDL bacteria source screening tasks for the Puyallup-White FC TMDL. The illicit discharge was immediately eliminated, and a new septic system was installed and approved in September 2014 as a long-term correction to this situation.

8. **Mixed Water and Paint Discharge (08/29/14):** An illicit discharge of about 10 gallons of mixed water and paint to the MS4 was reported to SWSS staff by water quality complaint on August 29, 2014. The impacted MS4 basins and pipes were satisfactorily pumped free of the discharge.
9. **Marina Washwater (10/10/14):** SWSS staff responded on October 10, 2014 to an ERTS call regarding boat washwater from a marina. SWSS staff provided education to marina managers and employees regarding proper management of boat washwater. Follow-up work is being conducted with the Washington State Department of Ecology and King County Wastewater Treatment Division.
10. **Septic/Washing Machine Water (11/06/14):** Illicit discharges of septic wastewater and washing machine water (two separate discharges from the same property) were confirmed on November 6, 2014 to be discharging into an MS4 ditch discharging to Boise Creek during TMDL bacteria source screening tasks for the Puyallup-White FC TMDL. Property owners have been notified by Public Health – Seattle & King County that these discharges must be immediately discontinued and that septic repairs are required. This Water Quality Complaint case is still open pending long-term resolution.
11. **Concrete Slurry (11/21/14):** Concrete slurry and granite rock cutting waste slurry was found in an MS4 catch basin adjacent to an active construction site on November 21, 2014. SWSS staff contacted the contractor responsible for this illicit discharge, who agreed to clean the CB of the slurry discharge. This case is still open pending resolution.
12. **Septic Wastewater from Hose (12/5/14):** A water quality complaint notified SWSS staff of an active illicit discharge of septic wastewater being pumped via a hose into the MS4 catch basin; staff immediately responded on December 5, 2014 and removed the pump and hose from the septic tank. Staff also educated the property tenants and owner that pumping septic tank waste into the stormwater system is unacceptable. Health was notified, as there are septic issues on the property, including too many people using the plumbing, as well as septic system maintenance issues. This case is still open pending septic system repair.
13. **Landmark Fuel Farm Spill (06/03/14):** At approximately 10:29 PM, Operations received a call from Landmark line service personnel regarding a spill at the North Fuel Farm. Approximately 20 gallons of fuel spilled. Landmark truck was refueling and he estimated that he needed 9600 gal of fuel and when it reached 9200 gal it vented and he ceased operations. Operations advised Maintenance to shut off North Pump House to prevent offsite spill to the Lower Duwamish Waterway (LDW). Downstream catch basins and oil water separators were inspected to determine extent of spill migration. From 11:40 PM to 12:08 AM, cleaning contractor on scene to complete cleanup of affected drains. No discharges to the LDW. On 12:15 AM, KCIA reported spill to Ecology (#14-1987).
14. **Landmark Ramp Hangar 4S (06/05/14):** At approximately 10:25 PM, Operations received a call from Ameriflight personnel regarding a spill at the Landmark ramp at Hangar 4S. Operations advised Maintenance to shut off North Pump House to prevent offsite spill to the Lower Duwamish Waterway (LDW). Fuel in the aircraft transferred from the left wing to the right and was venting out. Approximately 30 gallons had spilled into the catch basin, another 5-7 gallons on the pavement surrounding the drain. From 11:56 PM to 12:30 AM, cleaning contractor on scene to complete cleanup of affected drains. No discharges to the LDW. On 12:50 AM, KCIA reported spill to Ecology (#14-2027).

15. **Landmark Fuel Farm Spill (06/15/14):** At approximately 7:25 PM, Operations was notified by Aircraft Rescue and Firefighting (ARFF) of an active fuel spill (fuel truck) at the North Fuel Farm. Command advised that Landmark estimated that 10 gallons of fuel had been spilled and drains had been affected. On 8:23 PM, cleaning contractor onsite to clean catch basins. No discharges to the LDW. On 8:25 PM, KCIA reported spill to Ecology.
16. **Clay Lacy Fuel Farm Spill (07/31/14):** At approximately 10:28 AM, Operations was advised by ARFF that they were responding to a fuel spill at the Clay Lacy fuel farm. It was determined that 20+ gallon fuel spill went into the storm drain. From 11:18 AM to 11:50 AM, cleaning contractor began and completed cleanup process. KCIA reported spill to Ecology (#650496). Fuel truck that caused the spill was taken out of service.
17. **Aeroflight Fuel Spill (10/17/14):** At approximately 3:25 AM, Operations was advised by ARFF of a fuel spill at the Aeroflight ramp. There was 30-40 gallons of fuel spilled with an unknown amount that entered the drain. The spill was currently contained with kitty litter and a drain cover. Operations advised shut off North Pump House to prevent offsite spill to the LDW. From 4:50 AM to 6:20 AM, cleaning contractor began and completed catch basin and ramp cleanup process. On 5:40 AM, KCIA reported spill to Ecology (#14-4070).
18. **Landmark Executive Ramp Fuel Spill (11/05/14):** At approximately 8:50 AM, Operations was notified by ARFF of a fuel spill just north of Landmark's executive ramp to perform joint spill response. About 5-10 gallons of Jet fuel spilled onto the ramp. Landmark used absorbent pads and kitty litter to contain the spill. Operations advised shut off North Pump House to prevent offsite spill to the LDW. From 10:26 AM to 11:30 AM, cleaning contractor began and completed catch basin and ramp cleanup process. On 10:26 AM, KCIA reported spill to Ecology (#652721).
19. **Landmark Fuel Farm Spill (11/12/14):** At approximately 12:10 AM, Operations received a call from Landmark personnel regarding a fuel spill at the North Fuel Farm. It was estimated that 3-5 gallons may have entered a catch basin. From 1:09 AM to 1:30 AM, cleaning contractor began and completed catch basin cleanup process. On 12:20 AM, KCIA reported spill to Ecology (#14-4457). Fuel truck that caused the spill was taken out of service.
20. **Pump Station Overflow (10/25/14):** A sanitary overflow into Kirkland MS4 as a result of a shutdown of the KC Kirkland pump station by a power outage. During an 83 minute period before manual restart, 105,000 gallons of wastewater overflowed into the storm drain and was released into Lake Washington. During a high wind event that caused widespread power outages throughout the Seattle area, power bumps caused the KC sewage pump station to lose power. The controller failed and the backup controller did not automatically bring the pumps back on. KC is investigating the reasons for this event and the station will now automatically switch to generator power when any pump power irregularity is identified.

- 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.

2.1.9 Operations and Maintenance Program – S5.C.9

Each Permittee shall implement a program to regulate maintenance activities and to conduct maintenance activities by the Permittee to prevent or reduce stormwater impacts.

Minimum performance measures:

- a. Maintenance Standards. Each Permittee shall implement maintenance standards that are as protective, or more protective, of facility function than those specified in Chapter 4 of Volume V of the Stormwater Management Manual for Western Washington. For facilities which do not have maintenance standards, the Permittee shall develop a maintenance standard. No later than June 30, 2015 each Permittee shall update their maintenance standards as necessary to meet the requirements in this section.*
 - i. The purpose of the maintenance standard is to determine if maintenance is required. The maintenance standard is not a measure of the facility's required condition at all times between inspections. Exceeding the maintenance standard between inspections and/or maintenance is not a permit violation.*
 - ii. Unless there are circumstances beyond the Permittee's control, when an inspection identifies an exceedance of the maintenance standard, maintenance shall be performed:

 - (1) Within 1 year for typical maintenance of facilities, except catch basins.*
 - (2) Within 6 months for catch basins.*
 - (3) Within 2 years for maintenance that requires capital construction of less than \$25,000.**

Circumstances beyond the Permittee's control include denial or delay of access by property owners, denial or delay of necessary permit approvals, and unexpected reallocations of maintenance staff to perform emergency work. For each exceedance of the required timeframe, the Permittee shall document the circumstances and how they were beyond the Permittee's control.

The 2009 SWDM sets forth the maintenance standards for stormwater facilities in King County per KCC 9.04. King County published its first SWDM in 1990 and revisions and updates have occurred since then as new facility features are developed or standards change. To comply with S5.C.9.a, King County is currently in the process of updating the SWDM and related codes to include maintenance standards for LID BMPs. A draft version has been submitted to Ecology and the County anticipates submitting the revised SWDM and enabling codes to the Metropolitan King County Council in the 2nd quarter of 2015.

Maintenance of stormwater treatment and flow control BMPs/facilities (facilities) is typically initiated by one of the following inspections:

- ≠ Inspections of facilities regulated by King County are conducted according to the description under S5.C.9.b, below.

- ≠ Inspections of facilities owned or operated by King County are conducted according to the description under S5.C.9.c, below.
- ≠ Privately owned facilities are inspected every other year by King County. In alternating years, King County requires facility owners to conduct self-certified inspections.

When any of the inspections referenced above identify an exceedance of a function-critical maintenance standard requiring typical maintenance, that maintenance is conducted within the one year timeline allowed by the Permit. If the maintenance is more substantial and requires capital funds, up to \$25,000, the facility is added to the Facility Remediation Program and the maintenance is completed within the two-year timeline allowed by the Permit.

Catch basins owned or operated by King County are inspected according to the description under S5.C.9.d, below. When a catch basin inspection identifies an exceedance of a function-critical maintenance standard, (i.e. one that has the potential to negatively impact water quality), that maintenance is conducted within the six-month timeline allowed by the Permit.

As development and redevelopment projects add increasing numbers of LID BMPs to the County's stormwater infrastructure inventory, King County will be responsible for inspecting and/or maintaining more and more non-traditional stormwater controls. LID is relatively new and knowledge of effective maintenance practices is limited, which means that the County will have to adaptively manage its approach to inspection and maintenance of LID BMPs. This will likely require development of new maintenance techniques, potentially with new types of equipment, and training of County personnel involved in this body of work.

- 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.

- 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.

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. 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 Stormwater Pollution Prevention Plan.

KCIA also conducts these activities in compliance with its ISGP requirements and in accordance with its Stormwater Pollution Prevention Plan (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.

- e. Each Permittee shall implement practices, policies, and procedures to reduce stormwater impacts associated with runoff from all lands owned or maintained by the Permittee, and road maintenance activities under the functional control of the Permittee. Lands owned or maintained by the Permittee include, but are not limited to: parking lots, streets, roads, highways, buildings, parks, open space, road ROW, maintenance yards, and stormwater treatment and flow control BMPs/facilities.*

The following activities shall be addressed:

- i. Pipe cleaning*
- ii. Cleaning of culverts that convey stormwater in ditch systems*
- iii. Ditch maintenance*
- iv. Street cleaning*
- v. Road repair and resurfacing, including pavement grinding*
- vi. Snow and ice control*
- vii. Utility installation*
- viii. Maintaining roadside areas, including vegetation management*
- ix. Dust control*
- x. Pavement striping maintenance*
- xi. Application of fertilizers, pesticides, and herbicides according to the instructions for their use, including reducing nutrients and pesticides using alternatives that minimize environmental impacts*
- xii. Sediment and erosion control*
- xiii. Landscape maintenance and vegetation disposal*
- xiv. Trash and pet waste management*
- xv. Building exterior cleaning and maintenance*

The County has several programs that establish practices to reduce stormwater impacts associated with runoff from parking lots, streets, roads, and highways owned, maintained or operated by the County. Custodial agencies are responsible for developing an inventory of their properties, and developing and implementing an inspection and maintenance program. The inspection programs for most custodial agencies are based on a tiered program using metrics such as the presence of structures, potential pollution generating activities, public access, property size, and proximity of water bodies to prioritize the risk of pollution impacts for each site. These inspections range from single to multiyear frequencies depending on the level of risk.

In 2009, SWSS produced a draft document that consolidated the operations and maintenance BMPs from numerous King County program documents. These BMPs are designed to reduce stormwater impacts associated with operations and maintenance activities referred to in S5.C.9.e. Called the SIMPLA (Site Management Plan), this document includes sections of the following:

- C. the Regional Road Maintenance Endangered Species Act (ESA) Program Guidelines,
- D. the draft King County Department of Transportation Performance Standards,
- E. the SWDM,
- F. the SPPM, and
- G. the King County Integrated Pest Management Program guidelines.

The SIMPLA has been issued to the County's custodial agencies to be used as the minimum standard for operations and maintenance of properties owned or maintained by King County. In 2012, an updated, revised, and reformatted version of the SIMPLA was completed and distributed not only within King County but amongst other Phase I and Phase II municipalities in the region for their use/reference. In addition, a dedicated SIMPLA website was developed to allow for easy navigation and access to the document and its contents

(<http://www.kingcounty.gov/environment/waterandland/stormwater/documents/site-management-plan.aspx>).

Several agencies have internal manuals and programs that are as, or more, protective of stormwater quality than the baseline requirements found in the SIMPLA and may be used by those agencies as equivalent programs. Additionally, King County properties under NPDES industrial stormwater permits have SWPPPs. These SWPPPs will be used instead of the SIMPLA.

- f. Implement an ongoing training program for employees of the Permittee who have primary construction, operations or maintenance job functions that may impact stormwater quality. The training program shall address the importance of protecting water quality, operation and maintenance standards, inspection procedures, selecting appropriate BMPs, ways to perform their job activities to prevent or minimize impacts to water quality, and procedures for reporting water quality concerns. 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 the staff trained.*

King County offers a number of training programs within various agencies for personnel in positions that have construction or operations and maintenance job functions that could impact stormwater quality.

King County Roads has conducted annual in-house training of all field staff and appropriate support staff since 2002. The training is tailored specifically for Roads operations and maintenance staff and addresses stormwater pollution prevention, spill response, and aquifer protection, among other subjects. In addition, Roads field crews participate in the Regional Road Maintenance ESA Program training series (Track 1, 2 &

3). This training focuses on BMP practices and uses, maintenance guidelines, design criteria, and habitat requirements.

FMD has established a training program that focuses on general stormwater awareness, IC/IDDE and basic spill response for all the trades and janitorial staff. Trades that perform operations and maintenance work on building exteriors and grounds also receive training on the use of the SIMPLA.

Select positions across several agencies require CESCL training. This training is available in-house (Ecology-approved) or through qualified vendors.

SWSS conducts an ongoing review of County programs to identify activities and positions whose operations and maintenance activities could impact stormwater quality. 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.

g. Implement a SWPPP for all heavy equipment maintenance or storage yards, and material storage facilities owned or operated by the Permittee in areas subject to this permit that are not required to have coverage under the General NPDES Permit for Stormwater Discharges Associated with Industrial Activities or another NPDES permit that authorizes stormwater discharges associated with the activity. A schedule for implementation of structural BMPs shall be included in the SWPPP. Generic SWPPPs that can be applied at multiple sites may be used to comply with this requirement. The SWPPP shall include periodic visual observation of discharges from the facility to evaluate the effectiveness of BMPs.

Under the previous permits, King County reviewed an inventory of all known County-owned properties subject to this permit condition. Properties that had existing SWPPPs continued to implement them. New SWPPPs were developed and implemented for properties that did not already have SWPPPs. All SWPPP-covered properties continue to implement appropriate BMPs under the Permit.

As King County acquires or becomes aware of additional properties subject to this Permit condition, new SWPPPs will be developed and implemented.

h. Maintain records of inspections and maintenance or repair activities conducted by the Permittee.

Stormwater-related inspection and maintenance programs exist in several King County agencies, each with their own record-keeping systems. All agencies conducting inspections or maintenance activities germane to the Permit track those actions and maintain those records for a period of no less than five years.

2.1.9 Operations and Maintenance Program – S5.C.9

Each Permittee shall implement a program to regulate maintenance activities and to conduct maintenance activities by the Permittee to prevent or reduce stormwater impacts.

Minimum performance measures:

- a. Maintenance Standards. Each Permittee shall implement maintenance standards that are as protective, or more protective, of facility function than those specified in Chapter 4 of Volume V of the Stormwater Management Manual for Western Washington. For facilities which do not have maintenance standards, the Permittee shall develop a maintenance standard. No later than June 30, 2015 each Permittee shall update their maintenance standards as necessary to meet the requirements in this section.*
 - i. The purpose of the maintenance standard is to determine if maintenance is required. The maintenance standard is not a measure of the facility's required condition at all times between inspections. Exceeding the maintenance standard between inspections and/or maintenance is not a permit violation.*
 - ii. Unless there are circumstances beyond the Permittee's control, when an inspection identifies an exceedance of the maintenance standard, maintenance shall be performed:

 - (1) Within 1 year for typical maintenance of facilities, except catch basins.*
 - (2) Within 6 months for catch basins.*
 - (3) Within 2 years for maintenance that requires capital construction of less than \$25,000.**

Circumstances beyond the Permittee's control include denial or delay of access by property owners, denial or delay of necessary permit approvals, and unexpected reallocations of maintenance staff to perform emergency work. For each exceedance of the required timeframe, the Permittee shall document the circumstances and how they were beyond the Permittee's control.

The 2009 SWDM sets forth the maintenance standards for stormwater facilities in King County per KCC 9.04. King County published its first SWDM in 1990 and revisions and updates have occurred since then as new facility features are developed or standards change. To comply with S5.C.9.a, King County is currently in the process of updating the SWDM and related codes to include maintenance standards for LID BMPs. A draft version has been submitted to Ecology and the County anticipates submitting the revised SWDM and enabling codes to the Metropolitan King County Council in the 2nd quarter of 2015.

Maintenance of stormwater treatment and flow control BMPs/facilities (facilities) is typically initiated by one of the following inspections:

- ≠ Inspections of facilities regulated by King County are conducted according to the description under S5.C.9.b, below.

- ≠ Inspections of facilities owned or operated by King County are conducted according to the description under S5.C.9.c, below.
- ≠ Privately owned facilities are inspected every other year by King County. In alternating years, King County requires facility owners to conduct self-certified inspections.

When any of the inspections referenced above identify an exceedance of a function-critical maintenance standard requiring typical maintenance, that maintenance is conducted within the one year timeline allowed by the Permit. If the maintenance is more substantial and requires capital funds, up to \$25,000, the facility is added to the Facility Remediation Program and the maintenance is completed within the two-year timeline allowed by the Permit.

Catch basins owned or operated by King County are inspected according to the description under S5.C.9.d, below. When a catch basin inspection identifies an exceedance of a function-critical maintenance standard, (i.e. one that has the potential to negatively impact water quality), that maintenance is conducted within the six-month timeline allowed by the Permit.

As development and redevelopment projects add increasing numbers of LID BMPs to the County's stormwater infrastructure inventory, King County will be responsible for inspecting and/or maintaining more and more non-traditional stormwater controls. LID is relatively new and knowledge of effective maintenance practices is limited, which means that the County will have to adaptively manage its approach to inspection and maintenance of LID BMPs. This will likely require development of new maintenance techniques, potentially with new types of equipment, and training of County personnel involved in this body of work.

- 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.

- 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.

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. 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 Stormwater Pollution Prevention Plan.

KCIA also conducts these activities in compliance with its ISGP requirements and in accordance with its Stormwater Pollution Prevention Plan (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.

- e. Each Permittee shall implement practices, policies, and procedures to reduce stormwater impacts associated with runoff from all lands owned or maintained by the Permittee, and road maintenance activities under the functional control of the Permittee. Lands owned or maintained by the Permittee include, but are not limited to: parking lots, streets, roads, highways, buildings, parks, open space, road ROW, maintenance yards, and stormwater treatment and flow control BMPs/facilities.*

The following activities shall be addressed:

- i. Pipe cleaning*
- ii. Cleaning of culverts that convey stormwater in ditch systems*
- iii. Ditch maintenance*
- iv. Street cleaning*
- v. Road repair and resurfacing, including pavement grinding*
- vi. Snow and ice control*
- vii. Utility installation*
- viii. Maintaining roadside areas, including vegetation management*
- ix. Dust control*
- x. Pavement striping maintenance*
- xi. Application of fertilizers, pesticides, and herbicides according to the instructions for their use, including reducing nutrients and pesticides using alternatives that minimize environmental impacts*
- xii. Sediment and erosion control*
- xiii. Landscape maintenance and vegetation disposal*
- xiv. Trash and pet waste management*
- xv. Building exterior cleaning and maintenance*

The County has several programs that establish practices to reduce stormwater impacts associated with runoff from parking lots, streets, roads, and highways owned, maintained or operated by the County. Custodial agencies are responsible for developing an inventory of their properties, and developing and implementing an inspection and maintenance program. The inspection programs for most custodial agencies are based on a tiered program using metrics such as the presence of structures, potential pollution generating activities, public access, property size, and proximity of water bodies to prioritize the risk of pollution impacts for each site. These inspections range from single to multiyear frequencies depending on the level of risk.

In 2009, SWSS produced a draft document that consolidated the operations and maintenance BMPs from numerous King County program documents. These BMPs are designed to reduce stormwater impacts associated with operations and maintenance activities referred to in S5.C.9.e. Called the SIMPLA (Site Management Plan), this document includes sections of the following:

- C. the Regional Road Maintenance Endangered Species Act (ESA) Program Guidelines,
- D. the draft King County Department of Transportation Performance Standards,
- E. the SWDM,
- F. the SPPM, and
- G. the King County Integrated Pest Management Program guidelines.

The SIMPLA has been issued to the County's custodial agencies to be used as the minimum standard for operations and maintenance of properties owned or maintained by King County. In 2012, an updated, revised, and reformatted version of the SIMPLA was completed and distributed not only within King County but amongst other Phase I and Phase II municipalities in the region for their use/reference. In addition, a dedicated SIMPLA website was developed to allow for easy navigation and access to the document and its contents

(<http://www.kingcounty.gov/environment/waterandland/stormwater/documents/site-management-plan.aspx>).

Several agencies have internal manuals and programs that are as, or more, protective of stormwater quality than the baseline requirements found in the SIMPLA and may be used by those agencies as equivalent programs. Additionally, King County properties under NPDES industrial stormwater permits have SWPPPs. These SWPPPs will be used instead of the SIMPLA.

- f. Implement an ongoing training program for employees of the Permittee who have primary construction, operations or maintenance job functions that may impact stormwater quality. The training program shall address the importance of protecting water quality, operation and maintenance standards, inspection procedures, selecting appropriate BMPs, ways to perform their job activities to prevent or minimize impacts to water quality, and procedures for reporting water quality concerns. 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 the staff trained.*

King County offers a number of training programs within various agencies for personnel in positions that have construction or operations and maintenance job functions that could impact stormwater quality.

King County Roads has conducted annual in-house training of all field staff and appropriate support staff since 2002. The training is tailored specifically for Roads operations and maintenance staff and addresses stormwater pollution prevention, spill response, and aquifer protection, among other subjects. In addition, Roads field crews participate in the Regional Road Maintenance ESA Program training series (Track 1, 2 &

3). This training focuses on BMP practices and uses, maintenance guidelines, design criteria, and habitat requirements.

FMD has established a training program that focuses on general stormwater awareness, IC/IDDE and basic spill response for all the trades and janitorial staff. Trades that perform operations and maintenance work on building exteriors and grounds also receive training on the use of the SIMPLA.

Select positions across several agencies require CESCL training. This training is available in-house (Ecology-approved) or through qualified vendors.

SWSS conducts an ongoing review of County programs to identify activities and positions whose operations and maintenance activities could impact stormwater quality. 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.

g. Implement a SWPPP for all heavy equipment maintenance or storage yards, and material storage facilities owned or operated by the Permittee in areas subject to this permit that are not required to have coverage under the General NPDES Permit for Stormwater Discharges Associated with Industrial Activities or another NPDES permit that authorizes stormwater discharges associated with the activity. A schedule for implementation of structural BMPs shall be included in the SWPPP. Generic SWPPPs that can be applied at multiple sites may be used to comply with this requirement. The SWPPP shall include periodic visual observation of discharges from the facility to evaluate the effectiveness of BMPs.

Under the previous permits, King County reviewed an inventory of all known County-owned properties subject to this permit condition. Properties that had existing SWPPPs continued to implement them. New SWPPPs were developed and implemented for properties that did not already have SWPPPs. All SWPPP-covered properties continue to implement appropriate BMPs under the Permit.

As King County acquires or becomes aware of additional properties subject to this Permit condition, new SWPPPs will be developed and implemented.

h. Maintain records of inspections and maintenance or repair activities conducted by the Permittee.

Stormwater-related inspection and maintenance programs exist in several King County agencies, each with their own record-keeping systems. All agencies conducting inspections or maintenance activities germane to the Permit track those actions and maintain those records for a period of no less than five years.

King County Stormwater Services

Bear-Evans Creek FC TMDL Program 2014

Program Description

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 2014.

In 2014 King County Stormwater Services (SWSS) staff began preparatory tasks for fecal coliform total maximum daily load (FC TMDL) bacteria source screening. Tasks began to be conducted for both the Bear and Evans Creek basins as required by the NPDES permit. Applicable regulatory requirements from the Permit are included below. A narrative of task descriptions is provided in this document. Maps for informative purposes are also 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, Appendix 2).

Introduction: Bear Creek and Evans Creek basins are fairly large. Prior to implementing actual bacteria source screening work, such as in-situ field screening and sampling for bacterial analysis, it was determined that more upfront conceptualizing, planning and budgeting would be needed for these large basins, to better use staff time and other resources. This document provides narrative of this work so far.

Task Description Narrative: Work began on the Bear-Evans FC TMDL in October 2014. The following tasks were in the planning, implementing or completion stages in October-December 2014. Tasks are the responsibility of King County Stormwater Services (SWSS) staff.

1. Accurately delineated MS4 basin boundaries for Bear Creek and Evans Creek.
Information sources for both basins included:

- a. King County's GIS layers for topography and hydrology;
- b. King County's Road Map Vault, accessible online;
- c. King County SWSS drainage facility paper files, stored in 6th floor KSC file room.

It is noted that boundaries for the Bear Creek MS4 basin drainage do not exactly correspond with the basin's natural surface flow topographic boundaries. This is because some stormwater drainage facilities flow, as well as some flow from the built environment (sub-divisions, commercial parcels), cross topographic boundaries. The intent of this MS4 basin boundary delineation work was to capture basin topography and hydrology accurately as well as to identify MS4 systems discharging to Bear and Evans Creeks.

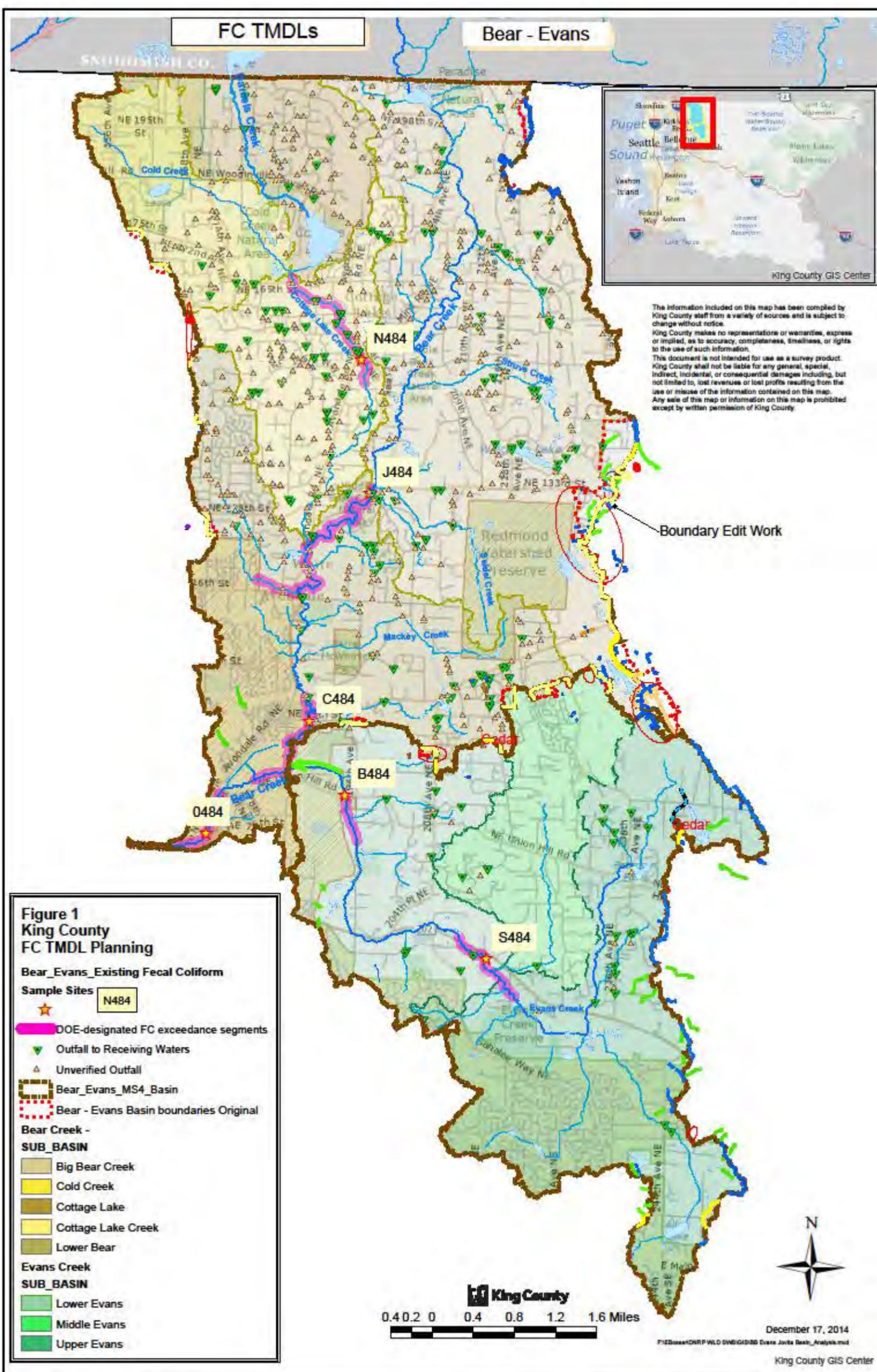
Figure 1 shows the Bear and Evans Creek MS4 subbasins and relevant information so far, including "boundary editing work" done so far.

2. Identified and accurately portrayed relevant natural drainage hydrologic centerlines including mainstems of Bear and Evans creeks and all their tributary streams.
3. Defined and delineated "MS4 subbasins" (Figure 1) within both Bear and Evans Creek basins. Concept of "MS4 subbasin" was used because not all currently mapped outfalls have been field verified as meeting the Permit definition, nor have the stormwater MS4 networks discharging to all outfalls been mapped for connectivity. Such MS4 networks would be ideal "MS4 subbasin", but delineating these is not possible with the current status of MS4 map information.
4. In the process of creating usable field maps for various bacteria source screening tasks; format is ArcGIS.
5. In the process of coordinating with SWSS Mapping staff to update the stormwater conveyance system in the MS4 basins as delineated above.
6. In the process of identifying "real" MS4 outfalls from currently mapped, unverified "outfalls" on SWSS maps, to the best extent possible. Information source to include current stormwater map database. "Real" outfalls will flow directly to Bear Creek, Evans Creeks, and their tributaries.
7. In the process of conducting connectivity gap analysis, including possibly identifying stormwater drainage facilities in both basins, as needed, to check for relevant downstream flow information that may be needed to fill gaps in conveyance flow. Downstream flow

details can be obtained from drainage facility paper file Technical Information Reports (TIRs).

8. Plan to identify any parcels that are served by sanitary sewage systems, as well as any sanitary sewer mains in the basins. The remaining developed parcels will be assumed to be served by onsite sewage systems (septic systems). Additionally, plan to identify “aging” septic systems whose installation pre-date 1970; the rationale for this is that older systems may have a higher probability of failure. Will determine how to manipulate this information, combined with other basin information, for meaningfully targeting areas for bacteria source screening.
9. In the process of gathering and assessing existing available water quality analytical results in Bear and Evans Creeks to inform and focus bacteria source screening efforts. Existing sampling stations with fecal coliform data are shown in Figure 1.
10. Initiating desktop GIS analysis to help identify potential areas of high bacterial discharge to the MS4 and to the creeks: areas could include animal access areas to surface waters, including the creek and private ditches; animal confinement areas such as fenced paddocks; barns and farm outbuildings; and anomalously colored patches of grass, considered to be possible failing septic systems.
11. Plan to perform field work including bacteria source screening (also known as IC/ID screening) in 2015 in 100% of the MS4 subbasins, over and above the required 50% of the above MS4 subbasin screening required by the Permit (see 3. Above for more discussion of “MS4 subbasin” concept). Screening work will be conducted similarly to bacteria source screening described for the Puyallup-White Watershed (Boise and Jovita Creek MS4 basin work plans).
12. Will ascertain if there are any County owned and operated parks and other properties reasonably expected to have substantial dog and horse use with the potential to pollute stormwater, and if so, begin work on installing and maintaining animal waste education and/or collection stations at these locations.

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



King County Stormwater Services
Puyallup-White River FC TMDL Program 2014
Program Description and Findings

Executive Summary

This document and corresponding data tables fulfill 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 2014.

King County Stormwater Services (SWSS) staff conducted fecal coliform total maximum daily load (FC TMDL) bacteria source screening in both the Boise and Jovita Creek basins as required by the NPDES permit. Work plans and findings specific to each basin are described in this report. As of this report date, three separate illicit discharges (IDs) have been identified in 2014 discharging to the County's municipal separate storm sewer system (MS4) in the Boise Creek basin.

One of the three IDs in the Boise Creek MS4 was confirmed in June 2014. It was a residential septic system piped directly into an MS4 catch basin. This ID was immediately eliminated, and a new septic system was quickly installed by the private property owner that replaced the previously failing septic system. The new septic system was approved by Department of Public Health-Seattle & King County (DPHSC) in September 2014.

Two other IDs were confirmed on another Boise Creek area parcel in November 2014. One ID is connected to the residence's failing septic system, and the second ID is connected to a washing machine in a separate outbuilding on the same parcel. Follow-up actions are being implemented by Public Health-Seattle & King County to correct these two IDs.

At the time of this writing, no IDs or other suspect high bacteria sources have been identified in the Jovita Creek MS4 basin area.

An interesting observation noted in this FC TMDL work is that the use of molecular qPCR-based human-specific *Bacteroides* analyses has been useful in confirming sewage IDs to the County MS4 in Boise Creek. Another observation is that in-situ field ammonium ion readings correlated with *E. coli* results. Moreover, very highly elevated ammonium ion readings correlated with the illicit sewage discharges in the Boise Creek MS4.

Continued bacteria source screening work will be implemented in 2015 in Boise and Jovita Creek MS4s, as described in this report. Specific programmatic tasks may be added and/or tasks described in this report may be dropped, both to more effectively and efficiently achieve program goals.

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Introduction

This document describes planning, implementation and findings for bacteria source screening in Boise Creek, and illicit discharge detection and elimination work in Jovita Creek. King County Stormwater Services (SWSS) staff implemented 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. Analytical results and field findings are summarized in Table 1 and Table 2 Excel files submitted concurrently to Ecology.

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.

Field and Laboratory Methods

Simple illicit discharge detection screening techniques were employed at screening and sampling locations, including looking for the following evidence: non-natural flows during both wet (saturated soils) and dry (unsaturated soils) weather periods; stressed or overly luxurious vegetation; staining in stormwater ditches or pipes; and flows with visual cues of contamination, such as cloudiness or discoloration, or odors, such as that of septic waste.

The second screening technique was using a Hydrolab MS5 water quality sonde equipped with ammonium ion, nitrate ion, pH, specific conductivity and temperature probes. This measured these parameters in-situ in the field. The rationale for using this sonde was to seek for anomalous readings that could indicate illicit discharges. The Hydrolab screening technique was employed most of the field work days.

The third screening method was using the Coliscan Easygel kit. In this method, samples were obtained for *Escherichia coli* (*E. coli*) culturing, to help identify sources discharging high bacteria levels to the MS4. The Coliscan technique is not a lab analysis but rather a commercially available, proprietary, preliminary screening method that can be performed by any staff trained in the technique. Coliscan culture tests were run at SWSS's building, in a workroom separate from the general office work area.

Based on screening results, lab analyses were used to gain additional information to seek potential high bacteria sources to the MS4. Lab analyses included conventional culture methods for fecal coliform (FC) and *E. coli*. Lab analyses included molecular (DNA) qPCR-based methods for assessing human waste-specific *Bacteroides* and ruminant waste-specific *Bacteroidales*. These molecular qPCR methods were deployed with the goal of differentiating between human waste streams (failing septic systems) and animal waste streams. Various ruminant *Bacteroidales* tests were used with the goal of differentiating between waste streams from wild versus domesticated ruminants such as cows and beef cattle.

Sampling techniques adhered to those previously established in King County's IDDE Sampling and Analysis Plan (SAP), which is based on accepted sampling protocols.

Project Trigger Levels for Bacteria and Nutrient Ions

FC and *E. coli*: A project trigger level of 300 cfu/100 ml for FC and *E. coli* bacteria was used for purposes of prioritizing locations for follow-up investigation work. This trigger level was not based on regulatory levels. It was selected solely to choose sample locations on which to expend more time and resources in the search for high bacterial sources.

Human-specific *Bacteroides* and ruminant-specific *Bacteroidales*: Project trigger levels for these were not firmly established. Relatively high values were regarded as indicating presence of human waste (*Bacteroides*) or ruminant waste (*Bacteroidales*). Very low to null values of these were taken to indicate little to no possibility of human or ruminant waste contributions.

In-situ ammonium ion and nitrate ion field readings: Project trigger levels were not set, but readings were used in conjunction with other findings. Relatively high values of ammonium ion readings were regarded as possible to likely indicators of human or possibly animal waste (urine).

Field Staff

Field reconnaissance, in-situ field screening and sampling was conducted by two-person field teams consisting of SWSS field staff, or one SWSS field person and one Science & Technical Support scientist. These teams performed all field tasks.

Field Screening Techniques

Field teams were equipped with and trained in the use of the following equipment:

- Hydrolab MS5, equipped with probes for in-situ field readings of ammonium ion, nitrate ion, temperature, pH and specific conductivity. The Hydrolab was calibrated weekly.
- Coliscan Easygel equipment and supplies. Equipment included pipette, disposable pipette tips, nutrient bottles and cooler with chilled blue ice for transport back to SWSS office.

- Sterile bottles for obtaining samples for bacterial analyses by King County Environmental Lab (KCEL) and Source Molecular (private lab).
- Coolers with chilled blue ice for transporting samples to the laboratory for analysis.
- Catch basin lid pullers and hammers for knocking jammed lids open.
- Catch basin bolt tools.
- Personal protective equipment, including high-visibility traffic safety vests, nitrile sampling gloves, work boots, rain gear and hard hats.
- Traffic cones.

BOISE CREEK FC TMDL PROGRAM DESCRIPTION & FINDINGS

Desktop Analyses

In late 2013 and through 2014, office analytical work began to be conducted for the Boise Creek basin. Preliminary steps included the following:

- Basin boundaries were delineated for Boise Creek from existing GIS information. Information sources for both included King County's GIS basin boundaries, topography and hydrology.
- Stormwater outfall and discharge point locations from SWSS maps.
- Stormwater drainage facilities in King County's inventory were identified in Jovita basin.
- Natural drainage hydrologic centerlines (streams, creeks, tributaries, rivers) from GIS maps.
- Streets from County GIS.
- Parcels from County GIS.
- Areas in Boise Creek that could be sources of high bacteria discharges to the MS4 or directly to Boise Creek were identified in a desktop GIS analysis. Areas identified included potential animal access areas to surface waters, including the creek and private ditches; animal confinement areas such as fenced paddocks; barns and farm outbuildings; and anomalously green patches of grass, considered to be possible failing septic systems.
- Water quality analytical results in Boise Creek, previously obtained by King County Science and Technical Support.

Investigation Site Selection

Field staff performed field reconnaissance (recon) in Boise MS4 basins to perform the following:

- Confirm MS4 outfalls to Boise Creek, previously identified by SWSS.
- Locate MS4 outfalls to the creek not previously identified by SWSS.
- Locate other points, including private discharges into the MS4.
- Observe land use practices in the vicinity of the MS4 that could discharge turbid water via sheet flows into the County MS4.

From the above outfalls and points, water quality screening and sampling points were established by assigning locator names and mapping them in ArcMAP.

Field Investigation Tasks and Findings

The following field recon and bacteria source screening and sampling tasks were performed in unincorporated King County's MS4 discharging to Boise Creek. Recon and in-situ screening analyses began on March 12, 2014 and continued through June 2014, whereupon on June 18, 2014 samples for lab analysis began to be obtained. Lab analyses included FC, *E. coli* and *Bacteroides* and *Bacteroidales*. Rationales for specific lab tests chosen are included in the following narrative of screening and sampling work.

All field and lab results are presented in Table 1, which was submitted as a separate Excel file concurrently with this document. The following narrative organized by calendar day describes field work and findings.

March 12, 2014: Field recon was initiated using known outfalls as the preliminary basis for selecting and establishing bacteria source screening and sampling locations. Sample locations Boise101 through Boise115 were established in MS4 outfall and private inlet points into the MS4; Table 1 presents information on all sample locations. In Table 1, King County Environmental Lab locator names are denoted with “BSE_1XX”, while in this narrative samples are denoted “Boise1XX”. Flowing water at these locations was screened using the Hydrolab. Samples were also simultaneously obtained for rapid Coliscan *E.coli* testing at County offices.

The following sample location had an *E. coli* level above the project bacteria trigger level of 300 cfu/100ml. Other sample locations did not exceed that level.

Locator	<i>E. coli</i> , Coliscan Easygel, cfu/100mL
Boise110	1240

March 18, 2014: Additional site recon was performed, focusing on basin areas not yet visited in this study. Sampling locations Boise116 through Boise126 were established. These points were simultaneously screened by the Hydrolab and samples obtained for Coliscan *E.coli* testing. No exceedances of the project trigger level of 300 cfu/100ml were noted for these locators.

April 28, 2014: Additional site recon was performed, focusing on basin areas not yet visited in this study. Sampling locations Boise127 through Boise140 were established. 15 sampling locations were screened with the Hydrolab and Coliscan *E. coli* culturing. Of these, the following five had *E. coli* levels exceeding the project trigger level of 300 cfu/100ml:

Locator	<i>E. coli</i> , Coliscan Easygel, cfu/100mL
Boise110	440
Boise112	520
Boise132	760
Boise135	400
Boise136	940

June 4, 2014: Additional site reconnaissance was performed with the intent of establishing additional sample locations if any could be found. Reconnaissance was performed over the entire Boise Creek drainage basin, with the goal of screening any established sampling points that exhibited flows. During this day, a suspected (and later confirmed) illicit connection of septic wastewater was found discharging from a private pipe into an MS4 catch basin. A second catch basin to the west, connected to this catch basin, was also affected. These two interconnected catch basins were established as sample locations Boise141 and Boise142. The illicit connection to these basins was initially suspected based on the visual observation of milky grayish water flowing into the manhole at a previously established sample location (Boise115). The water in both Boise 141 and Boise 142 catch basins exhibited very elevated in-situ ammonium ion readings. Coliscan samples were obtained from both catch basins, and the *E. coli* results

obtained after overnight culturing were extremely elevated, indicating possible septage. No lab samples were obtained this day as the field team forgot to bring specific bottles for this.

June to July 2014 work specific to Illicit Discharge (Sample Location “Boise142”): Specific investigatory and confirmatory follow-up work was conducted at Boise141 and Boise142. On June 18, SWSS field staff smelled a strong sewage-like odor when they went onto the private property adjacent to Boise142 to speak with the house occupant to inform them of the County’s strong suspicion of an illicit discharge into the MS4. A water sample was collected only from Boise142 catch basin, as that was the only illicit discharge input observed. This water sample was sent for rapid testing to a private lab in Florida (Source Molecular) for confirmatory human *Bacteroides* and ruminant (cow) *Bacteroidales* testing.

Lab results from Boise142 indicated very high human *Bacteroidetes* ID1, Dorei, which confirmed the sampled water was impacted by human waste. Cow *Bacteroidales* results were null.

Based on the foregoing observations and analyses, the situation at Boise142 was documented as a SWSS Water Quality Complaint. Department of Public Health-Seattle & King County (Health) was contacted and informed of the findings. Health conducted a confirmatory (positive) dye test of the toilet plumbing of the nearby private parcel; dye introduced into the toilet quickly entered the MS4 catch basin at Boise142. Health then issued a notice to the property owner to immediately cease the confirmed illicit discharge, and to repair the septic system. The septic waste discharge was noted to have been immediately stopped; SWSS visited the location the next week, and no active discharge was seen entering Boise142. The property owner complied with Health’s recommendations and took steps to replace the failing septic system, including applying for a repair loan and a repair permit. Health approved the newly installed septic system in September 2014.

June 23, 2014: Follow-up sampling was performed at other established sample locations where there was flow. Many sample locations by this time were dry so no samples could be obtained. However, some samples were obtained for *E. coli* lab analysis (this parameter was selected specifically for this follow-up day’s work because it is cheaper than molecular qPCR, tests results are rapid compared with the molecular qPCR tests as run by KCEL, which currently take a month or more turn-around time, and because it is deemed to correlate slightly more positively with human waste than FC). Samples which exceeded 300 cfu/100 ml are shown in the table below:

Locator	<i>E. coli</i> , lab analysis, cfu/100mL
Boise121	980
Boise134	3700
Boise142	29000

Note: Boise142 water was stagnant in the sump, was not an active discharge into basin. Known illicit discharge was being addressed.

July 15, 2014: Numerous established sample stations throughout the entire Boise Creek MS4 were visited but only five had flow. These five locations were screened (Boise108, 109, 131, 134 and 137). Of these five locations, three were sampled for analyses for FC, human-specific *Bacteroides* and ruminant (included cows) specific *Bacteroidales*. FC was used as a parameter on this day, in contrast to the use of

E. coli as a parameter on June 23, 2014, because staff decided FC data would be more useful from the State's perspective as it uses FC levels in regulating water quality. FC project trigger level exceedances are tabulated below. Sample results for human-specific *Bacteroides* are included as "Hu2Bacteroides" and for ruminant waste as "Rum2Bacteroidales". Based on null values for the two latter parameters, it is difficult to ascertain why there is a high level of FC for "Boise134", which is a 12" corrugated metal pipe capturing surface flows from a private ditch draining through a cow pasture into the MS4 ditch located fairly distant from the mainstem of Boise Creek, to the southeast of the basin. The null value for ruminant waste indicates there was no ruminant (cow) waste impacting this location at time of sampling:

Locator	FC, lab analysis, cfu/100 ml	Hu2Bacteroides, copies/100ml	Rum2Bacteroidales, copies/100ml
Boise108	510	0	0
Boise134	2300	0	0
Boise137	360	0	0

September 24, 2014: The above sample sites (Boise108, 109, 134 and 137) were revisited to follow up on July 2014's high FC results. There was no flow at Boise134 so it could not be sampled. Boise137 had a low level of FC and was null for human and ruminant waste on this day.

However, over on the northwest part of the basin, very close to the Boise Creek mainstem, flows sampled at Boise108 and 109 had high levels of FC and human *Bacteroides*, indicating human waste influence at these locations. Boise108 is a plastic drain pipe discharging from private property into the MS4 ditch on the east side of 248th Way SE, very close to Boise Creek. Water from the ditch flows under 248th Way SE to a manhole (Boise109). Water in the ditch smelled strongly like sewage on this date:

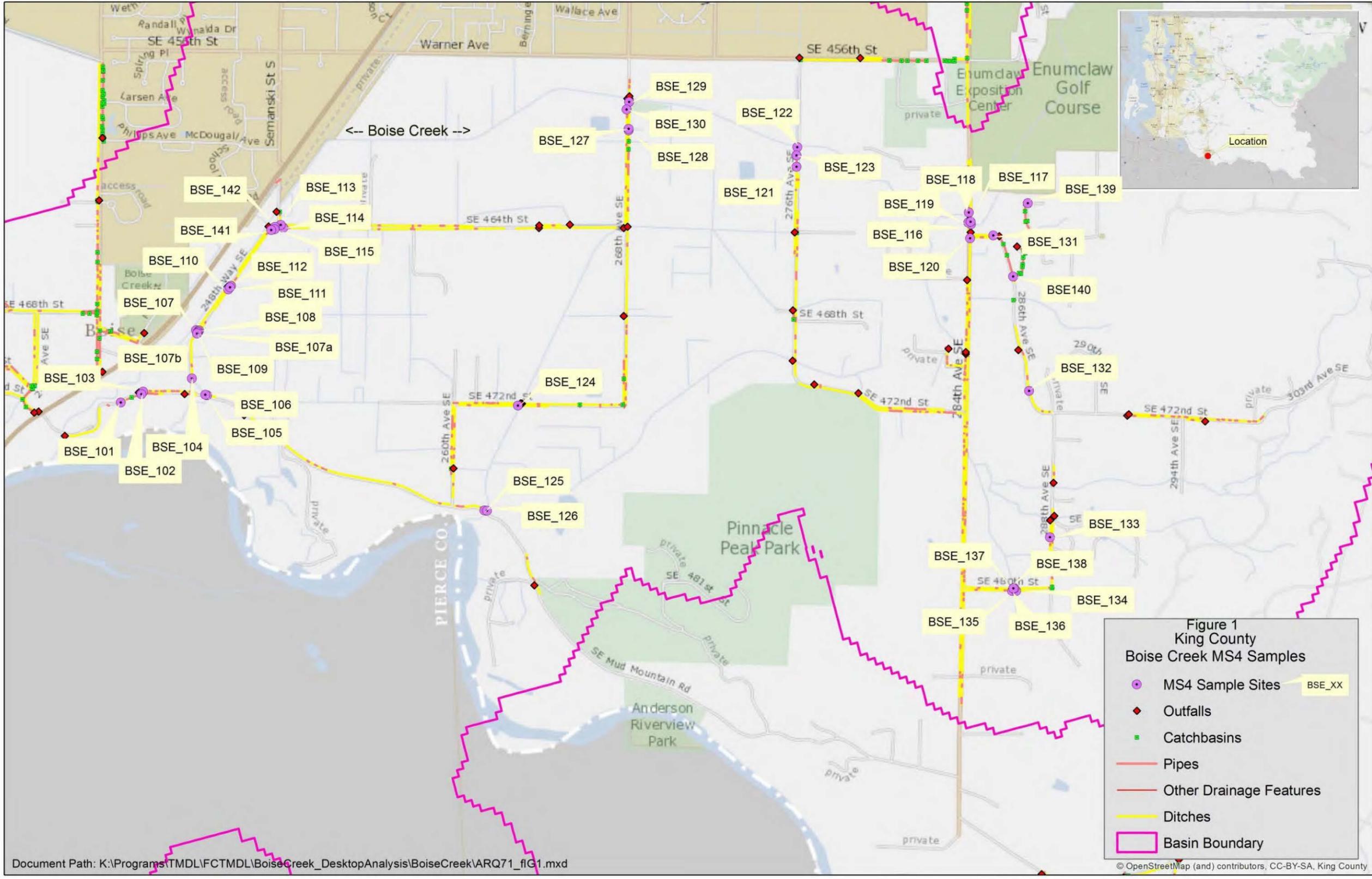
Locator	FC, lab analysis, cfu/100 ml	Hu2Bacteroides, copies/100ml	Rum2Bacteroidales, copies/100ml
Boise108	480	2530	0
Boise109	3000	161,500	0
Boise137	34	0	0

October 22, 2014: Once *Bacteroides* lab results from September sampling were obtained, SWSS was convinced of an active ID at or close to Boise108. Therefore, additional investigatory follow-up sampling was done in the vicinity of Boise108 and Boise109. Boise107, which is south of Boise108 in the same ditch but flowing the opposite direction, was also sampled. For source tracking purposes, another sample location was added on this day in this ditch and called "Boise107a". Additionally, a previously unknown private drainage pipe was found actively discharging flow into the same MS4 ditch and was named "Boise107b". Lab test results strongly confirmed septic waste discharging to the MS4 ditch from the private property located at Boise107b. A high level of ruminant waste also was indicated to be impacting the water in the discharge from Boise107b:

Locator	FC, lab analysis, cfu/100 ml	Hu2Bacteroides, copies/100ml	Rum2Bacteroidales, copies/100ml
Boise107	2300	61,388	0
Boise107a	60,000	8,433,500	0

Boise107b	84000	1,704,100	1,000,800
Boise108	690	237	0

November 6, 2014 work specific to Illicit Discharges (Sample Location “Boise107b”): Due to indications of human waste severely impacting the discharge from Boise107b to the MS4 ditch, SWSS requested Health conduct an investigation of septic system on the parcel at this location. Staff from both SWSS and Health conducted both dye testing and flow observations at two buildings on the private residential parcel, with the property owner’s permission. Two separate illicit discharges were found during this investigation. One ID was found to be connected to the residence’s plumbing (toilet, sink, bathtub) and discharging via the pipe at Boise107b. The second ID was connected to a washing machine located in a separate outbuilding, and discharging to the ditch via a second pipe located close to Boise107b’s pipe. Due to the foregoing findings, Health sent the property owners a notification letter that requires the elimination of the IDs and corrective septic system measures be properly implemented. At time of this writing, SWSS has not heard of any actions taken by the private property owners to correct this situation. SWSS plans to continue monitoring the discharges, both for the known human waste discharges (waste water and wash water) as well as to determine, if possible, the cause of the high ruminant waste levels indicated by the October 2014 test result at Boise107b.



JOVITA CREEK FC TMDL PROGRAM DESCRIPTION & FINDINGS

Preliminary Basin Investigation

In order to plan bacteria source screening in Jovita Creek MS4 basin, SWSS assessed the existing available information pertaining to the topography, streams and wetlands, drainage facilities and stormwater flow patterns in the area. This document summarizes the collected information and project planning. Jovita Creek MS4 basin information sources included King County's Road Map Vault and SWSS drainage facility paper files.

MS4 Basin Overview: The portion of unincorporated King County draining to Jovita Creek (the "project area") measures roughly two square miles, according to maps available from the King County GIS library. It consists of a portion of the plateau separating the Green and White River valleys from the Puget Sound. Jovita Creek, after leaving King County, eventually enters the White River at the City of Sumner, WA.

MS4 Basin Boundaries: The project area is bounded on the south at S 384th St. by the City of Edgewood (Pierce County), on the west by the Hylebos Creek (Puyallup River) basin, on the north by the Mill Creek (Green River) basin, and on the east by the Cities of Pacific and Algona, which occupy the White River valley. At the southeast boundary, a small amount of runoff (~0.04 square miles) from the City of Pacific enters the unincorporated Jovita project area. To the north of this, a small amount of runoff (~0.20 square miles) from the County enters the Cities of Pacific and Algona, running through ditches down steep valley walls and through unnamed creeks before entering the White River. Based on topographic information, SWSS considers that the surface water from the County's MS4 that discharges to the White River valley along the County/Pacific/Algona boundary is not part of the Jovita system and has not been monitored as part of this study.

Land Use: The project area is almost completely residential (zoned R-4; 4 dwelling units per acre). There is one convenience store and two County parks (Five Mile Lake Park and the South County Ballfields). All properties are served by on-site septic systems except for a small portion of the study area along 38th Ave S. (south of S. 380th Street) and the Sequoyah Middle School at 3425 S. 360th St, which are sewered.

Surface Water Drainage: Drainage is generally from north to south. Altogether, mapped lakes and wetlands and the open spaces surrounding them account for around 20% of the study area.

Wetlands and seasonal 'streams' in the upper portion of the study area drain to Five Mile Lake and Spider Lake, which in turn both drain to Trout Lake from the northwest and northeast, respectively. The outlet of Trout Lake (at the southeast corner of the lake) is the beginning of the main stem of Jovita Creek, which occupies a shallow ravine.

The drainage paths between Trout Lake and the two upper lakes are undeveloped wetland/stream corridors. In the summer, there is no outflow from Spider or File Mile Lake, and Jovita Creek (i.e., the outflow from Trout Lake) is reduced to a trickle.

Surface waters leave the study area at three locations, all along the County line at S 384th St: on the west side of 46th Avenue S; at Jovita Creek main stem (located about 400 feet west of 49th Ave S); and at a small unnamed and unmapped tributary to Jovita (located about 400 feet east of 49th Ave S). Only the

main stem of Jovita flows year-round. Its contributing basin comprises over 90% of the study area -- the areas draining to the other locations where water crosses 384th are quite small.

Stormwater drainage is, of course, oriented around the road network in the vicinity. Most roadside drainage is in vegetated ditches. The principal arterial in the study area is Military Road South, which is the oldest road in western Washington and was also a street car route in the early 20th century. It takes the natural route to avoid the wetlands in the area. It has moderately large stormwater collectors (ditches) with outfalls north of 358th, at 364th, and at the outlet to Five Mile Lake. Some of these (not all) appear to be large outfalls relative to others in the basin and should be considered for wet weather screening/sampling.

Besides the drainage along Military Road South, the general pattern of drainage is that ditches on north-south avenues (which tend to be dead-ends extending no more than a block or two) drain to ditches on east-west streets (which tend to extend across the study area). These ditches then intercept natural seasonal drainage at the location of a cross-culvert under the east-west street, which connects two open areas on either side of the road. Thus there are often 4 outfalls at the same location: both sides of road, from east and west. Because of the extent of open space and natural drainage areas in the basin, stormwater often has a short travel distance before it reaches an outfall. Many outfalls have small contributing areas. Outfalls were visited in a short amount of time due to this clustering. A wet season reconnaissance was able to quickly determine most outfalls see very little stormwater and were not so far used in the FC TMDL bacteria source screening work.

Investigation Site Selection

Field staff performed field reconnaissance (recon) in the Jovita MS4 basin to perform the following:

- Confirmed MS4 outfalls to Jovita Creek, previously identified by SWSS.
- Located MS4 outfalls to the creek, not previously identified by SWSS.
- Located other points, including private discharges into the MS4.
- Observed land use practices in the vicinity of the MS4 that could discharge turbid water via sheet flows into the County MS4.

From the above outfalls and points, water quality screening and sampling points were established (named and mapped), with the intent of finding MS4 flows with high bacteria levels.

Field Investigation Tasks and Findings

The following field reconnaissance and bacteria source screening and sampling tasks were performed in unincorporated King County's MS4 discharging to Jovita Creek. Screening by reconnaissance, in-situ screening and sampling began on July 15, 2014 and continued through November 5, 2014. Early samples for lab analysis FC, Hu1Bacteroides, Hu2Bacteroides and Rum2Bacteroidales. Later in the year Hu1Bacteroides was dropped as not being as human waste-specific as Hu2Bacteroides, hence not as good a human waste source indicator as the latter.

All field and lab results for Jovita Creek MS4 bacteria source screening are presented in Table 2, which was submitted as a separate Excel file concurrently with this document. The following narrative organized by calendar day describes field work and findings.

July 15, 2014: Field recon was initiated using known outfalls as the preliminary basis for selecting and establishing bacteria source screening and sampling locations. On this summer day, there was no flow nor was there any standing water in the Jovita MS4. However, some MS4 sampling locations were established despite lack of flow, for possible future use. Basin boundary delineation on the southwest and southeast portions of the basin, and confirming surface water drainage pathways were other field recon goals this day.

Additionally, sample locations Jovita1 and Jovita2 were established in the mainstem of Jovita Creek to provide baseline bacterial information that could help focus MS4 bacteria source screening work, as no Jovita Creek bacteria data was known previously in the Jovita mainstem. Jovita1 is located in Jovita Creek at S. 348th St (King-Pierce County line). Jovita2 is located in Jovita Creek just upstream of S. 376th St, downstream of the Trout Lake outlet.

Creek water at these two mainstem locations was screened using the Hydrolab. Samples were obtained for FC, Hu1Bacteroides, Hu2Bacteroides and Rum2Bacteroidales analyses at the King County Environmental lab. Samples were also sent to Source Molecular private testing lab for human waste marker HumM2 and cow waste markers EPACowM2 and EPA CowM3. KCEL and Source Molecular lab results are shown below:

KCEL lab results, July 15, 2014:

Locator	FC, lab analysis, cfu/100 ml	Hu1Bacteroides, copies/100ml	Hu2Bacteroides, copies/100ml	Rum2Bacteroidales, copies/100ml
Jovita1	2,100	548	0	2,500
Jovita2	72	2,329	0	7,400,100

Source Molecular lab results, July 15, 2014:

Locator	HumM2	EPACowM2	EPACowM3
Jovita1	Trace	0	0
Jovita2	0	0	0

The above lab results for both creek sample locations were interpreted as to not be strongly indicative of nearby human waste discharge. The rationale for this is that the KCEL Hu2Bacteroides test is considered more reliable a human waste source indicator than Hu1Bacteroides; both mainstem locations were null for the more reliable human waste indicator. The Source Molecular HumM2 results of “trace” for Jovita1 and zero for Jovita2 did not indicate direct human waste influence on Jovita Creek on this date. However, the result of “trace” at Jovita1 was interpreted to warrant continued monitoring and investigating for possible human waste sources to the creek upstream of Jovita1.

The highly elevated level of 7 million+ for Rum2Bacteroidales at Jovita 2 (upstream of Jovita 1) was considered possibly related to wild ruminant waste (deer) wandering through, or to goats and/or llamas kept in backyards. Deer, goats and/or llamas are suspected as possible waste sources, as Source Molecular’s results of zero for the CowM2 and CowM3 markers indicate that the Rum2Bacteroidales results at both Jovita1 and Jovita2 are likely not related to cows or beef cattle. The zero CowM2 and M3

results support the observation no cows or beef cattle being kept in the Jovita basin. The presence of domestic goats or llamas possibly discharging fecal waste to the creek has not been confirmed at time of writing and remains a line of investigation to follow in 2015.

August 5, 2014: There still was no flow or standing water in the MS4 on this summer day, so more basin delineation work was conducted, as well as another round of in-situ screening and sampling for lab analyses of the two Jovita Creek mainstem locations (Jovita1 and Jovita2). The lab parameters were again FC, Hu1Bacteroides, Hu2Bacteroides and Rum2Bacteroidales tests at the King County Environmental lab, and human waste marker HumM2 and cow waste markers EPACowM2 and EPACowM3 at the private lab Source Molecular. KCEL and Source Molecular lab results are shown below:

KCEL lab results, August 5, 2014:

Locator	FC, lab analysis, cfu/100 ml	Hu1Bacteroides, copies/100ml	Hu2Bacteroides, copies/100ml	Rum2Bacteroidales, copies/100ml
Jovita1	780	674	0	0
Jovita2	600	0	0	0

Source Molecular lab results, August 5, 2014:

Locator	HumM2	EPACowM2	EPACowM3
Jovita1	172	0	0
Jovita2	0	0	0

There were no to slight signals for human waste at Jovita 1, as indicated by low levels of Hu1Bacteroides and HumM2 found , which continued to suggest further human waste signal source tracking is warranted upstream of Jovita1, as feasible. Jovita2 (upstream of Jovita1) on this day had zero levels of all the human and ruminant waste indicators. On this day there were no ruminant waste signals in either of these creek mainstem samples.

September 24, 2014: More basin delineation was performed, in the northern part of the basin, to ensure all geographic areas contributing to Jovita Creek by the County MS4 were known. Additionally, there was flow in the MS4 as there was active precipitation, so flowing water from Jovita104, 105 and 108 was screened in-situ and sampled for lab analyses. Mainstem Jovita Creek sample locations Jovita1, Jovita2 and Jovita4 were also screened and sampled. Samples were submitted only to King County Environmental Lab, for analyses for FC, Hu2Bacteroides and Rum2Bacteroidales, as this bacterial analytical suite appeared sufficient for potential waste source characterization and cost less than the previous bacterial analytical suites.

Locator	FC, lab analysis, cfu/100 ml	Hu2Bacteroides, copies/100ml	Rum2Bacteroidales, copies/100ml
Jovita1	5,100	0	0
Jovita2	130	2,800	0
Jovita4	800	0	0
Jovita104	2,600	49,000	0

Jovita105	42,000	0	0
Jovita108	52,000	0	0

High to very high levels of FC were seen in most of this day's samples, both in the creek mainstem and in the MS4's flow. This is believed to be mostly attributable to the "first flush" (or a rainy season flush closely following first flush) over the contributing land surfaces, and not necessarily attributable to defined domestic animal or human waste sources. In particular, Jovita108, which is the MS4 outfall into Five Mile Lake from park impervious buildings and surfaces, is believed high in FC partly due to the presence of waterfowl (ducks), which are constantly present near the lake and/or on the lake surface. Jovita105, which was also high in FC, is a ditch discharging to a small south-flowing tributary hundreds of feet east of Jovita1. Jovita105's ditch flows eastward, in the opposite direction from the mainstem. Jovita105 is located near the King-Pierce County line.

Jovita104's result of 49,000 for Hu2Bacteroides indicated possible nearby human waste discharge and therefore warranted further source tracking investigations. Jovita104 sample location is an MS4 outfall which discharges to Jovita Creek immediately downstream of the Jovita1 mainstem sample location, near the King-Pierce County line.

Jovita1 creek mainstem sample location, which on the previous two test days had test results of traces of human waste, showed zero Hu2Bacteroides. Jovita2, conversely, which had zero Hu2Bacteroides test results on the previous two sample days, yielded a test result of 2,800 for this parameter. The bacteria test results over time do not indicate any clear pattern, but did warrant ongoing bacterial level monitoring and source tracking as feasible.

No ruminant waste contamination was indicated, as Rum2Bacteroidales was zero in this day's lab results.

October 22, 2014: September's lab tests were made available in late October. The high Hu2Bacteroides test result in the Jovita104 sample obtained in September indicated that further source tracking for human waste sources was warranted. Therefore, on Oct. 22 additional field reconnaissance, in-situ screening and lab sampling was conducted during an active precipitation event. Four MS4 locations were screened and sampled. This day was the first day Jovita103 was observed to have flow; Jovita103 is a MS4 ditch flowing eastward into the creek at Jovita1's location. Jovita105 was not flowing, so was not screened or sampled. As a source tracking component, Jovita109 was added in the ditch upgradient of and flowing toward Jovita104. One sample was obtained at the Jovita1 creek mainstem location.

Locator	FC, lab analysis, cfu/100 ml	Hu2Bacteroides, copies/100ml	Rum2Bacteroidales, copies/100ml
Jovita1	2,000	0	0
Jovita103	26,000	0	0
Jovita104	3,500	0	0
Jovita108	0	1,348	0
Jovita109	6,700	0	0

Jovita104 now exhibited no evidence of human waste, as indicated by the zero result for Hu2Bacteroides. Jovita108, the MS4 outfall to Five Mile Lake, now exhibited a trace of human waste, shown by the

Hu2Bacteroides result of 1,348 (previous Hu2 result had been zero). Jovita108 tested zero for FC while exhibiting this trace of human waste evidence. The Hu2Bacteroides result at Jovita108 warranted continued investigation for possible human waste sources.

Jovita103, the sample location flowing east into Jovita Creek near Jovita1 sample location, exhibited a very high FC count of 26,000 but no human waste or ruminant waste signal. Jovita103 will continue to be monitored for FC levels.

November 5, 2014: SWSS staff again visited the locations of Jovita1, -103, -104, -105, -108 and -109 for field recon purposes, to ascertain any obvious evidence for human waste discharge into Jovita104's outfall pipe in September. No sources were found by performing site recon by foot on the County roadways and carefully combing ditches for evidence of illicit connections or illicit discharges.

One theory that could explain the high level of Hu2Bacteroides in Jovita104's outfall in September is that the source may have been transient, such as a baby diaper being thrown near or into the MS4 ditch. Another theory is that it could have been caused by a dog, having ingested human waste, re-eliminating it, as the human *Bacteroides* DNA segments could have remained in the dog's digestive system and have been re-deposited in its feces. This is second theory is conceivable, as there are dogs kept on private residential parcels in the areas upgradient of both Jovita104 and Jovita105, and dogs have been observed running free and being walked in the neighborhood. Further investigatory work in 2015 will continue seeking possible human waste illicit connections or discharges in this neighborhood.

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Jovita MS4 Basin

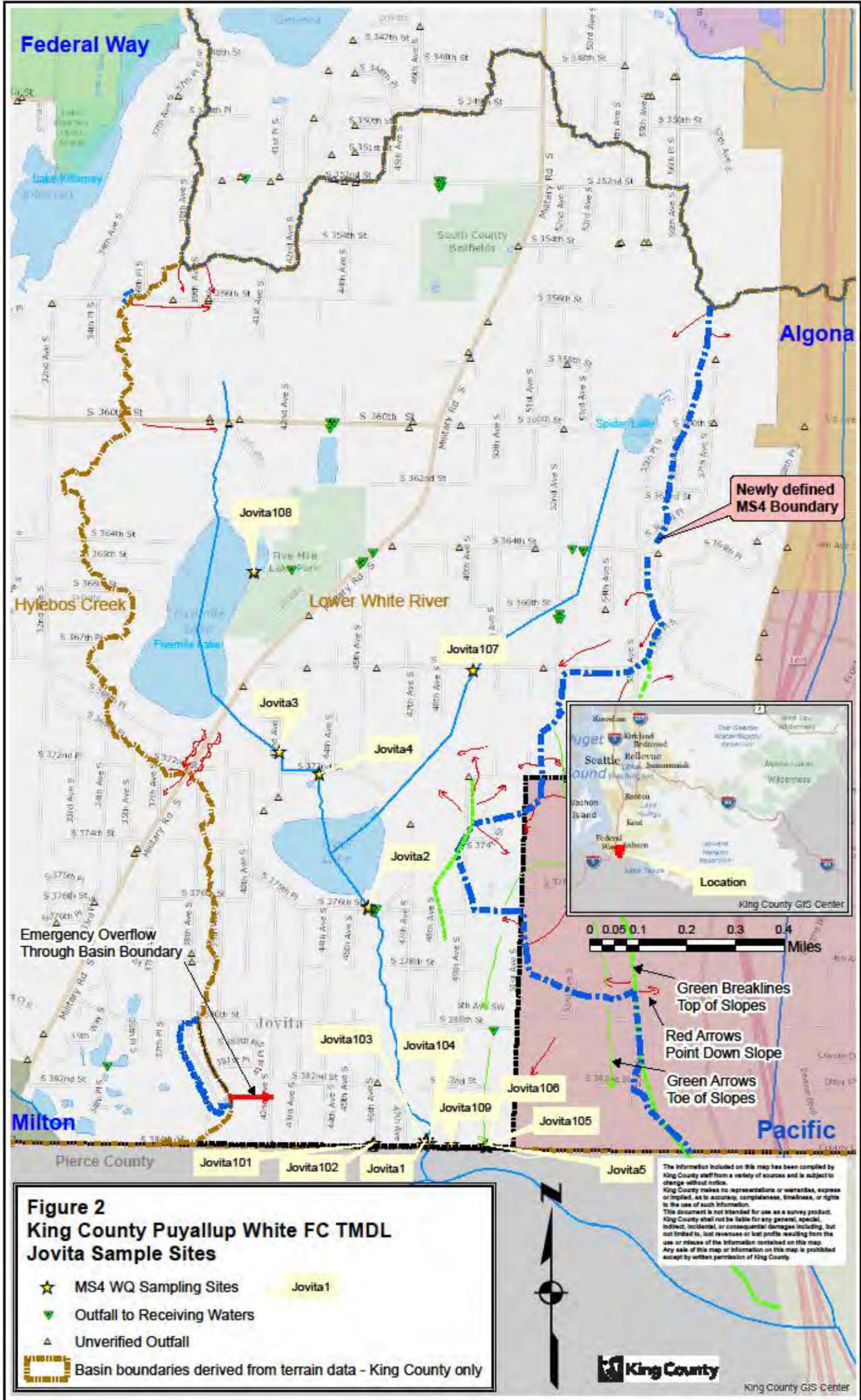
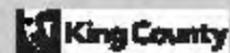


Figure 2
King County Puyallup White FC TMDL
Jovita Sample Sites

- ☆ MS4 WQ Sampling Sites
- ▼ Outfall to Receiving Waters
- ▲ Unverified Outfall
- ▭ Basin boundaries derived from terrain data - King County only



King County GIS Center

Agencies Helping to Identify & Eliminate Confirmed and Suspected Bacterial Sources

King County Water and Land Resources Division, Rural and Regional Services Section (RRSS) and King Conservation District (KCD): These two agencies work with agricultural land owners and managers in voluntary implementation of best management practices (BMPs). These BMPs specifically protect groundwater and surface runoff water quality. RRSS can provide cost-share funding to private property owners for BMPs such as adding buffer fencing near ditches and building structures to prevent manure runoff from leaving the property.

In the first few days of bacteria source screening in the Boise Creek basin, three areas on three separate private properties were observed to have bare muddy soil near the MS4 and or farm animals grazing in or near MS4 ditches. While no active surface water runoff was observed discharging from these areas, SWSS staff believed there was the potential for bacteria or suspended sediment discharges to occur from the muddy areas, as well as for the grazing animals (cows or chickens) to defecate directly into the County ditches. These three areas were reported to RRSS and KCD in the hope that either or both agencies will contact and work with the private property owners on a voluntary basis. The hope is that the muddy areas will be stabilized, and that the any domestic animals grazing in or near the County ditches will be prevented from doing so. At time of writing follow-up work done by either agency is unknown.

Public Health Seattle-King County (Health): Health staff work with private property owners to identify plumbing systems that discharge directly offsite as illicit discharges from septic systems. These illicit discharges include direct pipe connections to the MS4, failing drainfields, etc. When illicit septage discharges are identified, Health takes measures to eliminate sources, including providing letters of notice to owners that require them to immediately eliminate illicit discharges, and to fix failing drainfields or other septic system components so that the septic system will properly function with no illicit discharge occurring.

Washington State Department of Agriculture: This agency licenses commercial dairy operations. The staff has authority to perform site inspections of commercial dairies, and to require that necessary BMPs to protect surface water and groundwater be implemented by the dairy owners.

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

TABLE 1 Boise Creek FC TMDL MS4 Analytical and In-situ Field Screening Results, King County Stormwater Services January 2015

BSE_Locator	LocationDescription	Comments	ColiscanEasy gel_value	EcolilabValu e	FCLabValue	Units	Hu1Bacteroides units	Hu2Bacteroid es	Units	Rum2Bacteroid ales	Units	EPACowM2	EPACowM3	Units	SampDate	SampTime	Temperatur e	units	SpecCond units	pH	NH4+ units	NO3- units	Locator				
BSE_101	24431 SE Mud Mountain Road; ditch on south side of road.	Water infiltrating into ditch bottom. Note: Large road culvert under SE Mud Mt Rd is plugged entirely by soil.	140	ns	ns		ns	ns		ns		ns	ns		3/12/2014	1040	8.23	degreeC	142.0	µS/cm	6.89	0.6	mg/L	2.50	mg/L	BSE_101	
BSE_102	24606 SE Mud Mountain Road; ditch on north side of road.	Water flowing into driveway culvert from ditch.	0	ns	ns		ns	ns		ns		ns	ns		3/12/2014	1031	8.72	degreeC	76.2	µS/cm	6.91	0.36	mg/L	1.24	mg/L	BSE_102	
BSE_103	24531 SE Mud Mountain Road; ditch on south side of road.	Water flowing into driveway culvert from ditch.	0	ns	ns		ns	ns		ns		ns	ns		3/12/2014	1032	7.56	degreeC	116.0	µS/cm	6.83	0.51	mg/L	3.06	mg/L	BSE_103	
BSE_104	47010 248th Ave SE	Water flowing out of MS4 ditch into private ditch.	0	ns	ns		ns	ns		ns		ns	ns		3/12/2014	1055	7.19	degreeC	39.7	µS/cm	6.57	0.2	mg/L	0.22	mg/L	BSE_104	
BSE_105	24801 SE Mud Mountain Road, ditch on north side of road.	Water flowing into MS4 road culvert.	0	ns	ns		ns	ns		ns		ns	ns		3/12/2014	1100	8.41	degreeC	103.5	µS/cm	6.11	1.35	mg/L	1.63	mg/L	BSE_105	
BSE_106	24801 SE Mud Mountain Road, ditch on north side of road.	Water flowing from private ditch into MS4 road culvert.	0	ns	ns		ns	ns		ns		ns	ns		3/12/2014	1105	8.71	degreeC	50.6	µS/cm	6.70	0.29	mg/L	0.90	mg/L	BSE_106	
BSE_107	46732 248TH Way SE; ditch on east side of road.	Ditch upstream of #108 private tile discharge.	120	ns	ns		ns	ns		ns		ns	ns		3/12/2014	1130	8.86	degreeC	112.5	µS/cm	6.64	1.13	mg/L	2.21	mg/L	BSE_107	
BSE_107	46732 248TH Way SE; ditch on east side of road.	Ditch upstream of #108 private tile discharge.	ns	ns	2300	cfu/100 ml	ns	61388	copies/100 ml	0		ns	ns		10/22/2014	1510										BSE_107	
BSE_107a	46732 248th Way SE; ditch on east side of road.	Ditch downstream of #108 private tile discharge about 30 feet.	ns	ns	60000	cfu/100 ml	ns	8433500	copies/100 ml	0	copies/100 ml	ns	ns		10/22/2014	1515											BSE_107a
BSE_107b	46732 248th Way SE; ditch on east side of road.	Plastic pipe ("tile") draining from 46830 248th Way SE.	ns	ns	84000	cfu/100 ml	ns	1704100	copies/100 ml	1000800	copies/100 ml	ns	ns		10/22/2014	1530											BSE_107b
BSE_108	46732 248TH Way SE; ditch on east side of road.	Plastic pipe ("tile") draining from 46732 248th Way SE.	20	ns	ns		ns	ns		ns		ns	ns		3/12/2014	1131	10.16	degreeC	215.4	µS/cm	6.66	1.07	mg/L	1.90	mg/L	BSE_108	
BSE_108	46732 248th Way SE; ditch on east side of road.	Plastic pipe ("tile") draining from 46732 248th Way SE.	540	ns	ns		ns	ns		ns		ns	ns		6/4/2014	1425	19.93	degreeC	417.2	µS/cm	7.90	0.82	mg/L	0.63	mg/L	BSE_108	
BSE_108	46732 248th Way SE; ditch on east side of road.	Plastic pipe ("tile") draining from 46732 248th Way SE.	ns	ns	510	cfu/100m	66	cell/100 ml	0	copies/100 ml	0	copies/100 ml	null	0	cells/100 ml	7/15/2014	850	21.79	degreeC	583.7	µS/cm	7.62	0.37	mg/L	0.19	mg/L	BSE_108
BSE_108	46732 248th Way SE; ditch on east side of road.	Plastic pipe ("tile") draining from 46732 248th Way SE.	ns	ns	480	cfu/100mL	ns	2530	copies/100 ml	0	copies/100 ml	ns	ns		9/24/2014	1545	18.75	degreeC	567.4	µS/cm	7.17	0.38	mg/L	0.38	mg/L	BSE_108	
BSE_108	46732 248th Way SE; ditch on east side of road.	Plastic pipe ("tile") draining from 46732 248th Way SE.	ns	ns	690	cfu/100mL	ns	237	copies/100 ml	0	copies/100 ml	ns	ns		10/22/2014	1508										BSE_108	
BSE_109	Across road from 46732 248TH Way SE; west side of road.	Round manhole. 12inch CP from N; 12inch CP from S; 24inch CMP from under road; discharges to BSE_ Creek via 10' drop	20	ns	ns		ns	ns		ns		ns	ns		3/12/2014	1140	8.04	degreeC	82.3	µS/cm	6.33	0.55	mg/L	1.32	mg/L	BSE_109	
BSE_109	Across road from 46732 248TH Way SE; west side of road.	Round manhole. 12inch CP from N; 12inch CP from S; 24inch CMP from under road; discharges to BSE_ Creek via 10' drop	460	ns	ns		ns	ns		ns		ns	ns		6/4/2014	1432	19.96	degreeC	407.7	µS/cm	7.79	0.8	mg/L	0.82	mg/L	BSE_109	
BSE_109	Across road from 46732 248TH Way SE; west side of road.	Round manhole. 12inch CP from N; 12inch CP from S; 24inch CMP from under road; discharges to BSE_ Creek via 10' drop	ns	ns	ns		ns	ns		ns		ns	ns		7/15/2014	859	21.71	degreeC	588.0	µS/cm	7.83	0.33	mg/L	0.32	mg/L	BSE_109	
BSE_109	Across road from 46732 248TH Way SE; west side of road.	Round manhole. 12inch CP from N; 12inch CP from S; 24inch CMP from under road; discharges to BSE_ Creek via 10' drop	ns	ns	3000	cfu/100 ml	ns	161,500	copies/100 ml	null	copies/100 ml	ns	ns		9/24/2014	1600	17.21	degreeC	367.4	µS/cm	7.32	0.56	mg/L	0.85	mg/L	BSE_109	
BSE_110	25131 SE 464th St (drive to 46618 248th Way SE)	MS4 ditch flows south into 48inch concrete culvert inlet to #112. East side of 248th Way SE.	1240	ns	ns		ns	ns		ns		ns	ns		3/12/2014	1219	10.25	degreeC	135.8	µS/cm	6.61	3.11	mg/L	1.06	mg/L	BSE_110	
BSE_110	25131 SE 464th St (drive to 46618 248th Way SE)	MS4 ditch flows south into 48inch concrete culvert inlet to #112. East side of 248th Way SE.	440	ns	ns		ns	ns		ns		ns	ns		4/28/2014	847	8.66	degreeC	129.8	µS/cm	6.90	0.90	mg/L	1.42	mg/L	BSE_110	
BSE_111	25131 SE 464th St (drive to 46618 248th Way SE)	MS4 ditch flows north into 48inch concrete culvert inlet to #112. East side of 248th Way SE.	20	ns	ns		ns	ns		ns		ns	ns		3/12/2014	1220	10.95	degreeC	55.7	µS/cm	7.06	0.81	mg/L	0.90	mg/L	BSE_111	
BSE_111	25131 SE 464th St (drive to 46618 248th Way SE)	MS4 ditch flows north into 48inch concrete culvert inlet to #112. East side of 248th Way SE.	40	ns	ns		ns	ns		ns		ns	ns		4/28/2014	849	9.53	degreeC	78.2	µS/cm	6.92	0.27	mg/L	0.73	mg/L	BSE_111	
BSE_112	25131 SE 464th St (drive to 46618 248th Way SE)	48inch CP culvert inlet to #112 outfall. East side of 248th Way SE.	120	ns	ns		ns	ns		ns		ns	ns		3/12/2014	1218	9.34	degreeC	92.0	µS/cm	6.28	1.01	mg/L	2.32	mg/L	BSE_112	
BSE_112	25131 SE 464th St (drive to 46618 248th Way SE)	48inch CP culvert inlet to #112 outfall. East side of 248th Way SE.	520	ns	ns		ns	ns		ns		ns	ns		4/28/2014	846	8.28	degreeC	88.3	µS/cm	6.74	0.4	mg/L	1.28	mg/L	BSE_112	
BSE_112	25131 SE 464th St (drive to 46618 248th Way SE)	48inch CP culvert inlet to #112 outfall. East side of 248th Way SE.	ns	76	ns		ns	ns		ns		ns	ns		6/23/2014	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	BSE_112
BSE_113	25131 SE 464th St	Ditch discharges into road culvert that crosses SE 464th St northward.	60	ns	ns		ns	ns		ns		ns	ns		3/12/2014	1320	12.16	degreeC	136.5	µS/cm	7.22	3.34	mg/L	1.20	mg/L	BSE_113	
BSE_114	North across road from 25131 SE 464th St	Ditch discharges into road culvert that crosses 252nd Ave SE westward.	0	ns	ns		ns	ns		ns		ns	ns		3/12/2014	1321	8.98	degreeC	127.5	µS/cm	7.29	1.14	mg/L	3.21	mg/L	BSE_114	
BSE_115	46331 252nd Ave SE	NW corner of intersection.	0	ns	ns		ns	ns		ns		ns	ns		3/12/2014	1325	9.03	degreeC	127.3	µS/cm	6.96	1.45	mg/L	3.76	mg/L	BSE_115	
BSE_116	284th Ave SE and BSE_ Creek Bridge.	SW outfall at bridge over creek. 12" CMP.	0	ns	ns		ns	ns		ns		ns	ns		3/18/2014	1030	7.44	degreeC	48.6	µS/cm	6.01	1.15	mg/L	0.22	mg/L	BSE_116	
BSE_117	284th Ave SE and BSE_ Creek Bridge.	40 ft north of BSE_ Creek in ditch on east side of 284th Ave SE	0	ns	ns		ns	ns		ns		ns	ns		3/18/2014	1005	8.58	degreeC	43.0	µS/cm	5.48	6.11	mg/L	0.18	mg/L	BSE_117	
BSE_118	46225 284TH Ave SE	125 ft north of BSE_ Creek in ditch on west side of 285th Ave SE	0	ns	ns		ns	ns		ns		ns	ns		3/18/2014	1010	7.37	degreeC	81.6	µS/cm	5.57	4.12	mg/L	0.27	mg/L	BSE_118	
BSE_119	46306 284th Ave SE driveway	10 ft south of driveway in ditch, strong flow	100	ns	ns		ns	ns		ns		ns	ns		3/18/2014	1025	6.71	degreeC	56.9	µS/cm	5.45	1.53	mg/L	1.17	mg/L	BSE_119	

Field Screening Results, King County Stormwater Services January 2015

Locator	Coliscan Easygel value	EcoliLab Value	FCLabValue	Units	Hu1Bacteroides	units	Hu2Bacteroides	Units	Rum2Bacteroidales	Units	HumM2	units	EPACowM 2	EPACowM 3	Units	SampDate	SampTime	Temperature	units	SpecCond	units	pH	NH4+	units	NO3-	units	Locator
Jovita1	ns	ns	2000	cfu/100mL	ns		0	copies/100 ml	0	copies/100 ml	ns		ns	ns		10/22/2014	11:55	13.78	degreeC	125.5	µS/cm	7.29	0.09	mg/L	0.95	mg/L	Jovita1
Jovita1	ns	ns	5100	cfu/100mL	ns		0	copies/100 ml	0	copies/100 ml	ns		ns	ns		9/24/2014	13:48	14.85	degreeC	159.0	µS/cm	7.49	0.07	mg/L	1.56	mg/L	Jovita1
Jovita1	ns	ns	780	cfu/100mL	674	cell/100ml	0	copies/100 ml	0	copies/100 ml	172	copies/100 ml	0	0	copies/100 ml	8/5/2014	10:55	16.31	degreeC	235.1	µS/cm	7.71	0.11	mg/L	2.19	mg/L	Jovita1
Jovita1	ns	ns	2100	cfu/100mL	548	cell/100ml	0	copies/100 ml	2500	copies/100 ml	trace	copies/100 ml	0	0	copies/100 ml	7/15/2014	12:59	16.49	degreeC	226.2	µS/cm	7.65	0.1	mg/L	3.10	mg/L	Jovita1
Jovita103	ns	ns	26000	cfu/100mL	ns		0	copies/100 ml	0	copies/100 ml	ns		ns	ns		10/22/2014	11:57	14.14	degreeC	46.9	µS/cm	7.43	0.07	mg/L	0.83	mg/L	Jovita103
Jovita104	ns	ns	3500	cfu/100mL	ns		0	copies/100 ml	0	copies/100 ml	ns		ns	ns		10/22/2014	11:52	14.27	degreeC	65.3	µS/cm	7.19	0.15	mg/L	1.34	mg/L	Jovita104
Jovita104	ns	ns	2600	cfu/100mL	ns		49,000	copies/100 ml	0	copies/100 ml	ns		ns	ns		9/24/2014	13:35	17.08	degreeC	128.0	µS/cm	7.35	0.09	mg/L	2.00	mg/L	Jovita104
Jovita105	ns	ns	42000	cfu/100mL	ns		0	copies/100 ml	0	copies/100 ml	ns		ns	ns		9/24/2014	13:05	16.9	degreeC	71.3	µS/cm	6.99	0.08	mg/L	0.86	mg/L	Jovita105
Jovita108	ns	ns	0	cfu/100mL	ns		1348	copies/100 ml	0	copies/100 ml	ns		ns	ns		10/22/2014	11:10	13.48	degreeC	19.5	µS/cm	7.89	0.09	mg/L	0.16	mg/L	Jovita108
Jovita108	ns	ns	52000	cfu/100mL	ns		0	copies/100 ml	0	copies/100 ml	ns		ns	ns		9/24/2014	11:15	16.92	degreeC	32.8	µS/cm	7.45	0.15	mg/L	0.14	mg/L	Jovita108
Jovita109	ns	ns	6700	cfu/100mL	ns		0	copies/100 ml	0	copies/100 ml	ns		ns	ns		10/22/2014	12:30	14.31	degreeC	66.0	µS/cm	6.85	0.13	mg/L	2.14	mg/L	Jovita109
Jovita2	ns	ns	130	cfu/100mL	ns		2800	copies/100 ml	0	copies/100 ml	ns		ns	ns		9/24/2014	13:55	19.23	degreeC	109.7	µS/cm	7.62	0.04	mg/L	0.43	mg/L	Jovita2
Jovita2	ns	ns	600	cfu/100mL	0	cell/100ml	0	copies/100 ml	0		0	copies/100 ml	0	0	copies/100 ml	8/5/2014	12:59	19.81	degreeC	115.6	µS/cm	7.62	0.12	mg/L	0.21	mg/L	Jovita2
Jovita2	ns	ns	72	cfu/100mL	2329	cell/100ml	0	copies/100 ml	7,400,100	copies/100 ml	0	copies/100 ml	0	0	copies/100 ml	7/15/2014	13:20	23.25	degreeC	107.3	µS/cm	7.97	0.06	mg/L	0.61	mg/L	Jovita2
Jovita4	ns	ns	800	cfu/100mL		cell/100ml	0	copies/100 ml	0	copies/100 ml	ns		ns	ns		9/24/2014	12:15	16.77	degreeC	79.9	µS/cm	6.73	0.07	mg/L	0.43	mg/L	Jovita4